Appraisal of Investments in Health Infrastructure

Proceedings of the European Investment Bank (EIB) and World Health Organisation (WHO) Conference on the Appraisal of Investments in Health

Luxembourg 17-18 June, 1999

Edited by M. García–Barbero

Text editing: Silvia Grassi
ISBN: 84-607-0799-7

Published by.
World Health Organization
European Office for Integrated Health Care Services
Marc Aureli 22-36
0006-Barcelona, Spain

Printed by.
Repro Disseny
Juan de Mena, 19
08035 Barcelona, Spain
Dep.Legal:

Appraisal of Investments in Health Infrastructure

Appraisal of Investments in Health Infrastructure

Proceedings of the European Investment Bank (EIB) and World Health Organisation (WHO) Conference on the Appraisal of Investments in Health[1]. The Conference was held at the Bank's premises in Luxembourg on 17 - 18 June 1999.

Abstract

This book presents the papers and conclusions of a workshop, which brought together a number of experts to debate systematically the analytical issues associated with the selection and appraisal of health sector capital investment projects. The workshop took place in Luxembourg at the European Investment Bank premises. The workshop was part of a broader collaboration between the EIB and WHO European Region. The difficulties in appraising investment in healthcare were present throughout the meeting. It was clear that public institutions which hold a responsibility in their investment decisions, which is wider than the simple financial, must adopt a decision making process which enables them to both identify and reject investments which represent a poor use of scarce resources.

Key words

Appraisal investments
Capital Investments (health care)
Evaluation investments (health care)
Health care trends
Health care investments
Health economics
Health outcomes
Health services trends
Hospitals-trends

[1] EIB and WHO are pleased to acknowledge the valuable role played by the European Healthcare Management Association in the conception, design and delivery of the Conference.

European Investment Bank

World Health Organization
Regional Office for Europe
Copenhagen

Appraisal of Investments in Health Infrastructure

Edited by:
Dr. Milagros Garcia-Barbero
Head of the WHO European Office
For Integrated Health Care Services
Barcelona, Spain

INDEX

Preface

This volume is the result of a European Investment Bank (EIB) and World Health Organisation (WHO) Conference held at the Bank's premises in Luxembourg in 17 and 18 June, 1999.

The purpose of the meeting

The conference was conceived in recognition of the fact that the 'problem' faced by the Bank is, to a large degree, shared by a number of public agencies, and increasingly, private organisations[2]. The intention was to bring together a group of expert speakers and selected invitees, principally but not exclusively from Europe, to debate systematically the analytical issues associated with the selection and appraisal of health sector capital investment projects. In particular, the Conference was structured around four key themes:

- the *strategic context for appraisal* which focused on the evolution of healthcare systems, their changing role in the provision of services and their capacity to address health problems and healthcare needs;
- the appropriateness and availability of *data for appraisal* and, in particular, the extent to which the available data facilitates the measurement of output and outcome from systems and facilities;
- the *methodological issues* in appraisal, in particular the role of economic and other techniques in appraising capital healthcare investment projects and programmes; and
- the *impact of the design of infrastructure* on the current and future performance of healthcare facilities.

The volume is in two main parts. The first, written by EIB and WHO staff, sets the scene for the Conference and endeavours to synthesise the lessons learned from it; the second part includes revised versions of the papers given at the Conference. The papers are introduced in the same order as they were presented.

The papers are the sole responsibility of their authors. They are presented for discussion and do not necessarily reflect the views of the Bank or WHO. The editor has restyled the text only to harmonize the different presentations. The content has remained as presented by the authors. For that reason, a certain amount of overlap between and among papers is inevitable.

The European Investment Bank and the World Health Organisation would like to take this opportunity to place on record their appreciation to speakers and other participants in the Conference. A full list of speakers is included in this volume.

[2] The development of Public Private Partnerships as an apparently increasingly attractive means of financing and operating healthcare facilities has encouraged private investors to take greater interest in the underlying healthcare needs of projects as a component of assessing the risks to the income streams to projects. The attendance at the Conference of a number of private sector provides strong evidence of this.

Foreword

The Problem of Appraising Health Projects

The use of investment appraisal techniques is widely practised in both the public and private sectors to inform decision-making. Within the private sector, the purpose of this analysis is usually financial -to assess the expected profitability of a given investment. In its broadest sense, profitability relates to the difference between the value of inputs and the value of outputs produced by an enterprise. The value of inputs includes all factors of production including capital; the values of each of these are typically assessed from market prices. The value of outputs, in similar vein, is the *marketed* value of outputs. This principally relates to sales revenues received although, for example, the movements in the values of stocks and work-in-progress will be taken into a profitability calculation.

The investment appraisal calculation itself is known as a *discounted cash flow analysis* (DCF). This compares the discounted value of the total investment cost (capital and revenue) with the discounted value of the stream of revenues from the investment. This technique can be used to calculate either or both of the *net present value* of the investment (the excess of the value of discounted revenues over discounted costs) or the *internal rate of return* (the discount rate which leaves the net present value of the investment equal to zero). Either of these measures offer a clear decision indicator to the appraiser; if the net present value of the project is positive at the appraisers 'test' discount rate, the project is worthwhile. Putting this in another way, if the internal rate of return exceeds the 'test' discount rate, the project is, *prima facie*, worthwhile.

In the public sector appraisal typically focuses on the *economic* (rather than the more narrow *financial*) return to projects. This distinction is predicated on the idea that activities are brought into the public sector precisely because, in some sense, private markets would fail to allocate them optimally. This may be because some, or in the limit all, of the benefits of consuming the good or service are not limited to those who pay or for a range of other reasons. The net result is that market prices, even if they exist, are not the right measure of value in projects of this kind. The approach in which all the costs and benefits of a project are appraised, irrespective of whether they are matched by financial flows and who is the beneficiary is known as *cost-benefit analysis*.

It is possible to distinguish two types of circumstance in public sector projects. The first is the situation in which, although outputs are traded, there are reasons to believe that market prices do not reflect opportunity costs. Taxes, for example, can create a 'wedge' between prices and opportunity costs[3]. This is also the case when 'externalities' or some other form of market failure mean that market determined prices do not capture the wider social costs and benefits of the behaviour of economic actors. In these circumstances, it is possible to substitute 'shadow prices' within the DCF, using these to adjust the financial return from the project to derive its economic rate of return.

The second circumstance concerns the outputs from projects that are not traded at all. By definition, prices do not reflect value in this case – there are no prices. The rates of return to projects of these kinds need, therefore, to be calculated on the basis of imputed estimates of costs and benefits.

Economists have shown enormous ingenuity in deriving money estimates of the value of non-priced costs and benefits in a whole range of public projects. The healthcare sector, however,

[3] Although, of course, taxes on goods which exhibit external effects, such as fossil fuels, tobacco and alcohol, are used in part to bring market prices into line with social opportunity costs

stands out as an exception. For a number of reasons, many of which are amplified in the various contributions to this volume, the outputs of healthcare systems are hard to define, harder still to measure and, effectively, impossible to value!

But this cannot be the end of the story. A conclusion that 'it's difficult' is, of course, of absolutely no value to managers faced day to day with practical resource allocation decisions in health. The difficulties faced in appraisal have not stopped large amounts of capital being committed to a wide range of standalone healthcare projects, or indeed region wide programmes of investment.

The practical appraisal problem faced by managers is made more serious still by the fact that capital investment projects in health in general, and in hospitals in particular, bring with them an 'aftershock' of recurring expenditures (on clinical, support and ancillary staff, consumables, drugs and so on) which typically has a present value many times greater than the capital cost of the project. In this sense, the commitment to a capital project represents a commitment of resources long into the future. These resources, not only the capital, have an opportunity cost which needs to be carefully weighed in advance of an investment decision.

To some extent the development of investment in healthcare in Europe over the last 30-40 yeas is illustrative of the uncertainty related to the "right" level of capital expenditure. In the sixties, when total health expenditure in the EU represented approximately 4% of GDP, capital expenditure amounted to 6%, of this. As is well known, total health expenditure has seen a steady growth since then, at present constituting an average of well over eight per cent of (a significantly larger) aggregate national income. In the meantime, however, the share of this spent on capital investment has decreased to slightly more than 3%.

While a genuine shift in the cost of, for instance, healthcare staff relative to hospital construction may have occurred between 1960 and today this fails to account fully for a swing of this magnitude. Rather, the earlier political appeal of building healthcare infrastructure has not held up in the context of the fiscal realities of the nineties, and the rate of growth has been smaller than in previous decades[4]. So, as recurrent expenditure typically includes a staff cost component of 65-75% and therefore in reality cannot be reduced without employment consequences, investments' overall share in expenditure have been squeezed to very low, and in some instances unsustainable, levels, as is testified by the deterioration of the health state in some countries. Variations on the theme exist. While Italy has a reported 120 socalled "ghost hospitals", i.e. built but never fully completed and therefore not staffed, Italian medical unemployment is also the highest in Europe. The more than twenty per cent of Italian doctors without work are therefore not burdening recurrent health expenditure.

The European Investment Bank – a case in point

The experience of the European Investment Bank (EIB) provides a clear example of the dilemma facing decision makers (the need for robust appraisal but the apparent absence of suitable tools for this appraisal).

The EIB was created by the Treaty of Rome in 1958 as the financing institution of the European Union with the mission to promote the balanced economic development of the Community by

[4] In the 60s and 70s, EU Member States recorded *real* average annual health expenditure growth rates of 12 and 7%, respectively, while in the 80s and 90s the rates were 2% and less than 1% respectively.

making long-term and highly cost effective finance available for sound investment projects[5]. As a public institution, the Bank has a duty to ensure that its projects are not only financially sound but also economically productive and help to promote European Union policy objectives. This distinction between financial and economic objectives characterises much of the Bank's work in the identification and appraisal of projects. To a commercial bank the primary concern in appraisal is whether there is an income stream or recourse to a credit worthy entity to meet the financing requirements. To EIB, this is a necessary condition, but not sufficient. It is for this reason that the Bank commits a considerable effort to non-credit project appraisal.

The Bank's Board of Governors agreed in June 1997 to an extension of the Bank's mandate to cover lending for investment in the delivery of healthcare. To date, the Bank has approved over EUR 2 billion in loans in the sector. These loans, some relating to projects and others to programmes of investment, are summarised in Table 1. Other projects have been approved, but for one reason or another, not financed.

Table 1: Committed loans in the health sector

Country	*Project*	**EIB commitment (M EURO)**
Spain	Tertiary hospital	46
Spain	District hospitals plus infrastructure	160
Germany	East German *Land* hospital programme	679
Germany	East German *Land* hospital programme	500
Greece	Health sector programme	70
Germany	East German *Land* hospital programme	140
Italy	Teaching hospital	52
Germany	East German *Land* hospital programme	500
		2147

The Bank is currently appraising projects in the UK, Sweden, Austria, the Netherlands and Germany.

A word on the EIB's role in relation to EU's mandate in health: while the Treaty states that Community action 'shall fully respect the responsibilities of the Member States for the organisation and delivery of health services and medical care' it enhances the role of the Community in the area of *public health.* As is evident from the above list, lending has been almost exclusively to the hospital sector, for understandable reasons. However, it is equally clear that the Bank's mandate includes public health programmes, services and activities, and that applications for funding to operationalise Community public health policy in the areas identified[6], i.e. improving information for the development of public health, reacting rapidly to threats to health, and health promotion/disease prevention would be welcomed by the Bank.

Following the Cologne summit in June 1999, the Bank's mandate in health (and education) has been extended to include the countries in Eastern and Central Europe that have been accepted as

[5] In 1998, the Bank made long-term loans amounting to nearly EUR 30 billion, 90% within the European Union, with the rest going to prepare Eastern European countries for possible Union membership or to support the development needs of over 100 other countries outside Europe.

[6] Communication from the Commission on the development of a public health policy in the European Community. Brussels, 15.04.1998. COM(1998) 230 final.

official applicants for membership of the EU[7]. This means that, within certain limits and subject to the conditions applying to other loans, the EIB can assist the countries in preparing for membership by making a contribution towards addressing 'one of the biggest problems facing Central and East European Countries - the need to restructure the massive hospital sector'[8].

Each loan approved by the Bank goes through a rigorous approvals process to ensure that the borrower is a credit worthy entity, the terms of EIB involvement are reasonable and that the application of the funds is consistent with the requirements of the Bank's statutes. However, whilst the financial and economic appraisal of private sector projects and public projects in areas such as roads, rail, water and power were familiar to the Bank, health project appraisal represented a new departure. Furthermore, for the reasons alluded to above, it was unclear quite how the Bank's conventional appraisal tools should be modified to deal with the complexities of the health market.

In principle, the Bank is clear that it should reject projects if they do not offer a cost-effective return in terms of 'health gain'. The Bank's problem relates to the difficulty of applying this test. In practice, the Bank has to be pragmatic in the definition of health gain. So, for example, a hospital reconfiguration designed to eliminate spare capacity in acute beds can release resources for re-investment in other valuable healthcare services elsewhere. This would typically be deemed to pass the health gain test, usually without further investigation of whether released resources are, indeed, transferred to higher yielding uses. In contrast, a project which duplicates services, adding to capacity without good cause, should not pass the test[9].

In practice, the ability of the Bank to apply a 'health gain' test is further complicated by the nature of projects which are brought to it in the health sector. Many investments appraised by the Bank are not individual projects at all. Rather they are multi-facility capital programmes consisting of a myriad of different expenditures – essentially a time slice of an authority's spending. It is not at all obvious how to associate benefits to what is essentially an arbitrarily defined component of such a programme, or indeed to the programme in totality.

René Christensen and Nick Jennett
European Investment Bank

[7] In addition to the CEE countries of Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, the extended mandate includes Cyprus and Malta, both official EU applicants.
[8] Quoted from EIU Healthcare Europe 1st quarter 1999. The Economist Intelligence Unit Ltd. 1999
[9] In practice, this factor almost exclusively lies behind any decision of the Bank not to proceed with an investment.

Synopsis of the proceedings

The strategic context

The environment within which healthcare investment decisions are taken is subject to continual change. Healthcare systems are characterised by change in relation to:

- patterns of mortality and morbidity;
- the demographic characteristics of populations;
- medical technology and knowledge about efficiency and effectiveness of medical care;
- the manner in which healthcare systems themselves are financed and organised.

Taking a Europe wide perspective, there are areas of similarity in the experience of countries, but also important examples of diversity. All countries face the 'greying' of their populations. Although the impact of this on healthcare expenditure is controversial, the pressure it places on social care expenditure is unambiguously upwards. Similarly, all are addressing problems of escalating healthcare costs and limited resources. In an attempt to square this particular circle, most have sought to reform either, or both, of the financing and delivery mechanisms of their healthcare systems. But if the urge to reform healthcare has been a common factor across the continent, the development of health status has been marked by very significant differences in the pattern across Europe. Taken in the round, these factors represent the strategic context within which investments take place.

Healthcare reform

To Saltman, the experience of what has now been a ten year period of healthcare reform in Europe reveals a number of key common themes. The most important of these has been the attempt to 'inject competitive incentives and entrepreneurial behaviour into what remain publicly controlled and/or publicly accountable structures of management'. Saltman argues that there has been a subtle, but important, difference in the approach amongst the predominantly tax funded systems and the predominantly social insurance funded systems. The former have focused reform efforts on the provider side of the market, the latter on the funding side. Saltman concludes that the challenge of maintaining principles of social solidarity, on the one hand, whilst encouraging entrepreneurial behaviour on the other can be more successfully met where reform focuses on the provider side of the market.

Looking to the future, Saltman sees the role of national policy makers as increasingly constrained. In part, the constraints come from limits on the availability of (or perhaps growth in) resources. But there are also constraints on the ability of national policy makers to act. Decision making authority in relation to health is diffusing away from national governments; partly to lower public levels of authority, partly to supra-national bodies like the European Union itself, partly to patients who are increasingly empowered by access to clinical information from the Internet, and so on. The next phase of healthcare reform, therefore, will be characterised by a policy agenda more focused on incentivisation and leadership than the 'command' structures of previous decades.

From the perspective of planning capital investment, Saltman's scenario raises a number of issues, some of them problematic. Perhaps the most important of these relates to the possible impact on the strategic planning of healthcare facilities. Saltman defines *entrepreneurial behaviour* as 'taking the initiative, independently, to make one's operating activities more

efficient, more effective, more responsive to both population needs and individual patient preferences'. [[To a large extent, this is antithetical to the notion of *strategic* planning; it begs the question of whether individual healthcare actors (individual hospital managers, clinicians or whoever) will have the ability or the will to be more responsive to population health *needs*, although their ability to be more responsive to individual patient preferences or *demands* is not in question. So, for example, it is hardly credible that an acute hospital Chief Executive Officer, whose pay and status are inextricably linked to hospital budget and turnover, would entrepreneurially 'downsize' to release resources for primary care. Arguably, this places a still greater obligation on funders to ensure that the 'strategic fit' of proposed capital investments is right.

Health status

If the urge to reform healthcare represents a common feature of European experience, as McKee's paper demonstrates graphically, the evolution of the health status of Europe's population is marked by very great diversity. Whilst the populations of EU states have never lived longer, life expectancy in much of Central and Eastern Europe has fallen in the relatively recent past and remains well below Western European levels. For example, the life expectancy of males in Hungary has been falling since the 1960s. By the mid 1990s, just half of 35 year old men in Hungary could expect to reach the age of 70, compared with 75% in Sweden. Their probability of surviving was slightly worse in 1994 than it was in 1920-21. However, even within the Western countries of Europe, diversity is the predominant feature. There are very significant differences, for example, in rates of individual causes of death; the death rate from breast cancer in the Netherlands is 70% higher than in Finland.

From the perspective of informing investment decisions, the key questions concerns the extent to which patterns of healthcare have contributed to these differences, and to which future investment in healthcare might contribute to narrowing them. As McKee notes, since the work of McKeown and others, it has become part of the received wisdom within health policy analysis that health services make little contribution to overall levels of mortality. One obvious response, of course, is that much healthcare activity is designed to improve quality not quantity of life. McKee, however, questions aspects of this, in one sense, counterintuitive orthodoxy on its own terms. In particular, he notes that since McKeown's influential work, the scope of medicine has increased significantly and that many formerly fatal conditions are now susceptible to treatment. His paper goes on to present evidence which supports the view that health services can make a difference.

From the perspective of informing investment decisions, McKee's most interesting conclusions relate to the impact of access on avoidable deaths. In particular, he suggests that barriers to access represent one factor which prevents medical care exerting its full potential impact on population health. This raises important investment issues about the relative importance of centralised (*ceteris paribus* poorer access) and decentralised (*ceteris paribus* better access) services. There is a balance to be struck here between the impact on outcomes of specialisation and the impact from raising the price to patients of accessing healthcare. More work is required on this issue. However, McKee's conclusion is unequivocal:

> *'(Research findings) indicate that effective health care, or its absence, can now be added to the list of major determinants of health.'*

The implications for healthcare delivery

To Vang the implications of this evolving strategic context point clearly to the inappropriateness of 'traditional' models of hospital care. A hierarchical healthcare system of primary, secondary

and tertiary care represents an increasingly outmoded means of responding to new challenges. In particular, within the hospital, a model of clinical management based on the 'specialty' (itself little more than the way in which doctors choose to organise themselves) appears increasingly dated. On the one hand, there is increasing specialisation within specialties. On the other, the concentration of elderly people within the hospital population[10] results in a greater incidence of co-morbidities amongst patients. This makes old notions of admission to the care of a single consultant inappropriate – medical care is (or should be) increasingly a team activity. Vang coins the phrase 'the caring chain' to describe this new context for healthcare delivery. The implication is that a truly multi-disciplinary orientation will be required of healthcare professionals. As the focus of care shifts from a 'disease orientation' towards a more holistic 'health orientation', there are important implications for the design and the management of hospitals.

From an investment perspective, perhaps the most important of these implications is that hospitals may increasingly break down into smaller units, each of which is an economically and functionally independent organisation. Capital intensive central facilities (laboratories, operating theatres, imaging departments and so on) will be organised as quasi independent service suppliers to users. Similarly, 'bed departments' will offer admission rights to all accredited doctors, irrespective of whether these are based in the hospital or the community. If Vang is correct, this scenario opens up a whole new context for future investment in the hospital. In particular, the model implies new risks for the hospital of the future – irrespective of the 'macro' financing model which applies in each country, the most capital intensive parts of the hospital estate will be in the business of 'selling' services to a wider group of users, each of which has a looser affiliation with the hospital as an organisation.

Data for appraisal

The changing context for healthcare appraisal places increasing demands on the data necessary to support investment decision making. In particular, at a time of rapid change, the availability of comparative data and the ability to 'benchmark' evolving best practice takes on a particular significance. However, whilst the 'information revolution' may have transformed both the customer and the provider experience in service industries such as travel, banking and retailing, access to timely, reliable and meaningful data in the healthcare sector continues to be problematic.

Some of the difficulties are graphically illustrated in Poullier's paper. Even the most cursory scan of the macro performance indicators of health system performance demonstrates the nature of the problem faced by analysts and investors. Virtually all of the indicators display significant variations between countries. For example, the proportion of cataract surgery undertaken on a day case basis with EU member states apparently varies from 10.2% (Italy) to 59.2% (Denmark)[11]. What are we to make of this data? Certainly, a number of assumptions are necessary before concluding that Danish ophthalmologists display six times the efficiency of their Italian colleagues. In particular, can we be confident that:

- The quality or effectiveness of the procedures is common? Without the ability to link data on activity, outcome and cost our ability to draw conclusions is severely constrained;
- The relevant definitions (in this case, procedure definitions) are identical?
- The data are accurate?

[10] Vang points out that 75% of hospital patients in Sweden today are over the age of 70.
[11] Poullier, Table 6. Note that a still higher day case rate for this procedure is recorded for Canada.

The latter two points, in particular, is of self evident importance, but a continuing source of frustration in healthcare analysis. For example, Poullier presents data which reports WHO statistics on the fatal adverse effects of medicine consumption in number of countries. These purport to show that in 1994, the rate of fatalities from this cause in Luxembourg was some one hundred times the rate occurring in neighbouring France or Germany. A *real* difference of this magnitude, quite simply, is just not credible. The strong suspicion must be that the source of the variation in the figures is related to:

- Errors in data collection;
- Differences in definitions;
- Differences in the rigour with which drug related fatalities are investigated.

The implications of these weaknesses in the existing data are serious for all of those concerned with ensuring the best use of investment resources. Poullier suggests that lenders themselves might have a role to play in bringing together groups of borrowers for the purpose of quality assuring data and information exchange. However, *ad hoc* initiatives of this type are only ever likely to represent a partial solution. The increasingly *international* nature of healthcare demands an appropriate *international* response to the problems of data quality and comparability.

Some aspects of the possible components of this response are given by Bonte and Brückner. They note the entry of the EU as a serious player in the area of healthcare data collection and analysis, working in collaboration with bodies such as OECD and WHO. Traditionally, the problem within health has been less one of shortage of data, it has been one of shortage of information. Health services collect enormous amounts of data. Clinicians often take a leading role in this data collection, with large quantities of data being collected, in a variety of formats, for medical records, for research, for teaching and so on. The problem comes in how to aggregate this data and translate it into information for decision support purposes (be this *clinical* or service *management* decision making). An important part of the information problem for health services is that the degree of 'richness' (or detail) in the data required for clinical purposes may be considerably more than the degree required for management and planning decisions. Increasing the level of detail of record may add to its uniqueness, but it simultaneously reduces its comparability. The danger as, Bonte and Brückner point out, is that information becomes so rich that meaningful analysis is no longer possible. However, it is equally clear that unless data which are to be collected by clinicians have clinical value, the quality assurance of the data will inevitably suffer.

Bonte and Brückner describe work, which is on-going under the aegis of the EU's Statistical Programme Committee. The work involves partnership between Eurostat and lead partners from France, the Netherlands, Germany and the United Kingdom. This has resulted in the design of a framework for a coherent and consistent set of health statistics, organised around three sub-systems:

- Health and health related surveys;
- Causes of death; and
- Healthcare statistics, the later divided into statistics on manpower, money and providers or facilities.

They recognise, however, that the achievement of a 'coherent and consistent' data set may be some time off. Their paper, therefore, reviews a range of substitute indicators which may have value for appraisal purposes. A fuller review of the properties of these indicators is to be

prepared by Eurostat for dissemination in 2000. This in itself will represent an important contribution to better harmonisation.

The challenge, then, remains to link data on costs, effectiveness and need in a manner which will informs investment decision making at all levels. Maynard refers to this as the importance of practising *economics* based medicine. In the rush towards *evidence* based medicine, Maynard cautions against neglecting the opportunity cost dimension of decision making. *More effective interventions or facilities will not always be more cost-effective interventions or facilities*, yet if the concern is to improve efficiency in the use of healthcare resources, it will be the latter measure which is the more appropriate indicator for investment choices.

Maynard goes on to provide a short review of some of the evidence relating to the relationship between scale of hospital facilities and efficiency. On the basis of this review, he concludes that:

- Economies of scale, such as they are, are exhausted at relatively low levels of scale[12];
- The relationship between volume and quality of clinical outcome is probably exaggerated, is certainly complex and should only be evaluated on a specialism by specialism basis.

However, one other scale relationship requires careful consideration in the capital planning process. This is the relationship between volume and access. Here Maynard indicates that the evidence, such as there is, suggests a reduction in access as volume increases (particularly where patients themselves have a perception of low need for services; examples would be mammography and cervical cytology). The result is shift of costs onto patients. This has two effects:

- First, these costs may be hidden and may undermine any alleged or apparent efficiency gains from larger units;
- Second, there are equity implications of a transfer of cost from the wider community to patients.

The latter, in particular, raises an important issue for the appraisal of healthcare investments. This is that many investments are not made for their impact on efficiency*, but for their impact on access and equity*. This raises particular challenges for the development, and application, of an appraisal methodology which is grounded in a 'welfare economics' paradigm. Nevertheless, the neglect by an external appraiser like the EIB of the equity aspects of investment decisions on the part of public authorities will lead inevitably to a gulf of understanding, and in the limit conflict, between investor and project sponsor. This is an issue which is considered more fully below.

Methodological issues in appraisal

All healthcare investment decisions involve making choices and appraisal is basically concerned with informing these choices. However, if the information emanating from appraisal is to be reliable and comparable with other work, it needs to be taken forward within a clear and consistently applied methodological framework. The term *health technology assessment* (HTA) has come to be used to describe the systematic process of evaluating the impact of new or current practice on the objectives set for this practice.

Granados' paper describes the scope, purpose and applications of HTA. As she demonstrates, the discipline can, in principle, be applied to a wide range of healthcare 'interventions', including medical, surgical and other clinical techniques, drugs, equipment and devices, methods

[12] Maynard comments that the majority of hospitals in England are already in excess of their least cost size.

of healthcare delivery (for example, homecare, minimally invasive surgery, ambulatory surgery and so on) healthcare policies and reform initiatives. For this reason, the techniques involved in HTA have a clear and obvious utility in informing capital investment decisions. The initial stages in HTA in all of these areas will be common:

- Definition of the health technology to be appraised, in particular, the definition of its objectives[13];
- Context analysis;
- Search and review of the available evidence.

The last of these was, in effect, a large part of the subject matter of the section on data for appraisal, above, and the papers to which this section refers. The issues of additional interest in Granados' paper, therefore, relate to the definition of project objectives and 'context analysis'.

As Granados' paper makes clear, a 'technology' can only be assessed in terms of its contribution to meeting pre-specified objectives. These may relate *inter alia* to need, safety, efficacy or effectiveness[14], appropriateness, equity, efficiency and so on. The choice of the objectives for a technology defines, in turn, the data required for assessment and, to some extent, the methodology employed for the assessment. This insight can, of course, be readily generalised to all appraisal contexts. However, it is clear that the objectives of healthcare investment projects are often *not* adequately specified. One of the principal ways, therefore, in which external scrutineers can add value to projects is in demanding the clearest possible indication of what projects are designed to achieve (and as a corollary, what data and analysis will be necessary to judge whether the project has been successful in these terms).

Granados further stresses that all project appraisal must be set firmly within its economic, social, cultural and political context, and sometimes within a moral and ethical context. She describes as 'contextualisation' the process of moving from the assessment of efficacy (impact under experimental conditions) to the assessment of effectiveness (impact under 'every day' conditions). This distinction is, perhaps, most clearly seen in the assessment of the impacts of new drug therapies. A drug may prove to be highly efficacious under controlled experimental conditions (for example, where patient compliance is actively and successfully managed) but highly ineffective in 'every day' patient situations. For example, a given technology might require radical change in patients' daily routines – without proper assessment of this 'context', the potential benefits of innovation may be over-stated.

There are numerous parallels with other types of health technology. The maximisation of the use of 'day case' surgical techniques may prove highly effective in some contexts but ineffective in others. For example, relatively poor areas with high proportions of lone parents or elderly people living alone may not provide an environment which most readily supports early discharge from surgery. In this case, investments in day case facilities may fail to deliver the expected benefits because of extended hospital stays which are socially, even if not clinically, indicated.

The general conclusion is that no investment decision can ever be viewed independently from the social and economic system in which it takes place. Overall resource constraints are a consistent feature of the economic context, but the nature of healthcare investment is such that there are inevitably 'knock on' implications for social policy (for example, the impact on social

[13] Granados refers to this aspect as 'translation of the health or health care problems into research questions'.
[14] Granados defines efficacy as the impact of a technology under experimental conditions, but effectiveness as its impact under every day clinical conditions.

services of early medical discharge policies)[15], for health policy (for example, the impact on overall system costs of excess bed capacity), even for family policy (for example, the impact on relatives and other carers of a policy of running down in-patient psychiatric facilities). Appraisal which purports to take account of the full social impact of investment decisions cannot ignore these important contextual aspects. This is equally important in the case of investments which represent an entire programme of expenditure across a country or region.

Buxton notes that the use of economic evaluation techniques has moved from the purely academic province to much more regular application amongst health service professionals, managers and administrators. However, notwithstanding the accelerating use of these techniques, the proportion of healthcare interventions which have been subject to high quality appraisal remains small. In general, Buxton is cautious about the role that economic evaluation can play in informing investment choices. There are a number of important methodological reasons for this scepticism. Two are of particular interest and relevance to investment choices. The first, relates to projects which have a multi-sectoral component. Buxton demonstrates that the use of 'willingness to pay' approaches to the valuation of benefits in, for example, transport or environmental projects typically indicate a higher valuation on health gains than would be usual in health sector projects. This implies the danger of misallocation of resources across the investment 'portfolios' of organisations which finance projects in the health, transport and environmental sectors[16]. Secondly, Buxton cautions against the indiscriminate use of cost-effectiveness results derived in one context in another. In particular, in looking across countries, there may be important differences in the relevant comparators, medical practice, relative costs, patient expectations and views on what is an acceptable cost-effectiveness ratio. The latter, in particular, raises an interesting conceptual question for an international financial institution like EIB. Should the Bank have its own view of what is an acceptable cost-effectiveness ratio (in other words, in certain circumstances 'over-rule' national perspectives) or accept differences in national valuations at face value, thus raising the possibility of *identical* projects being accepted in one country but rejected in another. Differences in acceptable cost-effectiveness ratios may also reflect the fact that healthcare systems have objectives other than the maximisation of health gain. Underlining the point made by Maynard, Buxton points out that many healthcare investments are predicated on a desire to address issues of *equity* - not just those of *efficiency*. Furthermore, in the consumption of healthcare services, patients may wish to trade some outcome benefits for benefits associated with the *process* of consumption.

For all of these reasons, the range of resource allocation choices which economic evaluation is suitable to inform is limited. In particular, in Buxton's view:

> *'Economic evaluation … is not well suited to informing broader judgements as to whether in a particular country at a particular point of time we would be better investing in primary or secondary care, or in local or regional hospital developments… The only broad generalisation is that all such generalisations are likely to be misleading.'*

Buxton's general conclusion, therefore, reflects that of other contributors to this volume. This stresses the importance of full analysis of the context for any healthcare investment project or programme. The mechanistic transfer of findings from one context to another can only mislead.

This general conclusion is illustrated by Kun's paper which looks at the 'special case' of investment in information technology (IT) in health. The cultural and contextual difficulties

[15] In Sweden, before 1992, admissions lasting a year in cost-intensive, acute hospital beds were not uncommon. Since then, partly due to changes in incentives, average length of stay in acute hospital beds has decreased by 40 percent, and the overall number of acute beds has decreased from 3.7 to 2.8 per 1000 population.

[16] The European Investment Bank is a case in point.

associated with the transfer of technology from country to country or application to application may, in part, be responsible for the number of 'false dawns' around the role that IT will have on healthcare delivery. Whilst Kun's paper is essentially optimistic with respect to the impact IT can have on population health in the next century, it points up a number of possible sources of these difficulties. Kun identifies a range of opportunities in which telemedicine and support of home care are of particular interest from an investment perspective. In relation to the former, he argues that the creation of information systems up to 1,000 times more reliable than those currently available is a realistic goal. Effective interface between telecommunications systems and healthcare could unlock the potential for rapid, high quality and reliable transmission of images (especially CT and magnetic resonance images) which could, according to Kun's estimate save $36 million in the United States[17] as a result of reducing physician visits, improving the efficiency of medical time, the elimination of paper based records and so on. Telecommunications costs, however, can be high although as technology evolves these costs will fall. The investment problem, then is to optimise the timing of investment – maximising the benefits of IT by investment at the point at which the combined impact of technical improvement and falling technology costs make projects economic. The problem, of course, is that it is difficult to identify this point with certainty. This is related to the fact that the achievement of many of the benefits of investment in IT are dependent on securing significant change in staff working practices. Resistance to change has been an important factor in frustrating benefit realisation in many projects. However, there are also other potential drawbacks and dangers. The threat that IT can pose to patient privacy and confidentiality are one of the most important. This represents a further area in which different healthcare systems apply different 'weightings' to the risk factors inherent in these investments.

The design and management of healthcare facilities

An important focus of appraisal work is to ensure that a facility will deliver the right services, and is appropriately sized and located. However, the design and the management of healthcare facilities has a critical impact on the ability of these facilities to maximise the benefits from an investment project. Investment decisions, therefore, need to take proper account of these important issues.

Teikari draws timely attention to the fact that patients in acute hospitals are temporary, and increasingly short term, visitors. The staff of these facilities, however, have a much longer relationship with the premises. The design of hospitals needs to reflect properly this important difference. The acute hospital never can be, indeed never should be, 'homely'. Those patients who benefit most from a homely environment should be at home or in an appropriately designed environment for long term care. The design of the acute hospital should properly, therefore, reflect the needs of the staff for a decent working environment and one which enables them to maximise their productivity.

On the basis of an extensive research project carried out in a number of Finnish general hospitals, Teikari demonstrates that the key determinant of staff dissatisfaction with, and in the limit, stress from, hospital environments is the extent of 'repetitive encounters' with features which frustrate desired action plans. So, for example, the need to use as a thoroughfare an area which infringes patient privacy frustrates the goal of finding a less intrusive route. Similarly, the inability to withdraw from rooms or areas with unpleasant ambulant conditions can also, if maintained, increase staff stress, and reduce staff productivity. It is notable that in the area of healthcare facility design, as in much of healthcare delivery more generally, the evidence base is often weak or poorly disseminated. As Teikari comments:

[17] While other benefits are likely to flow from health information technology networks, the amount quoted here as potential savings constitutes less than 0.00004% of annual US healthcare expenditure.

'Especially in operating departments, the functionality and convenience (of the department) may have been remarkably constrained because of artificial zoning based on some vaguely substantiated assumptions both of the different cleanliness grades of the various traffic forms and the air movements between spaces. The general position (of Teikari) is that too complicated or rigid structural arrangements to control traffic and behaviour will inevitably lead to negligence on the part of the staff.'

The significance for investors of this is that the implications of hospital design for the efficient management of clinical services must feature in an overall appraisal of a project. This will have an even greater importance where the responsibility for design and delivery of non clinical support services is separated from clinical service delivery[18]. In this case, there could be some misalignment of incentives, with neglect of the role that design can play in promoting the overall efficiency of the hospital's clinical operations.

Beijers seeks to look systematically at the factors which will influence the design of the 'hospital of the future'. He argues that the key drivers which will continue to influence future developments are the:

- further decrease in *in*patient care;
- development of new and innovative services; and
- emergence of integrated healthcare delivery systems.

These features, he argues, will:

'render current health care facilities obsolete.'

Beijers foresees expanded investment in long term care facilities, but argues that investment in hospitals will come under increasing scrutiny via a strategic planning process. From the perspective of investors, the operation of robust strategic planning mechanisms is likely to be regarded as a highly desirable development. The increased capital intensity of the remaining hospital sites will demand maximum use of the available facilities – the avoidance of spare capacity is likely to remain a key concern for those committing capital in the sector.

Changes in the physical configuration of hospitals will be matched by important changes to the roles of staff. The key drivers to these changes will be to make the best use of scarce nursing and medical time. Registered nurses and physician extenders will increasingly take on what, to date, have been viewed as exclusively medical tasks. Demands on the time of registered nurses will be eased by the enhancement of the role of 'clinical technicians'. Perhaps the most interesting of Beijers' speculations concerns the development of 'hospitalists', dedicated in-patient physicians whose role is to 'manage' the patient through the process of admission to discharge. These new patient 'case managers' offer, perhaps, the best opportunity of making a reality of truly integrated care, at least in the hospital setting[19].

Beijers sketches out two complementary design models, both of which could 'operationalise' the principles elaborated in his paper. The first, characterised as a *care park – a hospital without beds*, envisages a dispersed design based around inter-connected pavilions. The footprint of this concept is relatively large, and so the care park would be located on the periphery of cities. The

[18] The model employed, for example, the hospital developments in the United Kingdom which are taken forward as public/private partnership projects.

[19] In the German healthcare reform proposal the role of the case manager, called 'patient navigator', is foreseen to be taken on by the GP. It is intended to be incentivised to extract value-for-money out of the secondary care tier, whether inpatient or ambulatory.

second, the *hospital as health mall*, envisages the services of the hospital concentrated within a single building which will become an integral part of the city infrastructure. Clearly, these two models could have very different implications in relation to capital and operating costs, patient access and so on, and may differ as well, in both respects, from the model foreseen by Vang. . This means that a single model is unlikely to be optimal in all circumstances. Careful appraisal of local situations will be necessary in advance of commitment to a particular design. However, both Beijers' models share a number of fundamental principles which he argues will define the hospital of the future: the primacy of ambulatory facilities, the principle of 'patient focus' and the role of the hospital as an integral part of a regionally organised integrated healthcare delivery system.

Bonaldi reflects many of the same concerns as Beijers and the earlier speakers. He highlights the increasing inappropriateness of the 'specialty' as an organisation model for patient care, underlining the strong case for patient focus in the design of the hospital of the future. However, Bonaldi also provides a timely reminder of the cultural and economic determinants of medical activity and, therefore, the 'need' for healthcare facilities.

The paper clearly demonstrates that securing quality and appropriate care remains a challenge in all healthcare systems. To Bonaldi, this is clearly a *management* problem and responsibility. In this context, initiatives designed to make the corporate management of hospitals responsible for the overall quality of clinical care delivered by their institutions (for example, the establishment of *clinical governance* in the United Kingdom's National Health Service) is to be welcomed[20]. From the perspective of investors, however, this raises an important new aspect in appraisal work. The implication of *clinical governance* is that investors should increasingly take a view on the clinical quality of the work of hospitals (or perhaps, more realistically, take a view on the quality systems that institutions have in place to seek to assure this quality). This places an important new responsibility on the providers of capital to the sector.

[20] The German reform plans similarly provides for a Federal Hospital Quality Assurance Committee to ensure that diagnostic and therapeutic methods employed are 'adequate, effective and efficient'.

Conclusions: The implications for appraisal

Whilst it is possible to conceive of a single measure of the financial value of an investment in a health facility, a parallel measure of the economic value of healthcare developments represents an unattainable goal. The problems associated with the multiple outputs of facilities, the impossibility of valuing all of these outputs in non-arbitrary ways and the difficulties of separating out the independent impact of a single facility from the (more or less) integrated system in which it operates makes the notion of an economic rate of return for a hospital project meaningless. These problems, of course, become more severe still where the focus for appraisal is a programme of investments rather than a single, 'stand alone' facility.

This does not, however, imply that it is impossible to devise or apply a robust analytical approach to the selection of these kinds of investment. Indeed, it was a clear and consistent message of the Conference that public institutions which hold a responsibility in their investment decisions which is wider than the simply financial, must adopt a decision making process which enables them to both *identify* and *reject* investments which represent a poor use of scarce healthcare resources.

Components of an appraisal methodology

When appraising capital investment in healthcare projects it is indispensable to identify and be critical of all assumptions. In particular, assess whether proposed services correspond to the prevailing epidemiology and demography; is there consistency between services and staff availability/skill mix; is organisational/managerial set-up likely to bring about effective and efficient production of healthcare; is proposed technology appropriate; does the design of a facility have sufficient flexibility to sustain major shifts in services provision, and does the proposed investment have policy robustness, i.e. will it withstand changes in health policy, private/public mix, allocation/reimbursement patterns. Taking on board these key messages the components of an appraisal methodology would take into account that:

- Markets and 'market determined' prices are inadequate indicators of value in the healthcare sector. Healthcare provision is characterised by inefficiencies as a result of the monopoly power of doctors, the poor information available to patients, and the propensity of insurance arrangements to inflate costs.
- There are no meaningful generalisations that can be made about the priority of investment in one part of the healthcare sector over another. Investments in primary care are not necessarily 'better' than those in the acute hospital sector. Indeed, the evidence base in relation to the cost effectiveness of primary healthcare is as weak as is that for the secondary care sector.
- It should be recognised that some investments, and perhaps many investments promoted by the public sector, are designed to promote equity and access, not to improve efficiency. Culture and social development condition political choices, and different countries have different views over what is a minimum acceptable cost effectiveness ratio for health investments.
- Appraisal should not necessarily accept public policy on healthcare provision as a given which should not be challenged. There are bad public policies within Europe. Most of Europe still has too many hospital beds and, one way or another, taxpayers will end up addressing the financial consequences of excess capacity.
- Finally, appraisal can and should take a view on clinical quality, or more practically, the adequacy and robustness of clinical quality systems.

What does this mean in practice for the development of an appraisal methodology? The principal conclusion is that health sector appraisal will lie towards the 'right hand side' of what can be usefully characterised as an 'appraisal continuum' (Fig.1).

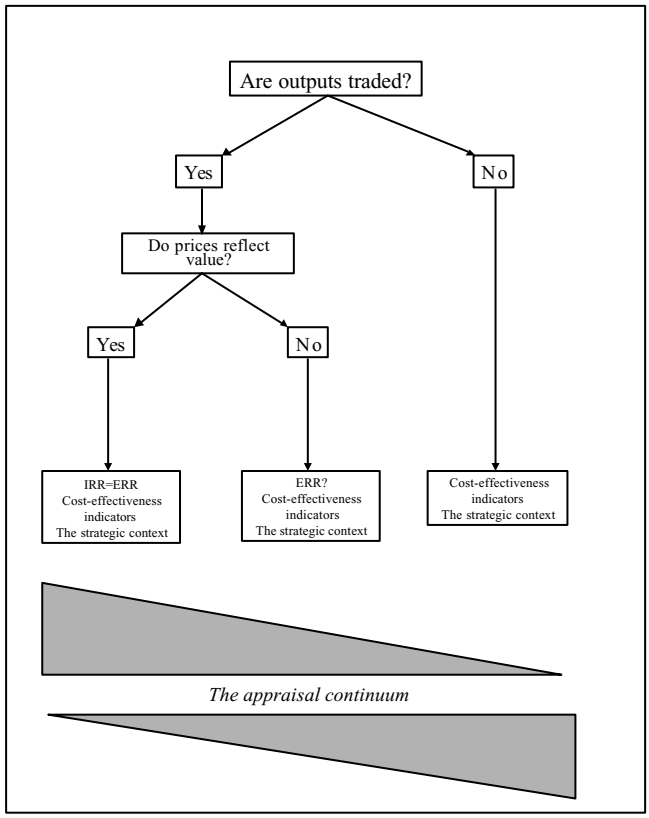


Figure 1. The appraisal continuum

For the reasons set out above, healthcare provision will almost always be characterised by either the complete absence of prices, or prices which give wholly inadequate indications of social value. Against this background, although it may sometimes be possible to estimate an economic rate of return to a project, the principal focus of appraisal activity will be on the impact of a project on cost-effectiveness of service delivery and the consistency of the project with the 'strategic context' in which it is located. In other words, the principal focus of appraisal work in the healthcare sector will be qualitative, rather than quantitative.

The strategic context

The appraisal of the strategic context focuses on the consistency of the proposed investment with a wider healthcare strategy within the system in question. In general, the expectation is that these wider strategies will be focussed on the achievement of cost-effective health gain although, as indicated above, this proposition should not be accepted uncritically.

The key components of the strategic context will relate to the need, demand and supply conditions which apply in the local healthcare market. Need should address *inter alia* demographic, epidemiological and technological aspects. Demand relates to the way in which this need is manifest in calls on the health services. This will incorporate inter alia consideration of the financing arrangements of the systems in question and the incentives facing patients and doctors as their agents. Supply relates to the service range and volume which is currently

available to meet demand, and the future prospects. This will include consideration of inter alia the efficiency of providers, the technology they utilise and the quality of care which is delivered.

An ideal health system is one which aligns the need for healthcare (typically defined as the ability to benefit from care) with demand and supply. An investment in healthcare facilities operates on the supply side of this market[21]. An economically sound investment in healthcare facilities could perhaps be defined as one which brings a closer alignment of supply with *both* need *and* demand in the most cost effective means possible. The qualification, however, relating to alignment with both need and demand is important. It is possible to conceive of investments which address demand but neglect the fundamental healthcare needs of a community; similarly, investments which address community healthcare needs but whose services will never be taken up by the communities they are designed to serve cannot be effective.

The recognition of need as a concept implies that supply and demand do not interact in the conventional manner in healthcare. As equity is generally characterised on the basis of need[22], its consideration tends to complicate traditional economic appraisal. As pointed out above, however, equity is integral to European healthcare policy[23].

The practical implication of this is that appraisers should continually challenge promoters, managers and doctors on the issue of how a particular project is consistent with the relevant strategic context, and in particular how it promotes cost-effective health gain or equity. It is unlikely that this reassurance could be offered in the absence of the project in question having been through a rigorous planning process, which includes the:

- Clear definition of the objectives of the project or programme;
- Robust consideration of the alternatives to the project.

Requirements for projects and programmes

The implication of the above is that the appraisal of health sector projects should focus on securing answers to a range of questions which are designed to test whether, and how, a given project or programme is grounded in a clear and defensible strategy for health gain. Within this context, a project would not be judged as economically viable without:

- A well designed health strategy for the patient population to be served by the facility;
- Clear links between the project and this strategy, in other words, the project should in some sense contribute to the achievement of the strategy;
- Evidence that the project contributes to the strategy in an efficient manner;
- A clear statement of the equity implications of the project.

In practice, considerable judgement will be needed in applying these tests. Furthermore, the approach will need to be modified to reflect local circumstances and the availability of information. However, as a guide, the following 'check list' of issues may be of value in making operational sense of the four tests identified above.

[21] It is recognised that this neglects the potentially important role of supply in creating demand for health services.
[22] A common definition of equity is 'equal opportunity of acces for equal need'.
[23] In this respect European countries as a group differ markedly from the US: about 15 percent of the population, including 10 million children and adolescents, in practice have no access to healthcare, i.e. neither through insurance or a state/federally subsidised programme.

A well designed health strategy

- Is the patient population to be served by this investment clearly defined?
- Have the healthcare needs of this population been identified? Have they been quantified?
- Have these healthcare needs been prioritised in any way?
- Are effective means of addressing these health needs available within the healthcare system?
- Have targets for health improvement been set?
- Is the strategy agreed with all other relevant actors in the healthcare system and by other agencies which have an impact on health performance?

Links between the project and the strategy

- Does the health strategy provide the appropriate strategic context for this project?
- What are the objectives of the investment? Have these been quantified?
- What are the benefits of a successful project and to whom will these benefits accrue?
- What is the order of priority attaching to the objectives of the investment? Are these consistent with the priority of objectives within the strategy?
- How will the decision to proceed with this investment, or not proceed with it, affect other parts of the healthcare system?
- If there are important 'knock on' implications are they being properly considered as a component of this project?

The efficiency of the project

- What are the alternatives to the investment?
- Do these include a *do nothing*, or a *do minimum* option (the latter where the *status quo* is, for some reason, not feasible)?
- What are the implications for the achievement of objectives and benefits of these other options?
- Are the benefits claimed for a particular investment genuinely a consequence of the capital scheme or could they have been achieved without the commitment of capital?
- Are the capital and on-going revenue costs of the projects clearly identified and reasonable?
- What evidence is there that the investment will promote performance improvement in service delivery?
- How is the quality of service delivery to be measured and assured in the course of the project?

Equity considerations

- Are the beneficiaries of, and payers for, the project clearly identified?
- Does the project enhance or diminish access to health services? Which groups gain and which groups lose?
- Are there further 'knock on' consequences of the project which could have an impact on equity in due course (for example, might a new development threaten the viability of an existing facility, with implications for access for the users of the latter)?

These information requirements should not be viewed as onerous or over demanding on the promoters of health sector investment projects. Rather they should be regarded as supportive. Information requirements for project appraisal should represent 'good practice' in the planning

of any capital investment in this sector. In other words, the appraisal should draw on information which promoters should in any case be seeking to analyse.

However, without the ability to address the four key issues identified above, it will simply not be possible to know whether a project or programme represents an economically sound investment. In this sense, projects or programmes which are unable to offer reassurance in these areas should be rejected.

Introduction

The Reform of Health Care Services

Mila García-Barbero, M.D., Ph.D.
Head of the WHO European Office for Integrated health Care Services
Barcelona

Health care reforms are driven mainly by five issues: the changes in the epidemiological and demographic patterns, the fast development of bio-technology and communication, the higher demands and expectations of the population and health care professionals, the increasing concern with the growing cost of care and the macro economic changes. While health care expenditure increased steadily during the 80s, just the same as the GNP, the trend now is to control the cost of social benefits to adjust to a more steady growth of the PPP.

At present, governments in Europe are considering the sustainability of the welfare society, which has been the main driving force in the 20th Century. In Europe health and health care is considered a citizens' right where universal coverage and public funding are the two pillars. The days were priorities in health care investment were clear are history now. Governments face very complex health care systems and a wide spectrum of possibilities and strategies. Unfortunately there is not a perfect system of a magic formula and although more evidence in management is becoming available we are still far away from an "evidence-based management doctrine".

Within the changes in epidemiological and demographic patters the shift in the mortality rate from infectious diseases and acute illness to chronic diseases and accidents and from infant mortality to mortality at old age stand out.

The development of high technology for diagnosis and treatment is changing the traditional PHC and secondary care approaches, diminishing the differences between the levels of care, with primary care practitioners performing interventions that were reserved for hospital personnel 10 years ago and hospitals providing services traditionally carried out by primary care providers. The terms "hospitals without walls", "hospitals without beds", "day care hospitals" "hospitals at home", indicate clearly the direction of the shift which hospitals are undergoing in terms of structures, diminishing the number of beds needed and the length of stay. The European average length of stay has diminished in the last twenty years from 15-25 days to 5-8 days allowing the increase in the number of interventions.

The new technology for communication and specially telemedicine will shape the health services of the future. The geographical barriers due to long distances or bad transport systems will disappear. Primary health care institutions will become the central point of health care services supported by secondary and tertiary care and will have to be equipped with modern technological equipment. Hospitals will become "fast tracks" high technology institutions carrying those tasks that would not be performed at primary level. Other institutions such as nursing homes will accommodate chronic or discapacitated patients.

The population, better informed, is putting pressure in the systems by increasing demands in the quality of the services and hotel facilities, the fast response to their problems, the use of high technology, free choice of providers and participation in the decision-making progress. This is forcing a change in the relationship between health care practitioners, managers and administrators and patients. Patients right charters and bills are being used or passed in several countries in Europe. Health care practitioners and institutions will need to change their working habits to comply with the better informed and more demanding population. The "paternalist" approach of health care professionals will be substituted by a specific or non-specific "contract" approach. The dominant position of health care institutions with structures and administration established to facilitate the work internally would have to focus on more convenient systems for the patient.

The four points is the need to contain the increasing cost of health services without loosing the focus on equity, accessibility, improved outcomes and efficiency. The golden age when the health care sector budget covered every need and the losses were repaid by the insurances or the state has ended. Health services have to be accountable for their expenditures, they have to provide better services at the minimum cost possible, and they have to comply with the increasing demands of patients, relatives and the community.

In response to the changing environment, health care services are embarking on new trends of development, which mark a break with the past. Critical choices concerning health care resources and financing and organization and management of health services are being made at all levels. Health systems are strongly influenced by the underlying norms and values of the broader society within which they function. Health care services are mirrors that reflect the deeply rooted social and cultural expectations of the citizenry as a whole. These fundamental values while generates outside the formal structure of the health system, often define the system's overall character and capacity. A substantial part of the health care reform debate in Europe revolves around the moral imperative of maintaining health as a social good, which is the backbone of the European health care systems, and the imperative of cost control.

Several strategies are being implemented in most countries with differences on the degree of emphasis of each one of them. Decentralization of managing and financing is one of the wide strategies followed in most European Countries. Applying substitution strategies, providing care at the lower level possible. Strengthen management by management development, strengthening individual capacity to lead, negotiate and communicate and by developing institutional tools to deliver health care more effectively and efficiently. Change the skills mix of the professionals, with the redefinition of roles and the increase in flexibility of contracts, salaries and tasks to be performed. Strengthen primary health care as a philosophy supported by secondary and tertiary care, which should ensure that health services at all levels protect and promote health, improve the quality of life, prevent and treat diseases, rehabilitate patients and care for the suffering and terminally ill. Focus healthcare interventions in outcomes and develop indicators, protocols and guidelines. Although it is not explicit in most health care reforms, one of the underlined strategies in most of the principles is the need for better coordination between the different levels of care and continuity of care. They should reinforce joint decision-making by the patient and care provider and promote comprehensiveness and continuity of care within their specific cultural environment.

All these points are mentioned at a small or large scale by the different authors on this book as forces that will shape healthcare services. They support the need for health care services to focus on patients' needs and demands; work for quality and cost-containment; select human resources to have the right skill mix and flexibility and define responsibilities of the different levels of care. *In summary*: considering the fast development of society, technology and the science the health care services of the future will need more flexible infrastructures, management and personnel.

The one that does venture upon,
does not cross the ocean
Marco Polo

Opening

Management of Health Care Facilities and Establishments (Organisational and Human Resources Trends)

by

Professor Per-Gunnar Svensson
Director General
International Hospital Federation
London, United Kingdom

Content

Introduction

In discussing this issue, I will "zoom" in on investment in healthcare infrastructure and the methods to appraise such investments. Healthcare provision is currently in a process of change dictated by technology development, demographic change, changing expectations, etc. Partly as a result of these pressures and partly as a development on its own healthcare is also adopting new approaches and processes in management. When appropriate social/cultural aspects will be elaborated in relation to the mentioned changes.

That will be done through focusing on two thematic areas. In order to provide examples these areas of mega trends are:

- quality assurance of health services.
- the health promoting hospital.

In relation to each of these areas some trends will be elaborated (1).

Quality Assurance of Health Services

It can be said without contradiction that one of the most exciting fields in health care today is the assessment of quality of patient care. The issues of quality measurement are crucial because they relate to costs and indeed the basic framework in which health care is delivered. In my role as Director General of the International Hospital Federation, I travel through many nations and have observed approaches to quality assurance which are presently developing. I would like to set these out and relate them to needs, in say, a 10 year perspective, for investment in health infrastructure and human capital.

Trend 1: Hospital Accreditation - Maturation & Spread

Many nations have now integrated hospital accreditation programmes into their health care systems. Four of the most recent are Japan, China, Georgia and Zimbabwe. The basic concept of hospital accreditation among nations is similar but in fact is maturing and changing in those countries where the programmes have long been in place (2). Hospital accreditation has always been about structure, process, and outcome but has focused mostly on the structure and process aspects. It is now the case in the United States, Australia, Canada, Europe (3) and some other countries that the emphasis is increasingly on outcomes. It needs to be recalled, however, that the identification of a bad outcome is an indicator that there is a problem in the process or the structure. For example, in the measurement of post-operative infection, there is absolutely no meaning other than that some aspect of the process or structure lies at the cause.

Some of you will know that the Joint Commission on Accreditation of Healthcare Organisations in the United States, has spent some 200 million dollars on research of outcomes. It is only recently, however, more than ten years later, that there is the beginning of an application of outcome measures on the scale they had originally envisaged. This is because the application of outcomes is very complex and requires a very sophisticated database to apply.

I would conjecture that the reason for the spread of hospital accreditation is that it is the best motivator for quality assurance that a country can introduce. That is, some good hospitals in a country may set up quality assurance systems but it is usually the case that the weaker and perhaps the most dangerous of hospitals do not attempt these measures. Hospital accreditation systems force these hospitals into action and compliance.

In order to develop hospital accreditation, health services need to develop close links with allies like health services research, legislators and the media. Not least the latter because of the need to transfer complicated scientifically based information to decision makers and to the public.

In this context there is a need for investing in infrastructure, in particular, sophisticated computerised information systems that make it possible to compare hospitals and clinics in order to, based on valid indicators, make benchmarking possible.

Also as a consequence there is, for obvious reasons, a need for a central/national leadership in order to accomplish this type of harmonised system. Following that, human resources have to be adequately prepared to manage the system.

Any chosen system has to be properly adapted to the cultural, social, economic and professional situation. Saying this, there is also a need for emphasising that a sophisticated hospital accreditation system may be entirely misplaced in a poor developing country where resources are best used if invested in, for example, primary care. There is, therefore, need for caution in that investment in such a scheme has to be related to the overall investment in health services in that particular context.

Appraisal of accreditation schemes may be done through surveys among concerned groups including the population at large. Also professional assessment of applied indicators and their validity will add further information. Focus group methodology has also proven effective in getting many faceted assessments including lay as well as professional views.

You may be interested to learn that presently the IHF, together with partners, developing a "sustainability communication platform" focusing on health organisations and their "behaviour" in relation to environment, human capital, etc. A pilot study is underway.

Trend 2: Governments Involving Themselves With Quality Measures

There is a trend in a number of countries for governments to get involved in the assessment of quality. Of particular note is the United Kingdom, where the government has introduced a system of a patient's rights known as the Patient's Charter (4). Patient's charters usually relate to quality as perceived from the patient's perspective.

The British government has taken this concept further and has started measuring the compliance of hospitals with this charter and from it has developed a 'league table' of what it considers to be the best and the worst performances in terms of the charter in Britain. This league table is published in the national press. This has infuriated many hospitals who find assessment of quality from this perspective quite absurd. There is, in effect, conflict between professionals who believe the key to quality of patient care lies in the arena of clinical issues rather than in patient comfort and convenience.

Another area where governments have involved themselves in hospital quality performance is in the publication of hospital mortality data relating to particular diagnoses and procedures; this practice has become a routine in the United States, Australia and Britain. Again, hospitals have complained bitterly about this approach as they feel that it makes a complex issue appear simple. That is, that there are many factors which contribute to mortality relating to a particular diagnosis or procedure which are unrelated to the skills of the individuals in the institutions or the physical aspects of the facility itself. Essential in establishing quality measures at government level is to have good working relations with legislative structures of the administration.

Assuming that this type of transparency of performance data is wishful from a patient/consumer perspective, there is certainly a need for investing in training of , in particular, physicians and managers. They, in particular doctors, have to accept that health services are to such an extent involving human, although highly skilled decision makers, who, under sometimes stressful circumstances, will now and then fail. This is a matter of changing attitudes about transparency and the feeling of being untouchable. But there is also a matter of knowledge and skills that may well be achieved through training and continuous education. It is about communication skills how to "translate" complicated statistics to explain for example why the sophisticated university hospital for certain diagnoses may have higher mortality than a small rural hospital. Appraisals may be done as described for Trend 1.

Trend 3: Utilisation Reviews

There are many organisations which are now identifying waste in health care systems. The Rand Corporation studies in the United States have shown that 1 in 4 hospital days was unnecessary and that 1 in 4 clinical procedures was unnecessary and that 2 out of 5 medications was unnecessary (5; 6). One would perhaps put this down to an extravagant United States health care system, however, we are now seeing figures developed in Europe which give similar reasons for concern. For example, in Britain the Royal College of Radiologists has also conducted a study which suggests that about a quarter of all radiology procedures carried out in Britain, are unnecessary.

Increasingly hospitals are therefore evaluating the use of supplies and drug usage. This of course relates to quality quite directly. For example, a study looked into the use of gentamycin in a large teaching hospital. In this study the criteria for prescribing this drug were developed and then pharmacy records reviewed to assess when it was being appropriately used. The study showed an extraordinary 80% of miss-usage of what, at the time of the study, was an expensive drug. These studies of utilisation, both in terms of procedures and supplies, have been very valuable in re-structuring education programmes for medical staff and nursing staff and also to affect disciplinary proceedings in hospitals.

Again there is a need to keep close links with health services research in order for them to produce valid information on the utilisation of health services. When relevant, this information will be of great value for health services' managers in their continuous effort to increase effectiveness. Also managers and clinicians need to set up criteria for assessing utilisation of services. Under which circumstances shall an old regime be cancelled, a new one introduced etc.?

As for investment opportunities and appraisal of utilisation reviews the same measures apply as mentioned in relation to Trend 1.

Trend 4: Treatment Standardisation

One of the most sophisticated approaches to standardisation of care to improve quality has been through the development of protocols for the treatment of particular D.R.G. Categories. These are now being made even more comprehensive by the development of critical clinical paths for particular procedures (7; 8). Therein is not only the requirement set out for the appropriate criteria of action but also the timing established for such interventions. One might perhaps dismiss this as overly academic and cook book medicine, however, let us examine the results of the use of such approaches. The benefits in cost and outcome terms. The medical staff are often

very antagonistic towards compliance with such rigorous criteria, yet it would appear that this must be the way of the future.

To establish standardisation, efforts have to be made to improve collaboration with professional groups. There is often too much scope for individual ad hoc decision making e.g. on drugs on grounds some feel are suspicious. Both peer pressure and regulation/legislation may prove effective in creating evidence based standardisation. Again the same recommendation for investment and appraisal apply as mentioned in connection with Trend 1.

Trend 5: Patient Education and Involvement

In many countries it is increasingly becoming accepted that quality of care relates in turn to patient involvement with care. That is, patients need to be informed as to, not only their condition, but also options for care. Indeed in the previous example of critical clinical paths, the patient receives a copy of his critical clinical paths so that he can, not only follow what is to be done but indeed prompt action when there is a problem.

There is increasing reliance also on assessment of patient satisfaction to improve quality of care. Of course many hospitals over many years have been using basic questionnaires to carry out this kind of assessment. These questionnaires and evaluation techniques, in terms of their focus and timing of application, have become very sophisticated. In some countries there have actually been patient representatives placed in hospitals to report directly to the ministers for health on their discussions with patients. Again patient and community groups are significant allies in relation to establishing patient involvement.

Hospital care is no longer an isolated world for the health professional. As citizens and consumers, people expect and often do have direct or indirect influence at all levels of the health care service system. Developments in medical science have for many years made the hospitals focus primarily on specialised services, and many consumers express concern about the management of more general health problems. Are hospitals of today ready to meet these challenges? How is the rising public awareness of ethical dimensions in patient care handled in health care systems or in individual hospitals? How should we prepare our hospitals and organisations to meet this intellectual challenge?

In particular, investment should focus on infrastructure such as availability of health and hospital information through the Internet that is made easily accessible at places where people live and work (netcafes, hospital lobbies, post offices, etc.)

Trend 6: Technology and Procedure Assessment

It may be hard for us to envisage how technology assessment relates to quality. It is my view, however, that rashly introduced technology may be inherently dangerous and if not dangerous then wasteful of funds which could be applied to more efficacious treatments and diagnostic approaches that in turn affect quality. Many countries are establishing national programmes for the assessment of technology before it is implemented. Such programmes, of course, relate to the government's ability to stop the use of technology in hospitals. Many countries are now beginning to use import controls and non-reimbursement of medical fees involved with the application of some technologies to control technology use.

Here I would recommend close collaboration with producers of health care technology. This may be arranged in a way that does not inflict on objectivity and integrity of the health services managers.

I recommend that investment in technology and new procedures is carefully contemplated before implementation. Considerations should be given to the fit between the new technology and procedures and the context (skills of staff, present technology and procedure) in which they are put in place. The appraisal of these initiatives should involve not only review of utilisation but also comparison with previous situation regarding effectiveness and efficacy.

Trend 7: Financial Disincentives

It is clear that health care payment systems affect the application of health services. For example, in comparison countries which provide fee for service payments more services are provided than those which are purely block funded. Just one example relating to caesarean sections is very educative. It is clear that how payments are made can directly affect quality of care.

Another dramatic example, in recent years, was in Germany where in 1994 the government introduced regulations which would have required that physicians who did not follow drug prescription protocols would have the differential costs deducted from their incomes. Even though the threat related to only 1% of their salaries, doctors have been complying with these criteria for prescriptions to such an extent that not a single doctor lost a single Deutsche Mark as a result of this programme. The result in saving for the government in Germany were in the order of 200 million Deutsche Marks. The German example shows, I believe, the value of health services managers having a good collaboration with health economists and behavioural scientists who know to what extent and how incentives and disincentives produce results.

Trend 8: Integration of Health Services

In some systems the care of the elderly is entirely integrated with hospital care, in others totally separated. Intermediate forms also exist. Independent from the form of system that is in place, several issues are common regarding the care for the elderly. That is, for example:

- How to care for an ageing population?
- How to find the appropriate balance in levels of care for the elderly?
- How to ensure quality of care for the elderly?

This is a topic that should be discussed in a broad professional context, i.e. by hospital managers and health professionals from hospitals as well as from other organisations such as nursing homes, managers of organisations for the care of the elderly. Similarly, hospitals do integrate also with primary health care.

After four decades of unprecedented growth and development - technical as well as scientific - in the hospital sector, it is generally acknowledged that lack of co-operation with the primary health care sector denies society the ability to meet the needs of the population. Modern technology also offers new possibilities for communication (e.g. telemedicine) between the sectors and provides opportunities for conducting many procedures outside hospitals which, a few years ago, could only be done in hospitals. Locally or as part of health care reforms, reallocation of health service elements from hospital to primary care, has taken place.

Many initiatives to develop rational and effective interaction between the two sectors have been explored in the 90's, and in the next century we will have to do even more in exploring the interface between in-patient and out-patient care.

Hospitals are or should also be, in many ways, integrated in the care of the mentally diseased. The consensus, for decades, regarding the question of the mentally diseased has been one of de-

institutionalisation. The question which now needs to be addressed is whether such a solution was perhaps too drastic in that not enough consideration was given to the peculiarities and diagnosis of patients. It is now time to reassess through scientific and practical evidence to what extent patients and relatives are suffering unforeseen effects of the present de-institutionalised and home-based system.

The above three examples of integration may happen at local, regional as well as national level, i.e. between single health services entities as well as established as a national policy decided by parliament and regulated by law. In between these two examples there are many other aspects of integration.

Investment in infrastructure such as buildings, location, transportation, communication should consider the possible need for integration of services. For example, a nursing home for care of the elderly should not be placed too distant from the hospital providing medical service for the elderly in that unit. I think this is a matter for utilising expertise from engineering, architecture, communication sciences, etc.

Appraisal of these investments may be made through benchmarking in relation to non-integrated services and their effectiveness. Otherwise measures of feed back from concerned parties are recommended (as listed in connection with Trend 1.)

Conclusion

A key question is, 'who should control the process of the quality assurance mechanism? - should this be the government, should it be patients or should it be professionals?' My view is that there should be a sharing of such assessments but that ultimately the responsibility should be placed in the hands of the professionals.

My view is that there is a need for some regulatory mechanism, be it laws or agreements between significant actors. There is no blue print in this respect to be recommended. Only, it should be made transparent the processes and outcomes of quality assurance. This information should be accessible to the public and other interested parties. These parties may be patient groups, community councils, companies, professional groups. The mixture and focus will differ from country to country, from issue to issue.

From what has been said in this section of the paper, quality assurance of health services can not be properly implemented unless a co-ordinated computerised information system is in place. Another prerequisite is the investment in developing human skills in order to match these investments.

Appraisal of applied investments relating to the improvement of quality of services may, as has been said, be done in many different ways using (depending on what is to be assessed) economic measures, panels of experts, focus groups (mix of lay and professionals), surveys, etc.

The Health Promoting Hospital

The health promoting hospital has a key role in improving public health. Its role is many faceted and in particular related to the following aspects:

- To provide good examples of health promotion models as evidenced in areas such as food menus for patients, visitors and staff, provide smoke-free environment, etc.

- The use of its individual medical record system to collect public health data in such areas as socio-economic differences, trends, differences between geographical areas, etc.

- To provide to the public, media, decision-makers and others, information relating to the mentioned areas. This is in order to contribute to a more solid foundation upon which decisions on measures relating to public health may be based.

- To participate actively in public debate providing professional and expert opinions on improving public health.

I will now further elaborate each of these four key roles for the health promoting hospital as an ally of public health.

Trend 9. To Provide a Good Example

There are many ways in which the health promoting hospital may be an ally of public health. One way is to provide a model for others based on scientific evidence, ethics and commonly agreed values. These may be initiated through the introduction of non-smoking policies, nutritional standards, environmental awareness and in general a transparent organisation based on democratic values and equity in access.

Although the existence of a healthy workforce may be evidence of a good example of health promoting activities, contrary examples and negative results have, nevertheless, been reported by the Nuffield Trust.

Financial constraints, in many countries, have forced services to be restructured which has resulted in a rise in unemployment among health works in many countries. Are hospitals providing outsourcing services to those that are forced to leave?

A lot of medical evidence is in support of non smoking policies and nutritional standards. More importantly, however, there is evidence for creating a hospital in which the public will have confidence and one in which when it comes to policy-making, the views and opinions of other spheres of the society will have to be taken into account. Environmental issues are examples of many more such areas which should be used for an integrated health promoting hospital policy. Initiation of these activities may influence such policy areas as waste management, energy production for heating, assessment of the quality of building material, cleaning products, transportation for staff and patients, etc.

What about collaboration with municipalities, another significant ally, who are responsible, for example, for pushing sand and salt on frosty pavements. A fall on such a slippery surface is the cause of a significant number of femur fractures particularly among elderly women in Northern Europe.

A properly co-ordinated and managed public transport system to hospitals could result in savings of up to 25 %, as evidenced in a project conducted in Hamburg. In this case companies and environmental authorities should, perhaps, be our allies.

A comprehensive hospital policy has to consider knowledge and experience from other sectors in order to create hospitals that reflect the main relevant and available information and knowledge. This will provide one prerequisite for public trust in hospitals.

Investors in health promoting hospitals/health services, in order to provide a good example, may favour those hospitals that practise, for example, environmental friendly policies. The latter may be assessed (as discussed in relation to Trend 1) through certification or accreditation processes. Agreements on loans/investments may stipulate inclusion of policies and processes for appraisal as hinted above.

Trend 10. Hospital support to provide public health oriented information

Another way in which the health promoting hospital may become an ally of public health is in the provision of relevant information. Even though, by nature, the information in principle is collected at the individual level, it may well be aggregated and desegregated in line with public health paradigms and criteria. This may, if well managed, promote better hospital management and procedures and ultimately, again if relevant and valid information is generated, influence general health policy.

Another reason for providing information relevant to the public is to create transparency in relation to individual hospitals and clinics, so as to create consumer friendly assessment of procedures and outcomes of specified medical regimes and clinical practices. Individual choice, where available, at national, county, and doctor-patient levels, as well as within hospitals and clinics, will be facilitated.

Although, as acknowledged that interpretation of information often is very difficult and includes many methodological problems of inference, if properly publicised, will create a better understanding of the functioning of hospitals.

Transparency of processes and outcomes are prerequisites for creating a more trustworthy image of health promoting hospitals. This might need some regulatory and legal changes in some countries. Implementation of such changes would require hospitals to create information systems that utilise the individual medical records for the public good. In order to accomplish this task, however, there will be a need for hospitals to rely on the application of a variety of competencies from many disciplines.

Investors and lenders may in this connection consider to include in their agreements with health services clauses that provide conditions supportive of transparent information systems. The latter can then provide performance data made accessible to the public in appropriate language.

Investment may be necessary in developing these systems for which exemplary show cases are already available (9).

Assessment of the adequacy of these investments may be conducted with the use of statistics, surveys of concerned groups before and after, to ascertain the extent to which there is improvement in the level of information available.

Trend 11. Information to the public through the media and other sources

What has been said before on availability of information is of special relevance in relation to the various media sources. Information has to be presented in a form that facilitates public understanding of inputs, processes and outcomes of health promoting hospitals. This will create

a more solid base upon which the individual as well as the public may make their decisions. The establishment of mutual interest between the public and hospitals, independent of any other factor, should provide the basic environment for creating such a well understood system of information. The information to be published should be clear and understandable and all problems of interpretation should be explained in common language.

Regarding processes, i.e. clinical practice and management, a critical assessment procedure should be in place. A sound evidence based management system should be established upon review, as is the case with evidence based medicine. Certain steps and criteria should be set up in order to create evidence based management of health services. These criteria, design and methodologies to be used for measurement, might differ to a lesser or to a greater degree, in comparison to those applied in evidence based medicine. Too often, management practice is a reflection of the most up-to-date fashions, like in the clothing industry.

Caution, however, must be applied, whenever the question of blue print of policy and/or management is raised. I believe that there is no one management blueprint or policy model available. I believe, on the contrary, that each country has to develop its own model based on its own history, basic values, financial constraints, available manpower, etc. Only at a very superficial level can blueprints, I believe, be applied.

Investors should be aware that blue prints, other than at a very superficial level are not easily available. A critical analysis would, in my mind, be welcomed of the effects on health of lenders and investors insisting on dramatic changes in, for example Russia, to significantly privatise services. What are the responsibilities of lenders/investors? Lenders/investors should seek to consult not just experts in such obvious disciplines as economics, but should endeavour to expand and involve experts within other varied disciplines, in order to avoid situations where the effects of any risk undertaken would not prove counterproductive to health targets.

Appraisal of effects might be done through comparison between countries/areas/hospitals that from the beginning were in some sensible sense equals but later were allocated to control and experiment like situations. But real controlled experimental trials can not realistically be set up at this societal level. For example, controls rarely stay in control like circumstances but rather turn into comparison groups.

Trend 12. Health promoting hospitals to participate in the public debate

In many ways this issue may be in conflict with the views of certain professionals regarding their roles. I would, however, like to make a plea to health professionals that according to their individual competencies and skills, participate more actively in public debate. The value of the professional status the so-called "white robe status" is not to be underestimated. This role should, of course, be performed with great regard to ethics and based on professional evidence, in order that the value of its performance may be enhanced. The role model approach, health professionals as peers, may be a strategic approach in drawing the attention of the general public, as well as the attention of special target groups.

Investors may wish to add this aspect as a prerequisite for agreement on loans/investments. Comparisons between hospitals with different policies and practices on this "public debate "role of hospitals may provide information needed in appraising this type of action.

Conclusions

Lenders/investors are very powerful if they were to exercise in full their potential in influence. This may be done by way of policy direction and action through agreements signed also by the receiving organisation. When considering applications for support I recommend that a broad range of expertise be consulted prior to the undertaking of any decision in order to avoid the mistakes and pitfalls referred to in this presentation.

I am looking forward to the development of indicators of the health promoting hospital as an ally of public health whilst considering aspects such as:

1. The level to which health promoting behaviour is being practised.
   This may be illustrated in a summation or additive index of such behaviour, although behaviour may differ according to their impetus. The latter may be an argument for consensus making, in order to create a weighed index.

2. The level to which hospitals use their information to the good of public health approaches. The workings of a consensus panel may be useful in this instance.

3. The level to which hospitals provide information and data relevant to public health in a way that is understood by the public, media and other important actors. A combination of experiment data and analysis of publicisied material may be utilised.

4. The level to which hospitals demonstrate their participation in public debate based on empirical evidence, in order to create an improved public health system, including less inequalities in health and in access to health services. In such circumstances, development of a composite measure (qualitative and quantitative) on this dimension, may be required.

As obvious as the object of this presentation may be, there is nevertheless a need for some form of regulation or agreement, be it at governmental or other levels between concerned parties. Concerned parties and regulation may only be defined at country level. I imagine, however, that most countries will need some formal action to establish the basis or criteria on which hospitals and health services may be assessed.

Acknowledgement

Regarding the first part of this paper I am grateful for being given the right to use material on quality assurance authored by my predecessor, Dr Errol Pickering (1).

References

1. Pickering, E.: Quality Hospital Care - Global Trends on Future Challenges. *World Hospitals and Health Services*, vol. 33, no. 2 , IHF, London, 1997: pp. 3-7.
2. Joint Commission: *Hospital Accreditation Standards*. Illinois, Department of Publications, 1999.
3. Shaw, C.: Hospital Accreditation in Europe. *World Hospitals and Health Services*, vol. 34, no. 1, 1999: pp. 15-20.
4. Department of Health: *The Patient's Charter*, reprinted HMSO. London, 1991.
5. Gifford, D.S., Keeler, E., Kahn, K.L.: Reductions in cost and caesarean rate by routine use of external cephalic version: a decision analysis. Obstet Gynecol 1995 June; 85(6):930-6.
6. Keeler, E.B., Park, R.E., Bell, R.M., Gifford, D.S., Keesey, J.: Adjusting caesarean delivery rates for case mix, *Health Serv. Res.* 1997 Oct;32 (4):511-28.
7. Zevola, D.R., et al: Clinical pathways and coronary artery bypass surgery. *Crit Care Nurse*. 1997 Dec;17(6):20-33;quiz 34-5. Review.
8. Huttin, C: The use of clinical guidelines to improve medical practice: main issues in the United States. *Int. J Qual Health Care* 1997 June;9(3):207-14.Review.
9. Reichle, C., Lerch, M., Fedke A.: *Better patient information for better healthcare*, Hannover, Germany, Department of Epidemiology, Medical School, 1999. WWW.therapie.net.

Opening

The Impact of Primary Care Reforms on Health Service Investment in England

by

Prof. Laurie McMahon
Office for Public Management
London , United Kingdom

Content

1. Overview

In this paper we suggest that the current pattern of health services in the NHS is becoming increasingly unstable. A new Labour Government - determined to abolish the internal market and modernise the NHS - has reformed the primary care side of the NHS by creating *Primary Care Groups* (PCGs).

We have used our simulation based 'soft futures' methodology to explore what additional momentum PCGs might provide in changing service configuration. The first results suggest:

- that we are about to see a marked and rapid reduction in the number of District General Hospitals providing the full range of specialist care in the UK
- that to capitalise these changes private\public partnerships are inevitable
- that primary care reform might be the most powerful lever in re-engineering health services
- that greater leverage can be exerted by enabling GPs to provide services than by strengthening their 'gatekeeping' role.

2. Background

UK Governments interested in reforming the health system never know quite what to do about their GPs. Aneurin Bevan's attempts to set up the NHS were almost thwarted by an inability to strike an appropriate deal with the BMA. It was only at the eleventh hour that the compromise that allowed them to this day to remain 'independent' contractors to the government was found. In 1989 Ken Clarke had a notion that since GPs were close to the consumers they should help bring market forces into the NHS. By the clever tactics of making the offer financially attractive but also voluntary, his 'wild card' of *GP fundholding* had grown to cover over 50 per cent of the population by the time of the 1997 election. But there were difficulties ahead. Not only was the money that lubricated the fundholding system getting tighter but general practice was in a mess.

In their enthusiasm to draw more GPs into the scheme the government had created three distinct forms of fundholder whilst also creating a 'locality commissioning' scheme whereby groups of non-fundholding GPs 'advised' health authorities on the services to be purchased on behalf of their patients. There was even the Primary Care Act Pilot Scheme which, among other things, allowed GPs to be paid for health services normally provided by trusts and for the first time, to be in the salaried employment of those trusts. But even more troubling was the fact that general practice was at the centre of a political paradox.

No matter how individual patients enjoyed such benefits of fundholding as reduced waiting times for hospital appointments, the charge of a 'two tier would not go away and there was a growing concern that the considerable savings that could be made by fundholders were not always used for better health services. It was no surprise that the abolition of fundholding was one of Labour's key health manifesto pledges.

3. Labour's Reforms

So in the NHS White Paper of 1998, which was designed to remove the trappings of the market from the NHS, we saw that the GP map in England was to be tidied up. 'Primary Care Groups' (PCGs) were to be created, consisting of all the GPs who served defined populations of between 80 and 120 thousand people. The intention was for these groups eventually to become trusts (PCTs) independent of the health authority. The GPs involved would jointly hold a population-based budget to commission or provide all the health services and medicines that their patients required.The GPs' reaction to this proposal ranged from anger at losing the freedoms of fundholding to grateful acceptance because they saw this as finally putting GPs in firm control of local health services. The timetable for grouping the GPs into PCGs was brisk and to almost everyone's surprise, by July 1998 all English GPs found themselves in a PCG. This I suggest was the start of the most radical reform of the NHS yet.

3.1 Initial Responses

Detractors and supporters alike have identified the problems. There are concerns about the ability and willingness of GPs – traditionally highly independent and not above feuding at times – to work together to handle common commissioning plans and care management protocols. There are concerns that 'autonomous' PCGs will inadvertently collapse the financial or clinical 'critical mass' of trusts by moving even quite small 'chunks' of service around the system. There are concerns about accountability both for the expenditure of large sums of public money and also about the lack of accountability of PCGs to the public. There are concerns about the capacity (or interest) of GPs to identify public health needs rather than those of individual patients. There are others – all more or less well founded. But at the heart of the PCG reforms is the desire to have GPs properly integrated into the system – of having processes to encourage GPs to improve the quality of primary care in a systematic way and also of GPs having incentives to reverse the pull on patients into acute hospitals and provide people with better access to more local services.

3.2 Will it Happen?

As so often when faced with fundamental change there those who say 'it will never happen' – just as they did about the purchaser/ provider split. Now, as then, I think they are wrong. Not only do we have a determined government with an effective implementation machine in the shape of the NHS Executive's regional offices, but I think the speed with which GPs learn is underestimated. Using a 'whole system' simulation called ***'PCGPower'***, we have repeatedly seen groups of GPs adjust very quickly to the new circumstances and understand very clearly the advantages of working in concert. They soon understand that, on this scale, general practice needs strong general and financial management and that they must have an effective way of aligning interests within and between PCGs. We are beginning to see this happen in reality and it is this will transform the NHS in terms both of management structures and of services.

3.3 Impact on Structures

Dealing with the structures first, we have already seen across the NHS the number of health authorities fall by almost a half in the last six years. From ***PCGPower*** we see that this trend will continue, fuelled by the need to reduce health authority management costs as those of PCGs rise

and the fact that the PCGs will take over many of the current functions of health authorities – especially those related to commissioning. The PCGs themselves will inevitably merge. The current boundaries are often arbitrary – sometimes drawn to accommodate the 'culture' of individual practices – and many are simply too small. More important will be the GPs' realisation that they can have greater control and reduce their costs if they combine. Equally powerful in some cases, will be the pressure to reshape PCGs to create co-terminosity with local authority boundaries so that effective working relationships between health and education, social care and other services can be facilitated. Since PCGs have boards that are more akin to those in the private sector – not expressly designed for public participation - new forms of engaging with the public will emerge as PCGs seek to understand their patients' needs and preferences and avoid the charge that they are unaccountable to local people. Even more dramatic will be the changes that PCGs will produce in the nature and location of our health services.

3.4 Impact on Service Configuration

PCGs are already voicing their intentions to take community nursing and other clinical services out of NHS Trusts and to bring them under their direct management. This coupled with the likely creation of larger, specialist mental health organisations means that community trusts are unlikely to survive beyond some transition phase. But even more dramatic may be the impact on acute hospitals.

We created a simulation based futures process known as **'Squaring'** (circles). This has allowed us to draw on the opinions and judgments of over 1000 managers, professionals and politicians about the impact of the pressures for change in the NHS. The process involves mixed groups first identifying the forces and drivers at work and then working together in a simulated but highly realistic health system until they find the 'best fit' – that pattern of services that best accomodates all those pressures for change.

Our players have identified an array of forces and drivers bearing on acute services – ranging from technical innovation in such areas as diagnostics, communications and pharmaceuticals through to the impact of workforce shortages, the demands of training and the now relentless pursuit of greater clinical effectiveness. These forces are both centrifugal – drawing some services out into community settings – and centripetal – concentrating others into ever larger hospitals – and the sheer line between these opposing forces is right over the roof of the typical district general hospital (DGH). In due course our players suggest that these pressures - present in many European systems - would force some DGHs, perhaps as many as one in three, to close or dramatically alter the level of care they provide.

But it is the simulations that we have run since the introduction of the primary care reforms that lead us to suggest that the effect PCGs will be galvanic – rapidly accelerating this down sizing process. Our players suggest that it is when PCGs have matured sufficiently to think about what services they could provide (or have provided on their behalf) in their own facilities that the big changes happen. In the simulations we have repeatedly seen 'GP hospitals' emerge.

These hospitals are in population centres of 80 to 120K and are either purpose built or are set into existing building stock. They have no overnight beds, house 50 to 80 better remunerated doctors, providing, in addition to family medicine, specialist outpatient clinics, virtually all day surgery and a comprehensive range of diagnostic tests that currently necessitate a patient trip (or trips) to hospital. To do this they work closely with the hospital consultants developing their own skills and specialisms with a much enlarged, multi-disciplinary team. There is also a 24 hour

emergency service with protocols to guide patients into more specialised services if they need them.

Although there are no longer individual practice premises dotted around the town, we have seen the emergence of a much more dispersed and accessible primary care service with 'health shops' in places like schools, malls, hotels and work places. We have also seen radical improvements in the extent and quality of non-NHS nursing homes to cope with those requiring intermediate care. All this serves to take clinical work and revenue from the local acute hospital and adds an irresistible pressure for consolidation of more specialised services into bigger remote 'metro' hospitals.

3.5 The Capital Requirements

In the NHS there is insufficient 'free' public capital to fund these changes because it is all locked into maintaining the existing pattern of acute hospitals. The only available source of 'hump funding' these new facilities (costing between £5-£10 million each) will come from the private sector. Private finance may be a bitter pill for some NHS traditionalists to swallow but for the investors, these smaller schemes with a more predictable flow of revenue and more flexible buildings appear to be much more attractive than big secondary care hospital projects. This Government has also demonstrated a keen interest in public\private partnerships in other areas, not just on economic grounds but as a demonstration of partnership working and the 'third way' ideology. Our players felt that private sector involvement in this way will be of little concern to a public who can see in their bright, new, accessible hospital tangible evidence of a modernising NHS. These local hospitals will also serve to lower the level of 'civic loyalty' to the existing bricks and mortar.

More problematic than securing investment will be the required disinvestment from the current service configuration. The next stage of our simulation programme will be to more closely at the workforce, estates and service delivery constraints of reducing the service range and number of acute hospitals.

4. Conclusion

Obviously the managerial and accountability arrangements for PCTs need to be clarified and strengthened and that is already beginning to happen. More problematic perhaps is the need for those providing services to become much less tolerant of the institutional interests of the hospitals blocking the remodelling of services across organizational boundaries.

More health authorities are going to have to bite the bullet and tackle the structural problems in acute services that have been haunting a number of health 'economies' up and down the country. Having stand alone hospitals (still) competing for survival on the margins of clinical effectiveness and solvency is draining the energy and morale for managers and more particularly for clinicians.

Those in the NHS Regions have to continue the move towards a more developmental style of performance management and be more relaxed about taking an assertive role in managing whole system change . They are the only players who can balance the strains of a service under change with the realities of local and parliamentary politics and it is they who are best placed to break down the departmental and sector 'silos' that inhibit partnership working for health improvement. And if all of this is to happen, a key task for the politicians and civil servants at

the top of the NHS is to find ways to help the public and those who lead local opinion think beyond the rhetoric of 'save our hospital' and understand the policy trade-offs and benefits involved in modernising the NHS.

From what we have seen from our simulation work it is the creation of large groups of relatively independent and appropriately incentivised GPs within a managed system that will provide the best lever for the modernisation of the NHS. For those working in other European health systems the key learning points may be:

- the degree to which the pressure for change in the system was intensified by the formation of PCGs
- the fact that many of the forces and drivers are beyond the control of local, regional and even national governments
- the apparent volatility of well established patterns of services and the speed with which our players anticipated changes will happen.
- the general lack of understanding about managing disinvestment from the existing acute hospitals
- the relative importance of the 'service provider' role of primary care over the traditional 'gatekeeping' role in reducing the number of acute hospitals
- the power of primary care reforms to generate 'whole system' change.

Session 1

The Changing Environment of Health Care Services

Status and International Trends in Health Care Systems: Is the past Prologue?

by

Richard Saltman, Ph.D.
Professor of Health Policy and Management
Rollins School of Public Health of Emory University
Atlanta, USA

Content

1.Introduction

The current era of systematic health system reform in Europe is more than 10 years old. The initial reform effort in a tax-based system was in Stockholm County in January 1988, while the first systemic restructuring proposal in a social insurance country was the Dekker Report, issued by the Dutch government in March 1987 (1). From these beginnings, an entire policy movement has mushroomed. It is a commonplace now to observe that systematic health sector reform is underway in most countries of Western as well as Central and Eastern Europe. The process has moved so far that the interesting question for some has become those few countries which have not set out to reform their health systems.

This 10 year process has generated a substantial body of experience with health sector reform. Both positive and negative dimensions have been described, discussed, and at least preliminarily assessed for a variety of different reform mechanisms, and within a number of different health sector sub-systems (e.g. hospitals, primary care, nursing home care, home care, dental, mental, pharmaceuticals, etc). How one interprets the available corpus of evidence, however, appears to be coloured by one's disciplinary training - what Thorsten Veblen, an American sociologist, referred to as one's "disciplinary blinders." Those who prioritize first and foremost the universality of health system access and the equality of outcome amongst the entire population have decried what they find to be the negative social consequences emerging from the current reform process. They argue that, starting with the Dekker Reforms in 1987 in the Netherlands (1) and Mrs. Thatcher's NHS white paper in January 1989 (2), European health reform has overemphasized economic concerns about cost containment, and has introduced a variety of market-derived mechanisms which have damaged solidarity and worsened the health status of society's most vulnerable groups (3; 4; 5). In short, they see European health reform in the 1990's as having gone far too fast, at too great a social cost.

Conversely, one finds that many health economists interpret the same evidence almost exactly oppositely. Driven by the imperative of achieving enhanced economic efficiency by reforming what they consider to be a wasteful service delivery structure, these analysts view the last ten years of health sector reform to have been largely cosmetic rather than structural in nature. They argue that the "public monopoly" in health care financing has not been broken in publicly operated health systems like that found in Sweden (6). They also find efforts to introduce managerial independence into provider institutions by transforming them into quasi-independent "public firms" to be only partial and inadequate (7). Frustrated with the seemingly slow pace of what they believe ought to be root and branch reform, some health economists have come to decry the "epidemic" of inadequate and incomplete reform programs and have begun to hunt for an alternative term for the entire current process (8). In short, from this decidedly opposite perspective, the health reform process has so far failed to adequately transform the health sector into an economically efficient, private-sector-style industry.

This debate between advocates of social solidarity and public health as against advocates of economic efficiency and cost containment provides a useful conceptual lens through which to view the topic of health sector reform in Europe. With regard to past experience over the last decade, it suggests that there are multiple strongly held interpretations of existing evidence to date. With regard to likely future developments in the next decade, it implies that different interpretations and shadings will be placed on the policy priorities that will be presented. In effect, much as this debate has come to colour the view of the recent past in the European health sector, it is likely to frame where policy emphasis is placed regarding initiatives in the coming years.

The objective of this paper is to transcend this Veblenian partialism by sketching out neither a public-health-driven nor an economic-efficiency-driven view of health system reform. Rather, drawing on both these interpretations of the evidence as well as several additional perspectives, this paper will approach the assessment of health sector reforms as a review of an ongoing public policy process. It will begin with a review of recent experience in the sector (Point 2), to be followed by a consideration of the likely future pressures that can be expected to influence policy making over the next decade (Part II). The paper concludes with an assessment of the central policymaking avenues that would allow national decision makers to channel these future pressures into directions more consistent with general national health policy objectives (Points 3 and 4).

2. The Past Ten Years

There have been two main avenues of health sector reform in Europe during the 1990's. One has been to add micro-efficiency at the institutional level -- managerial efficiency -- to the macro-efficiency that had already been largely achieved in the 1980's at the aggregate, health system level, in terms of restructuring overall health sector expenditures (9; 10). The second concerns how to achieve that desired institutional-level micro-efficiency, which has been by adding entrepreneurial behaviour -- that is, creative and innovative behaviour to improve services and generate new activities -- to the central health sector value that European policymakers still seek to retain, which is solidarity (11).

These two themes -- adding micro-efficiency to macro-efficiency, and adding entrepreneurial behaviour to solidarity -- draw together a wide variety of recent health policy initiatives across the different sub-sectors of the health care system, from hospitals to primary care to pharmaceuticals to dental care, and go a substantial way toward explaining the emergence of the various new models of health system governance that have begun to appear across Europe in the 1990's. Based on these two themes, one can consider how different governance arrangements are constructed, and what the available evidence and experience in Europe indicate about the emerging new role of the State in the health sector.

Issues of health sector governance have been discussed under a variety of headings over the last 20 years. Among the more visible, and in some respects rather similar, headings have been: "State vs. Market", "Public vs. Private", "Regulation vs. Competition." A great deal has been written about each of these health policy dichotomies (12; 13; 14). Each is often presented in the policy debate as a choice between opposites, between two mutually exclusive and incompatible concepts for constructing a system of health sector governance. This incompatibility is, of course, directly related to the differences in policy interpretations discussed in the Introduction above.

Yet, when one looks across Europe at the various new models of health system governance actually adopted in the 1990's, one sees not dichotomies but rather a variety of efforts to transcend these dichotomies, to generate new models which, in various different degrees, seek to incorporate key elements of these theoretical dichotomies into pragmatic workable health sector arrangements. Here, too, are a variety of terms that many of you are familiar with:

"internal markets" (15)
"planned markets" (16)
"quasi-markets" (17)
"managed markets" (12)
"public competition" (18)

"regulated competition" (19)
"mixed markets" (20)

When one reviews the various reform experience across European health systems, the common thread that connects these different models is an effort to combine the two strands of the central theoretical dichotomy: to inject competitive incentives and entrepreneurial behaviour into what remain publicly controlled and/or publicly accountable structures of management. This is also true in certain recent changes in tax-based systems in the UK and Sweden that, while back-pedalling competitive elements to emphasize co-operation, still do so within a less bureaucratic, more entrepreneurial framework of health system governance. In essence, the common policy thread has been the desire to gain the advantages of market efficiencies without surrendering the social justice that has been achieved through public control and/or accountability.

A further point here concerns where these models have been applied within health systems - to which part of the system. This assessment draws on the rudimentary three-way framework in Figure 1 for health care systems (10). There appears to be a general pattern in which predominantly tax-funded health systems have sought to apply these new models of governance exclusively to the production side of the health system, to the organizational arrangements for the delivery of health services, e.g. hospitals and primary care. In economic theory terms, in tax-funded systems, these new models have been applied to the supply side of the health system. These new models have been adopted in the UK, in Sweden, in Finland, in parts of Spain and in parts of Italy. The available evidence suggests that these supply side models have, first, generally moved beyond development to introduction, and second, have been reasonably successful in reaching a number of the organizational and financial objectives that national policymakers have set for them (14; 21; 22).

Figure 1. Rudimentary Health System model

(Demand)		(Supply)
Funding	Allocation	Production
- tax	- integrated budgets (salary)	- hospitals
- social insurance	- contracts	- physicians
- private insurance	- reimbursement	- nurses
- self-pay	- prospective	- nursing homes
	- retrospective	- home care
		- OT
		- PT

Source: 10.

Quite differently, in predominantly social insurance funded systems like those of Germany and The Netherlands; the effort to develop and apply new models has concentrated almost exclusively on the funding side of the health system, on how the money is raised. That is, these new hybrid models of governance have been intended for application to what in economy theory is the demand side of the health system. Here, the available evidence suggests two points. First, in practice these models have not been put into place, certainly not in Germany or The Netherlands. Second, this reflects, in turn, judgments of national policymakers in Europe that efforts to focus new models of governance on the funding side of health systems don't work very well, either financially or in terms of maintaining appropriate levels of social responsibility and solidarity.

This interpretation, of course, reflects the problems that European policymakers identify with the only developed country which has allowed entrepreneurial behaviour on the funding side of the health system to fundamentally outstrip regulatory control by the state -- the United States. It also is fully consistent with recent experience in Central and Eastern Europe, certainly in the Czech Republic, and, interestingly, in Slovakia, where after several difficult years with eleven different health insurance funds, the new government is now seriously considering recombining these different funds into a single national health insurance fund similar to that found in Hungary. By way of summarizing this point, the past 10 years experience with the application of these various models of health system governance appears to suggest that, while entrepreneurial behaviour can in fact be combined with solidarity and social responsibility on the production, or supply side of the system, it appears difficult to combine these two on the funding or the demand side of the system (14; 22).

When one reviews the experience that governments have had over the 1990's with the introduction of these various new models of governance -- specifically in predominantly tax-funded health systems, and on the production or supply side of the health system -- what one observes appears broadly counterintuitive. That is, it is almost exactly opposite to what the proponent of some of these models had forecast. What had be forecast was that as decision-making power moved out of the central public bureaucracy and into the hands of various decentralized and/or self-managing units, which could act entrepreneurially and were in some degree of competition with each other, that the role of the State would shrink.

In reality, no such thing has happened. What has changed is not the importance and power of the State, but rather the nature and focus of how that authority is deployed. Instead of centralizing inputs, the State is now learning how to monitor and evaluate outputs. Instead of dictating behaviour, the State is learning how to set standards for measuring performance, how to evaluate that performance, and how to reward good outcomes. In essence, the State is reconfiguring its role to one that focuses on setting strategic policy direction. In the words of a popular policy metaphor, the State is learning how to "row less, steer more" (23).

This, of course, makes conceptual sense. If operational decisions are being pushed down to lower level institutions, whether through decentralization and devolution in the public sector, or even privatization of ownership or management, there is an enhanced need for a central coordinating and strategic role if the country is going to have a consistent universal health policy that applies to all citizens - that is, if solidarity is to be maintained. To achieve this, the State needs to be equally as strong, perhaps even stronger, as well as more sophisticated and competent in its day to day behaviour, so as to be able to perform new and more difficult tasks. Ironically, this leads to the conclusion that the more diversity in one's health system, and certainly the more market forces one incorporates into one's health system, the more a powerful, competent State is necessary. On this issue, there is a wonderful consistency of opinion between Milton Friedman, the extreme right University of Chicago economist, and Karl Marx, the far-left social revolutionary: Both believed that, if the correct economic model was adopted (admittedly each a different model in mind) and if the economy was correctly structured, then the State would become unnecessary and would wither away. Recent evidence in European health systems provides a clear example of the extent to which they both were flat wrong on this issue.

3. The Next Ten Years

Having discussed the conclusions one can draw from the past decade of experience with health sector reform, the second part of this paper focuses on the major factors that will likely influence future health policy decision making over the next decade. This switch involves not just one of

focus, but, obviously, one of intellectual methodologies as well. To talk about the context, the environment, within which future health policy decisions must be made, one can not be discussing "evidence-based policy," but rather what best can be termed "evidence-based speculation." One extrapolates from what has already been established, to come to policy conclusions that, by their intrinsic, long-term, future-oriented character, can not be attributed exclusively to past research results and experience. This evidence-based speculation approach is not, it should be noted, an exercise in uninformed, ungrounded, or ideological speculation about the future of the health sector. Rather, evidence-based speculation simply tries to keep in mind what one has already learned and understood as one surveys the next period that extends out in front.

One can speculate about the likely future of European health systems in a variety of different ways. For those who are committed to achieving a greater role for public health, and for inter-sectoral action, in the development of future health policy, there is the hope that, in the future, there will be less of a gulf between medical care systems and what could truly and correctly be called systems for health and health gain. Some public health advocates have suggested, for instance, that in the future governments should no longer have separate ministries to deal with health, environment, labour, etc., but ought to have only a single National Authority for Well-Being. This, of course, raises the problem of whether one gigantic Ministry could possibly behave efficiently and responsively. At the other end of the conceptual spectrum, some neo-classically inclined micro-economists fully expect that, in the future, all health and medical care systems will have achieved ideal efficiency levels by converging into a set of private contracting mechanisms, in which the only arbiter of all policy decisions will be the personal preferences of each separate individual consumer, and the clearing price for each purchase of service.

Looking at the policy environment more generally, the major pressures that European health systems will confront over the next 10 or 20 years are likely to be at least as much external in genesis, from outside the health sector, as they will be from inside it. Indeed, if one inventories the major pressures that European health systems confront today, it is clear that a central policy capacity which health systems will require in the future will be the ability to deal in a pro-active manner, ahead of the curve, with various types of externally generated shocks that have no direct connection to health systems and have little interest in their mission.

The process of health policy making in Europe will likely be dramatically affected over the next decade by a series of changes in the external environment that are already well underway. While these factors are typically generated by forces outside the health sector, they can be expected to constrain the degrees of freedom for policy making, as well as to stimulate additional pressures for structural change within existing funding and delivery arrangements.

Among the major pressures that can reasonably be anticipated are the following:

1) Epidemiological and demographic pressures for increased chronic care, home care, and elderly care services.
2) Economic pressures tied to the growing globalization and regionalization of economies, generating
   a. imitations on public funding for health care leading to pressures for privatization, and
   b. pressures to prioritize individual curative over population preventive forms of care.
3) Geopolitical pressures reflecting the growing role of the European Union in health policy making in Europe.
4) Technological pressures generated by the ongoing electronic industrial revolution regarding collection and distribution of information, including
   a. bio-engineered-pharmaceuticals, gene mapping, and custom drugs

b. expensive new and/or "heroic" procedures
c. downsizing and decentralization of diagnostic and therapeutic procedures
d. telemedicine
e. Internet access cross-nationally to diagnostic, therapeutic, and pharmacological treatment options

5) Structural and organizational pressures to rationalize provider institutions into integrated care networks.

While space does not permit a thorough discussion of each of these categories, the likely impact of each on the process of future health policy making will be briefly considered, each in turn.

3.1 Epidemiological and demographic pressures

A great deal has been written about the "epidemiological transition" that developed countries have gone through, in which infectious disease declines while the volume of chronic disease dramatically increases. Partly this reflects improved pharmacological capacity (e.g. vaccines and antibiotics), partly the increasing number of over-65 and (especially) over-85 individuals, partly it is related to man-made environmental hazards, and partly it reflects various unhealthy lifestyle habits. The recent emergence of new infectious diseases (AIDS) and a resurgence of older infectious problems (drug resistant tuberculosis) in Western Europe, as well as the resurgence of a variety of infectious conditions in Central and Eastern Europe and Commonwealth of Independent States countries, still haven't changed the overall trend toward an increased burden of chronic illness (14; 24).

This ongoing shift in the burden of illness will have a direct impact on the clinical and preventive services required in European health care systems. Both parts of this requirement can be seen in current efforts, for example, in the Welsh NHS to budget both clinical and preventive funds in one combined account by disease category, i.e. "cardiovascular disease", etc. As Western European health policy makers are acutely aware, future policy pressures will be to increase the substitution of more intensive clinical services (e.g. cardiac surgery) with less intensive and more custodial and preventive services (e.g. home care services). Much of the current movement in various European health care systems (the UK and the Nordic countries, also in the Berlin experiment in Germany) to give primary care units control over part or all of hospital budgets reflects this desire for increased substitution, and to drive patient care to the lowest, least intensive but still appropriate level of service in the delivery system.

3.2 Economic Pressures of Globalization and Regionalization

Globalization serves as a symbol, a talisman, for the types of economic pressures that will increasingly be brought to bear on the development and execution of health policy over the next period of years (21). In a curious way, it reflects a reverse form of inter-sectoral action, in which policy pressures from elsewhere in society, which have no intended or direct relationship to the health sector, are impinging upon the health policy arena in a way that re-configures policies and priorities inside individual medical care and health systems.

Globalization is based on fundamental changes in information technology and telecommunications. These changes are at the heart of what is the third industrial revolution: the first was steam, the second was electrical, this third revolution is electronic. These changes express themselves in four international economic flows:

- trade,
- direct foreign investment,

- stock and bond purchases (often short-term in nature), and
- foreign exchange transactions.

It is no more possible to reverse the process of globalization than it was for the Luddites in 1830 to prevent the establishment of factories to weave cloth. Thus, just as with industrialization in the mid-19th Century, the key issue has to be re-framed as how to channel, to re-direct globalization so as to make it more socially responsible.

To date, the responses that have been put forward revolve around two general themes:

First, compensating domestic workers inside a country who lose their jobs, through improved social insurance as well as better job retraining programs; and second, imposing one or another type of tax on international economic transactions, in order to raise new international revenues to replace the national tax revenues that globalization and pressures to improve economic competitiveness have forced individual states to reduce or relinquish (25). Of these two strategies, it is international taxes that holds the most promise for the health sector, since it would replace some of the public revenues being lost at the national level, yet it is also international taxes that will be the hardest to put successfully in place in an era of deregulation and private market hegemony.

Privatization. Turning to privatization, this pressure is also generated in the broader economy, is financial in nature, and it, like globalization, is often brought to bear on the health sector with no knowledge of health whatsoever. It is worth noting that privatization can focus on either the funding or the production side of the health system. It is privatized funding that raises the most troubling questions, from an equity perspective (14).

Viewed more broadly, there is substantial pressure throughout Western Europe to decrease public sector funding for health care generally (21). This pressure to privatize funding includes a number of different measures: increased cost sharing and co-payments; rationing and priority setting; and creating competing private insurers. They all inevitably involve offloading a proportion of publicly paid health sector expenditures onto private household budgets, with strongly negative consequences for universal access and thus for social equity. These pressures to privatize are also being brought to bear on the problem of how to fund the growing need for long-term care services for the elderly.

Individual patient-based demand

The pressure to privatize funding for health services is linked to and reinforced by the belief of neo-classically influenced health economists that individual patient-based demand should be viewed as the only economically appropriate way to characterize demand within a health system (22). This issue concerns the conceptual hegemony of neoclassical micro-economists, who believe that the demand for any service or product is always and only an expression of individual personal preference, as defined exclusively through voluntary transactions. In this view, collectively administered programs to reduce aggregate population-based demand for health services, such as immunizations, or smoking reduction, or well-baby programs in maternal and child health clinics, do not exist as a collective feature at a societal level, but ought rather be viewed as just one more commodity that separate isolated individuals, relying on ostensibly rational personal decisions about how they want to spend their disposable income, might choose to buy (26).

The dilemma generated by this conceptual approach demand is obvious: if neoclassical micro-economists are allowed to dominate the formulation of national health policy, there is unlikely to

be the necessary balance between individual and aggregate forms of demand. Instead, private individual-based strategies will be prioritized - through, among other mechanisms, privatization of funding. This author is increasingly convinced that a new debate is required on how to conceptualize demand in the health sector (26). The damage to the overall health of society by this inappropriate overemphasis upon individual patient-based demand is heightened by the fact that, typically, individual patient-based demand is curative in character, while responses to aggregate population-based demand typically involve preventive and health promotive measures.

3.3 Geopolitical Pressures: The Role of European Union

The future role of the European Union in the health sector can best be characterized as a wild card. While the general principle of subsidiarity remains in place, there are a variety of activities occurring on the margins of subsidiarity that have the potential to eat away at its core assumption that health care and medical care issues are the responsibility of national governments, not the European Union. Among these activities on the margins are the following:

1. The increasing EU role in the area of public health, underlined by relevant articles in both Maastricht and Amsterdam Treaties; as well as strong interest by several Brussels Directorates, in expanding its health-related activities (27).

2. Cases in the European Court concerning the rights of patients to procure medical services in a neighboring country, while having that service paid for by the patient's home country health financing system (28).

3. Pressures from pharmaceutical companies -- and EU Single Market Commissioner Martin Bangemann as well - to choke off the parallel market in importing drugs from low price countries into high priced countries (29).

4. Pressures from commercial insurance companies to sell private health insurance policies across national borders.

5. Potential pressures from the newest Directorate, DG-15 for Consumer Affairs.

None of these, to date, represent a serious challenge to the predominance of subsidiarity in the health sector. Taken together, however, they suggest that the role of the EU, particularly in defining the permissible policy boundaries for national health sector decision makers, is very likely to increase considerably over the next period of years.

3.4 Technological Pressures

A consistent source of pressure on future health policy making will be technological in nature. The rapid development of information processing and associated changes in the capacity of clinical services to diagnose and manage medical conditions has already affected nearly every aspect of health system decision making during the 1990's. Projected forward, it seems clear that the clinical and managerial consequences of this third, electronic, industrial revolution will be felt with ever increasing force. Among the more important pressures are likely to be the following:

a) Pharmaceuticals. Bio-engineered compounds have already changed clinical treatment patterns in a number of medical areas, and additional drugs for treating a variety of clinical and physiological conditions including a number of cancers are in the

developmental pipeline. Expensive lifestyle drugs such as Viagra are expected to increase, including new compounds to sharpen memory in older adults. Genetic mapping will likely facilitate the development of "custom drugs" for relatively small groups of patients. As recent experiences have shown, pharmaceutical companies price these bio-engineered compounds at a very high level, patients put strong pressure on national health decision makers to make these advances readily available, and the resulting cost has been a major factor in pushing up aggregate health expenditures across Western Europe (30).

b) new and/or heroic interventions. The rapid growth of clinical treatment capabilities will almost certainly contrive to put pressure on health system budgets. Expensive heroic procedures to replace major body organs or re-construct damaged extremities (e.g. hand and arms) can be expected to become increasingly routine. New imaging and less invasive surgical techniques will generate substantially higher volumes of care, transforming less expensive treatment protocols into increased aggregate expenditures for health systems. Policy makers' zones of discretion with regard to approving or adopting these new procedures will shrink as the international standard of what is possible increasingly converges with the national standard of what is funded through third party payers. Policy makers in developed countries who are seen to evade these international standards will find themselves hemmed in by private sector providers who will assuredly provide those high-standard services, and by patients who will discover the existence of such treatment options on the Internet (see below).

c) decentralized diagnostic and therapeutic procedures. A major aspect of current technological developments has been the miniaturization and simplification of diagnostic tests. Complex assessments can now be conducted on a small laboratory machine in a general practitioner's office, or sometimes in over-the-counter kits that patients can use at home. General practitioners will increasingly be expected by knowledgeable patients to have such equipment in their offices. Such downsized diagnostic and therapeutic units will allow more patients to be treated out of the hospital, but, again, a larger volume of activity on smaller less expensive equipment often totals to a higher aggregate expenditure.

d) telemedicine. Rapid improvements in the processing of imaging and information has made it possible to develop techniques for off-site patient diagnosis and treatment. This technology has been pursued with considerable interest in countries like Sweden which have substantial populations living in sparsely populated rural areas. One can also envision telemedicine supporting the development of "hub and spoke" relationships between large urban medical centers and smaller district-level facilities. Drawbacks include the cost of purchasing and operating the necessary equipment, as well as the likely unwillingness of many middle class patients to rely on telemedicine to support invasive procedures. If a stable technology becomes widely accepted, telemedicine has the potential to generate radical changes in the staffing and configuration of hospitals across Europe.

e) Internet. The likely future of the Internet in the funding and delivery of health care services is as yet difficult to fully grasp. Already it has become a cross-national, indeed an extra-national source for patients for a vast variety of health-related information, some excellent and some terrible in quality. The Net is also emerging as a marketing tool for large pharmaceutical corporations, intent on convincing patients to demand specified products from the patient's local practitioner. Doctors in many European countries are beginning to see patients who arrive for a consultation carrying reams of data about their

medical condition, and in support of a specific treatment pattern that the patient desires. NHS physicians in Wales already have patients who come in carrying (31). One positive impact concerning the quality of medical care is that physicians increasingly feel pressured to use the worldwide web themselves to improve their diagnostic and treatment knowledge, so that their advice is consistent with what patients can download.

The central point about the web from a policy point of view is that it, and the information on it regarding treatment protocols and options, is entirely beyond the control of any particular group of national policy makers. As such, it directly empowers individual citizens and patients, as well as directly undermining expert control of information and the central health system hierarchy. How this new dynamic will play its way out in health systems across Europe has yet to be seen.

3.5. Structural and Organizational Pressures

The rise of integrated care networks for the delivery of health care services represents a fundamental challenge to traditional patterns of health system organization. One need not advocate the expensive and largely failed U.S. model of managed competition among for-profit Health Maintenance Organizations (32) to recognize the importance of generating better integrated service delivery arrangements. While the U.S. model focuses its efforts on the demand or funding side of the health system, European countries can be expected to intensify their efforts to link different types of provider units on the supply or production side of the system. This will likely expand well beyond current efforts in tax-funded public systems such as the ADEL reform measures in Sweden to move "bed blockers" out of county-run hospitals and into municipality-run home care (33) and total fundholding and/or (potentially) Primary Care Groups in the United Kingdom (34). In social-insurance-funded health care systems, one can anticipate a variety of experimental models based around different types of contracting arrangements.

A critical pre-condition for the establishment of such collaborations is, of course, the information revolution, which makes possible the collection and flow of the necessary management control data. From a policy-maker's perspective, however, the increased scope of collaboration will be a two-edged sword. On the positive side, it will improve both the quality and cost-effectiveness of certain forms of patient care. On the negative side, however, it will be increasingly difficult to steer these unwieldy collaborative structures in directions consistent with evolving national health objectives.

To summarize this exercise in evidence-based speculation, Part II presented five major pressures that health-systems will likely confront over the next ten to twenty years. These pressures will help form the context, the policymaking environment within which national policymakers for European health systems will have to make their decisions. National policymakers in the foreseeable future may well find that a considerable degree of the policy discretion that is lodged today at the national level will have moved beyond the Nation-State, to supra-national forces as represented by the European Union and globalization, as well as finding themselves under fairly continuous conceptual pressure from notions about privatization, and individual-oriented notions of health sector demand. In addition, national policymakers will continue to lose direct control over aspects of day-to-day operating and management responsibility to lower level, regional and even municipal levels of organization and perhaps private sector providers as well, as the process of decentralization that has been underway for some 30 years is further speeded by developments in information technology. It does not take great prescience of thought to realize that the overall result will be a more constrained national decision-making environment, with proportionately fewer resources flowing through the public funding system for health care, but with little or no

reduction in the expectations or responsibility for outcomes that will still be placed on national policy makers.

4. Future Policy Options

With this as the background, the critical question concerns the options that future policymakers can in fact pursue. How can national policymakers do more with less: less resources, less authority, less discretion? How can they develop the necessary new models of health system governance with fewer public financial resources and with less direct control over service providers? How can they provide the levels of regulation that a more diffuse and diversified health system requires? Put otherwise, what new role for the State in this changed health sector environment?

WHO concluded that the core of the State's strategy in the health sector, as in public policy generally, was to focus on setting objectives, and strategy rather than micro-managing the service delivery structure (14). This general approach can serve as a good basis for developing future health policy options in a constrained environment, since it places the emphasis on creative flexible leadership, rather than on brute bureaucratic force. In applying this type of approach, one generates a policymaking agenda that is based on three central concepts: entrepreneurial behaviour, accountability, and distributive justice.

First, entrepreneurial behaviour. Entrepreneurial behaviour means taking the initiative, independently, to make one's operating activities more efficient, more effective and more responsive to both population needs and individual patient preferences. The potential for entrepreneurial behaviour is dramatically increased by the information revolution, in that it facilitates a wide variety of organizational decentralization and re-structuring. Almost by definition, entrepreneurial providers are creative and flexible, seeking to stretch existing revenues further, to do more with less. In this sense, entrepreneurialism must lie at the heart of national policymaker's response to the increasingly constrained situation they will face.

The use of the term "entrepreneurial behaviour" here does not refer strictly or even primarily to the private sector. There is no conceptual or practical reason why entrepreneurial behaviour shouldn't lie at the core of publicly owned, publicly operated health care systems as well. As experience has now shown in the UK and Sweden, there is no good reason to allow entrepreneurialism to be the special preserve of private sector providers (21). The challenge to national policymakers will continue to be to make publicly accountable providers equally as dynamic in their behaviour, especially in order to maintain broader policy objectives of equity and solidarity.

There are a variety of mechanisms already developed that can inject entrepreneurial behaviour into publicly operated health systems. Among the most important are: public competition among publicly owned providers; turning public hospitals into public firms or public corporations; contracting between primary care budget holders and hospitals; patient choice of provider and provider institution; and performance-based payment for general practitioners, specialists, and hospitals (14; 26). All of these mechanisms are currently being utilized in various Western European countries, however all will likely require further research and refinement to enable them to operate optimally. We most likely will see more effectively targeted versions of these and similar mechanisms as European health care systems, particularly publicly operated health care systems, seek to adapt themselves to the new external and internal pressures they face.

In addition, policymakers will want to continue to explore new frameworks, on the production side of the health system, in the area of public-private partnerships; things like shared responsibilities, joint services, public contracting of private providers, even contracts for private management of non-core public provider institutions. While there are equity concerns about all of these measures, and particularly about the types of public-private partnerships just mentioned, it is likely that the damage to solidarity and equity will be far greater without this new creativity and flexibility than with it, since the middle classes will not stay in a health system that does not provide adequate access and quality.

If entrepreneurial behaviour is to be successful, however, in terms of helping national policymakers achieve their objective, then it must be combined with the second key element: accountability. Accountability refers to specifically political accountability for the impact and outcome of these entrepreneurial innovations. This accountability requires a re-configured and sophisticated steering role for the state. It includes:

- setting standards, including for accreditation;
- monitoring performance
- evaluating outcomes, and, if necessary,
- intervention with both sticks (regulation) and carrots (incentives).

It also requires strict regulation over the roles and behaviours of private for-profit actors, especially where they can do the most harm: on the funding side of the system, where private funders inevitably try to establish various types of cherry-picking or cream-skimming systems (36). It is useful to note that Sweden has developed a quality-oriented prototype of this new state role in its National Board of Health and Welfare (37), and the Labour Government in the UK has adopted a similar approach (34).

The third crucial element of national policymakers' responses to their future environment is continued emphasis on distributive justice. A useful way to conceptualize distributive justice can be derived from the work of the political theorist Michael Walzer (38). For Walzer, society is segmented into separate, relatively discrete spheres of human activity, each of which has its own internal ethical norms. The appropriate and fair basis for allocating outcomes in the educational sphere (merit) is and should be different than in the economic sphere (profit) or the political sphere (election). This view of the world leads to the judgement that the basis of allocating access to medical care (need) should be based on ethical rather than economic or political criteria.

In practical policy terms, distributive justice means a continuation of efforts to ensure that all citizens -- or as many citizens as possible -- hold "membership" inside the health care system, and that everyone has access to the same acceptable standard of health care services. In practical political terms, it mean that European policymakers will need to resist political pressure to allow wealthy people to opt-out of collectively financed insurance and tax systems, to prevent the development of "two-tier" delivery arrangements. As already noted, reliance upon entrepreneurialism will be essential to the ability of national policy to maintain solidarity, which is a key element of distributive justice. Basically, health systems will have to become more flexible organizationally if they are to have sufficient funds to be able to provide a reasonable standard of services for all citizens. The two concepts go hand-in-hand; since, conversely, entrepreneurial behaviour, particularly in the public sector, will be acceptable politically only if can be shown to enhance rather than undercut distributive justice.

5. Concluding Remarks

As this suggested portfolio of strategies indicates, national health policy makers in Europe will confront an increasingly complicated governance situation. The essential character of decision making in the health sector over the next decade will be the diffusion of authority away from national government: diffusion to lower public levels of authority; to global economic forces; to the European Union in Brussels; to private providers; to private manufacturers of medical instruments and pharmaceuticals; and -- via the Internet -- to the most diffuse of all groups, patients and citizens. Policymaking in the health sector will be much less content-oriented and much more process-oriented. It will be even less one of issuing commands, and even more tied to acts of structuring incentives, designing regulations, setting standards, monitoring and evaluating outcomes, and rewarding performance. Policymaking will become, in short, an exercise in strategic leadership rather than organizational management. By emphasizing entrepreneurialism, political accountability, and distributive justice, national decision makers can develop the techniques and instruments required to steer European health systems in the coming post-computer world.

References

1. Ministry of Welfare, Health and Cultural Affairs: *Verandering versekerd (Change Assured)*. Tweede Kamer, 1987-88, 16645 (27-28), March 1998.
2. 2. HMSO: *Working for Patients*. London, 1989.
3. Dahlgren, G.: *Framtida Sjukvårdsmarknader*. Stockholm, Natur och Kultur, 1994..
4. Diderichsen, F.: Market Reforms in Health Care and Sustainability of the Welfare State: Lessons from Sweden. *Health Policy* 1995; 32 (1-3): 141-154.
5. Whitehead, M.: Is it Fair? Evaluating the Equity Implications of the NHS Reforms. In: *Evaluating the NHS* . Robinson, R. and LeGrand, J. (Eds.). London, Policy Journals, 1994 pp.208-242.
6. Rehnberg, C.: The Swedish Experience with Internal Markets. In: *Health Care Reform Through Internal Markets* . Jérôme-Forget, M. , White, J. , Weiner, J.M. (Eds.). Washington, Brookings Institution, 1995, pp. 49-74.
7. Preker, A. and Harding, A. : *Innovations in Health Care Delivery: Organizational Reforms Within the Public Sector*. Draft. Mimeo. Washington, World Bank, 1998.
8. Salomen, P.: *Personal communication reported in Parker and Harding*, op.cit.. 1999.
9. Abel-Smith, B., Mossialos, E.: Cost Containment and Health Care Reform: A Study of the European Union. *Health Policy* 1994; 28:89-132.
10. Saltman, R.B.: A Conceptual Overview of Recent Health Care Reform. *Eur J Public Health* 1994; 4:1287-293.
11. Saltman, R.B.: Regulating Incentives: *The Past and Future Role of the State in Health Care Systems*. Proceedings of 8th Public Health Forum. London, UK London School of Hygiene and Tropical Medicine, 1999 forthcoming.
12. Ham, C. (ed.): *Health Care Reform*. Buckingham, UK, Open University Press, 1996.
13. Robinson, R. and LeGrand, J. (eds.): *Evaluating the NHS*. . London, Kings Fund Institute, 1997
14. World Health Organization: *European Health Care Reform: Analysis of Current Strategies*. Edited and written by R. B. Saltman and J. Figueras. Copenhagen, World Health Organization, 1997.
15. Enthoven, A.: *Reflections on the Management of the National Health Service*. London, Nuffield Provincial Hospital Trust, 1985.
16. Saltman, R.B. and von Otter, C.: *Planned Markets and Public Competition: Strategic Reform in Northern European Health Systems.* "State of Health" Series. Buckingham, UK ,Open University Press, 1992.
17. LeGrand, J., Barlett, W.: Quasi Markets and Social Policy. London, McMillan, 1993
18. Saltman, R.B. and von Otter, C. Re-Vitalizing Public Health Care Systems: A Proposal for Public Competition in Sweden. *Health Policy* 1987; 7:21-40.
19. van de Ven, W.P. M.M., Schut, F.T.: The Dutch Experience with Internal Markets. In: *Health Care Reform Through Internal Markets.* Jérôme-Forget, M., White, J., Weiner, J.M. (Eds.). Washington, Brookings Institution, 1995, pp. 95-118.
20. Saltman, R.B., von Otter, C.: Public Competition versus Mixed Markets: An Analytic Comparison. *Health Policy* 1989; 11:43-55.
21. Saltman, R.B.: Globalization and the Future of Public Funding for Health Care Services. *Eurohealth* 1997; 3 (Autumn): 34-36.
22. Saltman, R.B. and Figueras, J.: Analyzing the Evidence on European Health Care Reforms. *Health Affairs* 1998; (March-April): 85-108.
23. Osborne, D. and Gaebler, T.: *Re-inventing Government*. Reading, MA, Addison-Wesley, 1991.

24. 24.McKee, M.: *Health Status in the European Union and the Central and Eastern Countries.* Paper prepared for Conference on Appraisal of Investments in Health, WHO-European Investment Bank, 17-18 June 1999, Luxembourg. 1999.
25. Rodrik, D.: *Has Globalization Gone Too Far?* Washington, Institute for International Economics, 1997.
26. Saltman R.B.: *Thinking about New Models of Health System Governance: A European Perspective.* Paper for the Sawyer-Mellon Faculty Seminar on Markets and Health Care, Emory University Center for Ethics and the Professions, 19-20 April. 1999.
27. Fischer, A.: new Beginings and Continuity: The Health Agenda for the German EU Presidency. *Eurohealth* 1999; 5 (spring):1
28. van der Mei, A.P.: The Kohl and Decker Rulings: Revolution or Evolution?*Eurohealth* 1999; 5 (Spring): 14-15.
29. Keck, J. : The European Union Single Market in Pharmaceuticals. *Eurohealth* 1999; 5 (Spring):24-24.
30. Mossialos, E.: Regulating Expenditures on Medicine in European Union Countries. In: *Critical Challenges for Health Care Reform in Europe.* Saltman, R.B., Figueras, J. and Sakellarides, C. (Eds.) Buckingham, U.K. and Philadelphia, Open University Press, 1998, pp. 261-286.
31. Prosser, S.: *Personal Communication*, 10 May 1999.
32. Saltman, R.B.: The Sad Saga of Managed Care in the United States. *Eurohealth* 1998; 4 (Spring): 35-36.
33. Johansson, L.: Decentralization from Acute to Home Care Settings in Germany. *Health Policy* 1997;(Supplement): S131-S144.
34. MSO:. *The New NHS*. London, 1997
35. Saltman, R.B. and von Otter, C. (eds.): *Implementing Planned Markets in Health Care: Balancing Social and Economic Responsibility.* "State of Health" Series. Buckingham, UK, Open University Press, 1995.
36. Chinitz, D., Wasem, J., Preker, A.: Balancing Competition and Solidarity in Health Care Financing. In: *Critical Challenges for Health Care Reform in Europe*. Saltman, R.B., Figueras, J. and Sakellarides, C. (Eds.). Buckingham, U.K. and Philadelphia. Open University Press, 1998, pp. 55-77.
37. Kokko, S., Hava P., Ortun, V. and Leppo, L.: The Role of the State in Health Care Reforms. In: *Critical Challenges for Health Care Reform in Europe.* Saltman, R.B., Figueras, J. and C. Sakellarides, (Eds.). U.K. and Philadelphia, Open University Press, 1998. Buckingham, pp. 289-307.
38. Walzer, M.: *Spheres of Justice.* 1983.

Session 1

The Changing environment of Health Care Services

Health status in the European Union and the central and eastern European

by

Martin McKee, Ph.D.
Professor of European Public Health
European Observatory on Health Care Systems, London School of Hygiene and Tropical Medicine
London,United Kingdom

Content

1. Introduction

This paper examines patterns of health in Europe, with a focus on how they relate to health services. As will be discussed, this relationship is not clear-cut. Health care is only one of many influences on a population's health. However, it is probably more important now, at least in modern industrialised countries, than has been assumed in the past.

Even if health care does contribute to patterns of health, it is only one among many factors. Early studies on the determinants of health at population level rapidly concluded that there was no simple explanation for why one country performed better than others. Globally, certain factors emerged, such as, in general, the wealthier a country was, the greater was its life expectancy at birth. There were, however, exceptions, with some countries performing better than expected, such as Costa Rica, Sri Lanka and China, and others worse than expected, such as the countries of the Arabian peninsula. This led to the recognition of the importance of female literacy. Within Europe, some countries also performed better than expected, most notably those in the south, leading eventually to recognition of the benefits of the 'Mediterranean' diet. However, any attempt to go beyond these broad generalisations confronted a mass of specific factors.

Furthermore, these factors act over differing time periods. For example, current rates of stomach cancer in a population reflect socio-economic conditions 60 years earlier, when those now contracting the disease were children and being infected by helicobacter pylori bacteria. Similarly current levels of breast cancer reflect, at least in part, levels of nutrition when those now contracting the disease were children. In this case, unlike the situation with stomach cancer, the relationship is modulated by screening and treatment. In contrast, deaths from road traffic accidents are much more closely related to contemporary conditions, such as car ownership, police enforcement of safety legislation, and access to alcohol.

Any contribution that health care will be able to make to health of a population will depend on the mixture of factors contributing to the burden of disease in that population. This may differ in ways that are not obvious. For example, while as will be shown later, while widespread use of thrombolysis and secondary prevention may have had an impact on deaths from ischaemic heart disease in some western European countries, its potential impact is much less in, for example, Russia, where a much higher proportion of people die suddenly than in the west and do not reach hospital, due largely to the greater aetiological role played by alcohol.

The complexity of these relationships mean that it is rarely possible to ascribe observed patterns of health to changes in health care, except in very circumscribed circumstances and where specific data collection exercises have been undertaken. The differences between countries in levels of disease and in underlying risk factors that will be described later serve to make international very difficult.

This is not, however, an argument for ignoring levels of health. Instead, it is incumbent on those responsible for planning and providing health services to take account of the trends and patterns of disease in the populations they serve, rather than, as is often the case, solely the interests of healthcare providers.

This can be illustrated by a simple example. Those providing health services in an area were many people retire should place sufficient emphasis on care for the elderly. In contrast, health

services in inner cities may be more concerned with issues such as sexually transmitted diseases and the consequences of illicit drug use.

However health care needs change, as do the opportunities for treatment. Population's age, the socio-economic composition of localities vary, new diseases emerge and others disappear, and innovative treatments become available while old ones become obsolete. Health services must respond to these changing needs. This is illustrated by the example of the rise of HIV infection which led initially to the creation of highly specialised inpatient treatment facilities for the many patients with AIDS and subsequently to their reduction, as new methods of treatment enabled patients living with AIDS to remain in the community.

One option is to rely on the health care system to respond to market pressures, so that competitive pressure leads to innovation where that is of benefit to those using health care and the abandonment of services that are no longer required. This model may work in some areas of commerce but there are many reasons why it is inappropriate in health care and these reasons have been rehearsed at length elsewhere so they do not need to be recounted here (1). It is sufficient to note that they include issues such as information asymmetry, the scope for supplier-induced demand and other forms of opportunistic behaviour, and externalities, where society has an interest in provision of health care to those who might not express a demand for it, such as those with certain infectious diseases or mental health disorders. Instead, if health care needs are to be addressed it is necessary for those responsible for health services to anticipate those needs and ensure that services are configured in a way that will meet them.

Another reason why attention should be paid to changing health care needs is the growing recognition, at least in Europe, of the importance of governments pursuing objectives that will lead to an improvement of the health of their populations, with some leading economists arguing that life expectancy at birth may be a better measure of a nation's progress than a narrow economic measure such as gross national product (2). Others, who might not go so far, are beginning to see investment in health as a pre-requisite for economic progress, with high levels of ill-health acting as a brake on economic progress. In either scenario, it becomes increasingly important that health care contributes to maximising health gain rather than simply supporting the interests of the health care industry.

But the need to respond to health care needs poses substantial challenges. As will be shown. Within Europe there is enormous diversity in the patterns and trends of major diseases. Consequently, the configurations of services that might be appropriate in one country may be inappropriate elsewhere.

This paper seeks to provide a broad overview of these major trends. It continues by examining some of the major determinants of health and how they are changing. It then examines the evidence about whether health services actually can make a difference to levels of health. Finally, it concludes by exploring some of the ways in which health services are adapting to the health challenges they are facing and discusses the structures that are required if they are to do so more effectively.

Before doing so, a methodological note is required. This review focuses predominantly on measures of mortality, both all-cause and disease specific. An immediate problem arises when deaths by cause are examined. There are differences in the way that labels are applied to clinical syndromes in different countries. This is a particular problem for deaths at old age, where individuals often have several disease processes and deciding which was predominant can be difficult. In such cases, diagnostic labelling may reflect local custom. To overcome this problem,

at least in part, cause specific death rates have generally been quoted for those aged 0-64 years only.

A further problem arises from the differences in the intensity with which individuals are investigated and treated. Patients with advanced abdominal cancer who do not reach specialised care are unlikely to be diagnosed with as great a degree of precision as those seen in a tertiary referral centre. Finally, in some countries within the European region, for a variety of reasons including war, under-development, or weaknesses in the statistical system, registration of death is incomplete. Consequently, interpretation of mortality data should take place within an understanding of the context in the country concerned.

With the exception of certain communicable diseases, for which some data, even if often incomplete, exist, no attempt has been made to examine morbidity. This is simply due to the fact that comparable data do not exist. A great deal of effort has gone into the development of composite indicators that include mortality and morbidity, with the Disability Adjusted Life Year, or DALY, being the most widely used. Such measures do, however, require a large number of assumptions about, for example, the value to be placed on disability and its differential weighting at various ages (3). While they can potentially help to compare the burden of disease in different countries and describe the health gain to be obtained from particular interventions, interpretation of the resulting values requires detailed technical considerations that are beyond the scope of this paper.

2. A divided continent

Analyses of health trends in Europe have typically divided the continent into three parts, based on broad trends in life expectancy (Figure 1). The countries of Western Europe have experienced a steady improvement, adding almost six years to life expectancy at birth since 1970. In contrast, the former communist countries of central and Eastern Europe experienced stagnation between the mid 1970s and 1990, with a small improvement subsequently. The countries of the former Soviet Union show a strikingly different pattern. After a slow fall in life expectancy at birth from the mid 1960s, they experienced a dramatic increase in 1986 which was not sustained and which then led to a catastrophic decline, of over three years, after 1991, only recovering in 1995. Although these groupings broadly follow the current political groupings within Europe, there are some important exceptions, most notably the Baltic republics which, while including Estonia, which is in the first wave of European Union pre-accession countries, have a pattern of health that is typical of other countries that were part of the Soviet Union.

Although, as will be demonstrated throughout this paper, the countries within these broad groupings encompass enormous heterogeneity, this division does have certain advantages as the countries within each group display some similarities that are, in general, distinct from those in the others. In the subsequent section, these three groups of countries will be examined in more detail.

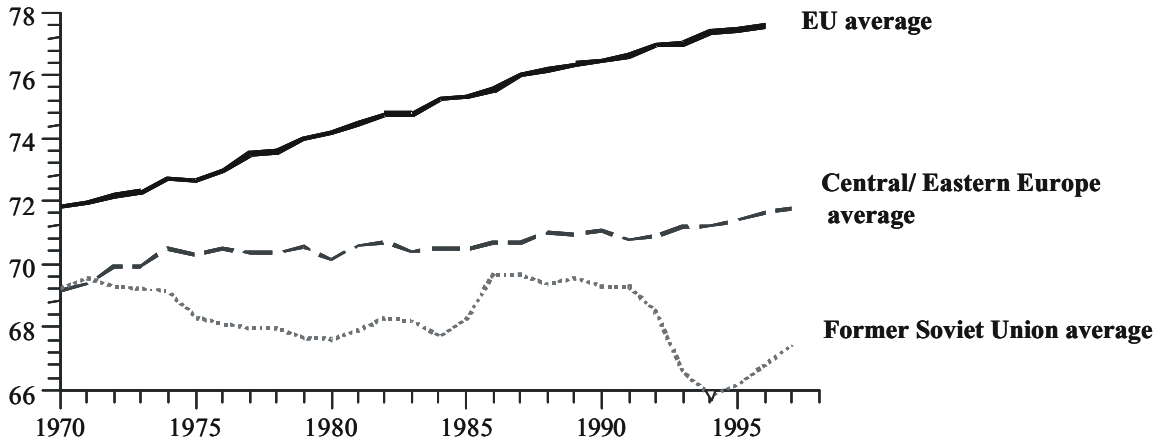


Figure 1. Life expectancy at birth

2.1 The former Soviet Union

Life expectancy at birth in the Soviet Union has been declining steadily from the mid 1960s. A striking improvement in 1986, associated with Secretary General Gorbachev's anti-alcohol campaign (4), was short lived and was followed by a steady decline until 1991. In the subsequent three years the decline accelerated markedly, only to reverse in 1995. Between 1991 and 1994, taking all the former Soviet republics together, the figure for males fell by 4 years and for females by 2.3 years.

Although the fifteen former Soviet republics became independent in 1991 and subsequently followed very different political and economic pathways, the general pattern of mortality has been strikingly similar. This can be seen most easily by looking at trends in life expectancy at birth, although it must be noted that this is only a partial indicator of mortality, especially in this region, as it conceals differing trends in different age groups. For example, between the 1960s and 1980s, throughout central and eastern Europe and the former Soviet Union, improving infant mortality obscured the rising death rate among young and middle aged men (5).

For clarity, the fifteen republics are divided into regional groupings. Taking the Caucasus first, it is noteworthy that life expectancy has consistently been higher than in other parts of the former Soviet Union, so that, even in 1980, male life expectancy at birth in Armenia was over 8 years longer than in Russia. Unfortunately, available data from Georgia are fragmentary, due largely to the impact of the civil war and the effective cessation of significant parts of Georgian territory.
Russia, Ukraine, Belarus and Moldova are characterised by very large fluctuations in life expectancy in 1985-86 and in the early 1990s. The patterns are strikingly similar, although the pace and magnitude of change has been greater in Russia than elsewhere. Belarus, which has retained what is essentially the Soviet system of government, did not experience either the acceleration in the decline in life expectancy or the later improvement seen in Russia in the 1990s, instead following a steady downward course.

The central Asian republics display a mixed picture. Kazakhstan and Kyrgyzstan, both of which have large ethnic Russian minorities, show a pattern similar to that seen in Russia whereas Uzbekistan exhibited much less change. Turkmenistan stands out among the former Soviet Republics as female life expectancy at birth is substantially lower than that in other republics. Mortality data from Tajikistan are unreliable because of the effects of civil war.

Mortality is, however, only a partial measure of disease. There are also very high levels of morbidity in this region and, of particular concern, rates of many communicable disease have been rising dramatically. For example, the number of new cases testing positive for HIV in Kaliningrad rose from 1 to 100 per month in a four month period in 1996, with intravenous drug use as the most important risk factor (6). Rates of tuberculosis (7) and, most worrying, multi-drug resistant disease (8; 9) , have also risen greatly. In some former Soviet Republics, diseases that had been virtually eradicated have re-emerged, such as malaria, diphtheria (10), cholera (11; 12) and polio (13).

It is, of course, necessary to move beyond a simple description of recent trends in disease to explore the underlying factors. Clearly, any consideration of future patterns of health care must draw on what can be surmised about how patterns of disease will evolve in the future.
One immediate cause of many deaths in this region requires special attention. The break up of the Soviet Union led to conflict in several areas, such as the Caucasus and Tajikistan. Although its direct impact on mortality is small in overall terms, it is important because of its many indirect and long term effects, which include the destruction of infrastructure, displacement of populations and migration of skilled workers, and residual hazards such as land mines.

The main characteristic of mortality in these countries is, however, the changes in mortality among young and middle aged men, affecting some specific causes of death (14). Cardiovascular disease, cerebro-vascular disease, injuries and violence, and suicide increased until about 1994 and then began to fall. In contrast, deaths from neoplasms have remained relatively constant, in some countries exhibiting a slow downward trend.

Research on regional patterns of mortality in Russia (15) has confirmed the importance of injuries and violence, cardiovascular diseases, and alcohol-related disorders, with the last category accounting for 15% of the overall decline in life expectancy at birth between 1990 and 1994. When the regional mortality pattern was linked with socio-economic data it became clear that the greatest increases in mortality where in those regions that had experienced the most abrupt transition, measured as labour force turnover, and which had the weakest social cohesion, measured as crime rates.

After 1994, mortality rates in many parts of the former Soviet Union began to recover. This has been examined in Russia by Shkolnikov (16), who found that the improvement in mortality was due almost entirely to a reduction in age specific death rates towards their 1991 levels although, by 1997, death rates at these ages still remained about 30% higher than in 1991. In contrast, the increase that occurred in death rates at between 15 and 24 has not declined significantly and this was attributable largely to the rising death rate from tuberculosis.

The general improvement in mortality since 1994 is difficult to explain. The observation that the age groups and causes involved are essentially the same as those in which death rates improved during the earlier anti-alcohol campaign suggests strongly that alcohol is again involved. This receives support from other research. A detailed analysis of monthly trends in deaths in Moscow between 1993 and 1995 showed that, after seasonal effects were removed, the turn around was seen most clearly in chronic diseases associated with alcohol consumption (17). Data from the

Russian Longitudinal Monitoring Survey (RLMS) show that alcohol consumption began to fall shortly before the improvement in mortality (18). In contrast, however, the RLMS data show that most measures of socio-economic status continued to decline, with the percentage of households below the poverty line increased from 11% to 36%. Real household income fell by 23%. Income inequality rose markedly, with the ratio of income in the top 20% of households to those in the bottom 20% growing by 68%. Finally, unpaid employment increased considerably in all age groups.

These findings have been interpreted as showing a process of adaptation, in which the population has come to terms with the steady decline in socio-economic conditions and has developed a range of coping mechanisms (19). This illustrates the essential unpredictability of mortality rates in this region, where overall death rates are driven to a substantial extent, by factors such as alcohol that act over a relatively short time span.

2.2 Central and Eastern Europe

As in the Soviet Union, earlier improvements in mortality were halted during the mid 1960s as deaths among young and middle aged men began to rise, largely driven by increasing rates of cardiovascular disease and injuries. To this extent, all countries in this grouping were similar. However, there is also considerable diversity, that has increased markedly since the political transition in the late 1980s.

During the 1970s and 1980s, Bulgaria and Albania had somewhat longer life expectancies than did the other countries in this grouping. The situation in Albania is especially interesting. One factor was the almost complete absence of cars during the Hoxha era but Albania also had a very low rate of cardiovascular disease compared to other countries in Eastern Europe. A study of regional variation in Albania has shown that the country can be considered as falling into two quite distinct parts, in terms of dietary habits, reflecting traditional patterns of agriculture and the poor transport infrastructure (20). This is associated with a two-fold greater mortality from cardiovascular disease in the north, where the diet is based on fat of animal origin, compared to the south, where the diet contains more fruit, vegetables and olive oil, providing further evidence in support of the benefits of a Mediterranean diet (21).

The countries of central Europe are rather more homogeneous but Hungary stands out from the others (22). It fared markedly worse than Poland or Czechoslovakia during the 1980s, with the difference largely attributable to a dramatic increase in deaths from alcohol-related disorders and especially cirrhosis in Hungary (5). Hungary also stands out as having the highest death rate, among males, from lung cancer that has ever been recorded.

As well as the differences between countries in overall measures of health, there were also some differences in specific causes that reflected national characteristics. For example, Romania pursued a strong pro-natal policy, in which contraception and legal abortion were unavailable. As a consequence, by the end of the 1980s, maternal mortality was almost twenty times higher than in Hungary or Czechoslovakia. In Poland, the events of 1980, with the rise of Solidarity and the imposition of martial law, led to a marked reduction in alcohol consumption, which has had persisting effects (23).

After the transition, the diversity increased. Overall life expectancy began to improve almost immediately in Poland and the Czech Republic, followed in 1993 by Hungary. There is now considerable evidence that this was due, in large part, to a rapid change in diet due to the much greater availability of imported fruit and vegetable oils (24; 25). For example, life expectancy at birth in the Czech Republic increased by 2.5 years between 1990 and 1996. In contrast, there has

been a continuing steady deterioration in Bulgaria and Romania, which is still inadequately understood.

One phenomenon requires particular attention. Death rates of injuries and violence have been very much higher in Eastern Europe than in the west. These increased further in most countries in the years immediately prior to the transition, as enforcement of regulations on traffic and safety at work became lax. They peaked in the early 1990s but, as governments have rebuilt their enforcement systems, they have now fallen, albeit to levels that are still very much higher than in the west (26).

The improvements in some of the central European countries, while welcome, have, however, only had a limited effect on the east-west mortality gap. For example, life expectancy at birth in Poland and Austria was virtually the same for several years in the early 1970s but now the figure for Austria exceeds that for Poland by five years. Life expectancy at birth in Hungary is still eight years less than in Sweden.

In contrast to the diversity in mortality trends, there has been a striking similarity across the region in birth rates, which have fallen dramatically, so that many populations are now reproducing at below replacement rates.

The fall in the birth rate has been accompanied, in some countries, by a fall in infant mortality. This has been examined in detail in the Czech Republic and it is one of the relatively few examples in which the impact of health care can be quantified. The improvement was found to be due to an improvement in birth-weight specific mortality, which can reasonably be assumed to reflect an improvement in medical care after 1990 (27). However, the Czech infant mortality rate still lags behind that in western European countries but this is now due to a more adverse distribution of birth-weight, an issue that will require changes in social rather than healthcare policy to address.

One other issue requires attention. As in the countries of the former Soviet union there have been substantial rises in some areas, especially those bordering Ukraine, Belarus and Moldova, in sexually transmitted diseases. It is expected that this will, in due course, lead to a large increase in the rate of HIV infection.

Finally, it is necessary to mention the health consequences of the wars that have taken place in the southern part of this region, in the countries of the former Yugoslavia. As in the former Soviet Union, the impact on health is difficult to quantify but must have been substantial, taking both its direct and indirect effects.

In summary, levels of health in central and Eastern Europe continue to lag well behind those in the west, even though some countries in the region are likely to be members of the European Union within a few years. There are some recent signs of improvement, which appear largely to reflect changing dietary patterns and more rigorous enforcement of safety legislation. These improvements have not, however, been experienced by all countries. The reasons why mortality is so high in these countries are complex but major factors include a diet with a very low level of micro-nutrients (28; 29) historically high levels of smoking among men, and very high rates of alcohol consumption. The effects of these risk factors are compounded by what has been a very weak policy environment that has lacked the capacity to identify major threats to health, identify effective interventions to tackle them, and implement policies that address them.

2.3 Western Europe

Overall, Western Europe has experienced a pattern of changing life expectancy that is very different from that in the eastern part of the continent. Since 1970, life expectancy at birth for men has increased by 5.4 years, from 68.6 to 74 years. Women have done even better, increasing by 5.8 years, from 74.9 to 80.7 years. Unlike the situation in the other two regional groupings, there are not, however, any obvious sub-regional patterns, with neighbouring countries, such as Sweden and Denmark, often exhibiting quite different trends in mortality (30).

One of the most striking observations about this set of countries is the enormous diversity in rates of individual causes of death. The death rate from ischaemic heart disease in France is about a quarter of that in Finland. The male death rate from lung cancer in The Netherlands is three times that in Sweden. Among women, Denmark has the highest death rate from lung cancer, with a rate almost eight times that in Spain. The death rate from breast cancer in The Netherlands, which is the highest in Europe, is 70% higher than in Finland.

Importantly, these relative positions have not been static. Life expectancy among Danish men has increased by only 1.8 years between 1970 and 1995 while that of their neighbours in Sweden has improved by 4 years (30). The figure for Danish women improved by only 1.8 years while Swedish women improved by 4.4 years. Of particular concern, life expectancy at birth actually fell slightly for both sexes in Denmark between 1994 and 1995. The Danish record is in stark contrast to that of Austria, where male life expectancy at birth increased by 8.4 years over the same period, with Austrian women doing only slightly less well, at 7 years.

Trends in particular causes of death have also been very variable. Finland has experienced a substantial fall in death rates from ischaemic heart disease, a change that can be attributed almost entirely to changes in known risk factors (31). Conversely, the decline has been very much less in Ireland.
Change has not been uniform over time. Spain experienced rapid improvements in life expectancy until about 1981 but then slowed down (32), in the face of rising rates of HIV infection and injuries. A similar picture can be seen in Finland, although it has subsequently caught up again.

Women in The Netherlands who, for many years, experienced one of the longest life expectancies in the European Union, have lost their advantage, with very little improvement in the past decade. Having lagged behind Italy by two years in 1970, they were overtaken in 1989 and Italian women can now expect to live about a year longer than their Dutch counterparts.

Change has also affected particular age groups differently. In most countries, death rates among young children and the elderly have improved but young males, aged between about 20 and 40 have fared much less well. In many countries the death rates in this age group have failed to improved in the 1970s and 1980s but what is of much greater concern is that, in several countries, they have actually increased, and in some places quite markedly. For example, the probability of a Spanish man in this age group dying doubled between 1982 and 1992 and that of Italian men increased by 50% (33).

As in the east of Europe, men are doing worse than women, with the long standing gap in life expectancy increasing. There are, however, a few exceptions but unfortunately these do not provide reassurance. Typically this is because of a slowing down in the rate of improvement among women or, as in The Netherlands, an actual halt.

It is not only at a national level that differences exist and there are large regional differences in many countries (34). In particular, health in some large cities is failing to improve at the rate experienced by the rest of the country. An example is London, which has failed to match the gains in life expectancy seen in the rest of the United Kingdom (35).

There are also large socio-economic differences. These exist in every country in which they have been sought (36). Comparisons of the scale of social gradients within different countries are difficult, in part because the usual measures of social class, based on occupation, tend to have different meanings in different countries and levels of income transfer vary widely (37). However, there is increasing research in which education is used to classify subjects that is helping our understanding of this phenomenon. Also, only a few countries collect information in a way that will permit this type of analysis. What research exists suggests that inequalities in health do vary between countries, an example being a much greater difference in infant mortality between rich and poor in the United Kingdom than in Sweden (38).
There are also large differences in the health of different ethnic groups but here there is even less information as, in many countries the necessary data are simply unavailable. Reasons vary. It may be that immigrants are not citizens, as is the case with gastarbeiten in Germany. In France, those born in Martinique, Guyana or la Reunion are citizens of France and thus there is little official recognition that they could be disadvantaged. In Spain and Italy many immigrants have arrived illegally and are also outside the official system. It may also be that, in the light of events earlier this century, the idea of identifying separately particular ethnic groups is politically unacceptable. However, where research has been undertaken, most notably in the United Kingdom, there is clear evidence that health needs vary (39). This may be due to genetic factors, such as the presence of sickle cell anaemia in those of Afro-Caribbean descent or an increased risk of diabetes and its micro-vascular complications in those of South-Asian descent (40). However there are also many less obvious challenges such as difficulties in obtaining access to care, especially where there are linguistic barriers, or the effects of poverty, which is often highly prevalent among minority communities, a situation exemplified by the Roma communities in many European communities (41).

In summary, the countries of Western Europe exhibit a very mixed picture. All countries have experienced substantial gains in life expectancy in the post-war period but there is now evidence that these are plateauing in some countries, with deaths among certain age groups actually rising. The major factors are the rise in tobacco related diseases, especially among women in some northern European countries, reductions in deaths from cardiovascular disease, especially in northern Europe, reflecting dietary change, increasing death rates from AIDS among young men in some southern European countries, and deaths from injuries and violence. The scale of these changes mean that any impact of health care on overall levels of health is likely to be difficult to disentangle, except by detailed examination of selected causes.

3. The leading causes of premature death

The preceding sections have examined the patterns of disease within the three major divisions of Europe. What is most apparent is the enormous diversity, both in overall levels of mortality and in the contribution made by different causes to the total burden of disease in a particular country. Nonetheless, it is apparent that there are some issues that are of major importance in all countries. These will now be considered briefly.

Cardiovascular diseases is one of the leading causes of premature death in all parts of Europe although, as noted above, it is much less important in the countries of southern Europe, largely

reflecting traditional dietary patterns. It has been estimated that it causes half of all deaths and a third of all permanent disability in Europe and so it accounts for a substantial proportion of total health care costs (42).

In the countries of the European Union, the age-standardised death rate from ischaemic heart disease among men aged 0–64 years almost halved, from 79 to 45 per 100 000 population between 1980 and 1997. In females, there was also a decrease from 18 to 10 per 100,000 over the same period. In central and eastern Europe, however, the rate among males increased from 61 per 100,000 in 1970 to 110 in 1991, before falling back to 97 in 1996. Rates among women have also increased, although from a much lower baseline, from 18 to 25 per 100,000. The situation in the former Soviet Union is, as expected, much worse. Data are only available from 1981, when the rate per 100,000 among men was 154, rising to 220 in 1994 and falling to 183 in 1997. The corresponding figures for females are 47, 64 and 55. In other words, the death rate from heart disease among men aged under 65 in the former Soviet Union is now four times that in western Europe, with cardiovascular diseases accounting for approximately half of the difference in life expectancy between eastern and western Europe.

The second largest cause of death in Europe is cancer, accounting for 20% of all deaths. It is, however, important to recognise that the term 'cancer' includes diseases at many different sites, with different causes, treatments and prognoses.
Despite this diversity, cancers can, however, be divided into two broad categories, smoking-related and non-smoking related. That this division exists highlights the enormous contribution to premature death in Europe made by tobacco, which is, of course, also an important risk factor for cardiovascular disease. Tobacco is most closely associated with cancer of the lung, although it also causes or contributes to cancers in many other organs and can act synergistically with other causes of cancer, such as exposure to asbestos and human papillomavirus, when it causes cancer of the cervix. Thus, tobacco emerges as one of the leading causes of premature death in Europe. Peto et al. have estimated that, in 1995, smoking caused 32% of deaths among men aged 35-69 and 20% of deaths among men aged 70 and over in the European Union (43). The corresponding figures for women are 10% and 5%.

It is important to recognise that the full consequences of tobacco only become clear some years after smoking rates increase so there is no room for complacency about the relatively low contribution that tobacco makes towards deaths among women. In many parts of the European Union, particularly in southern and in central and eastern Europe, smoking became common among women only relatively recently (44;45). In contrast, as noted earlier, countries such as The Netherlands, where smoking has been common among women for many years, are now seeing a marked rise in smoking related deaths. The death rate from lung cancer among Dutch women has increased four-fold since 1970 and it has been estimated that smoking caused 16% of female deaths between the ages of 35 and 69 years of age in The Netherlands in 1995. Smoking is also a major factor in the stagnation of life expectancy in Denmark (30) and death rates from smoking related diseases are also rising rapidly among women in several other countries, such as Belgium.

External causes of death, such as accidents, homicide and suicide, are the third greatest cause of death in the Region, and they are the second largest contributor to the gap in life expectancy at birth between eastern and western Europe. They particularly affect adults in their thirties and forties, and thus have a disproportionate impact on families and on industrial productivity.

Injuries and violence are especially sensitive to social, economic and political circumstances. They fluctuated markedly in the former Soviet Union after 1985, falling during the anti-alcohol campaign and rising after the break-up of the Soviet Union. They were also affected by the

political transition in Spain in the 1970s, increasing by 60% between 1982 and 1989 although subsequently declining. Death rates often differ substantially between otherwise similar countries, with those in Belgium twice those in The Netherlands.

The conditions discussed above represent the leading immediate causes of death in Europe. It is, however, important to recognise that they are underpinned by more distal determinants of health. One example is diet. It has long been recognised that life expectancy in southern Europe is greater than would be expected on the basis of economic growth. It is now apparent that consumption of a 'Mediterranean' diet plays a major part in this difference. This is a diet that is rich in fresh fruit and vegetables and where olive oil is used instead of animal fat. This has been shown to reduce significantly the risk of many types of cancer and of heart disease.

A second factor is alcohol. It is now apparent that alcohol has been a very important factor in the fluctuations in mortality in the former Soviet Union since the mid 1980s and is also an important contributor to the high death rates in central and Eastern Europe, especially in Hungary (46). However, alcohol related deaths are also increasing in many western European countries.

One important underlying factor which would require a much more detailed exploration than is possible here, is social inequality. Wilkinson has shown how, in industrialised countries, life expectancy at birth has ceased to be driven by levels of economic development and, instead, are more closely related to levels of income inequality, with more unequal countries faring worst (47). This has given rise to a body of research that has identified the importance of social cohesion as a factor in improving health and, in particular, in reducing deaths from injuries and violence (48). This is illustrated by the finding that the increasing death rate in central Europe in the 1980s was much greater among those who were unmarried, and thus might be expected to have fewer social ties, than those who were married (49).

In summary, while there are certain major determinants of health, both immediate and distal, acting within Europe, the relative contribution to the total burden of disease within a country varies considerably. What is most important to note, however, is that these factors generally lie outside the formal health care sector. Consequently, any attempt to relate broad measures of health to characteristics of the health care system is over-simplistic.

4. Health care – an important determinant of health?

This raises the question of whether health care does contribute to health, at a population level. There is a widely held view that health services make little contribution to overall levels of mortality. This is based on the work of McKeown (50) who showed how three-quarters of the decline in mortality in England and Wales between 1841 and 1971 had been due to a reduction in deaths from infectious disease and that three-quarters of this reduction had preceded the widespread introduction of immunisation or antibiotics. He argued, the main influences on health had been nutrition, environment and behaviour. This view was, however, developed many years ago. Since then, the scope of medicine has enlarged greatly, with many formerly fatal conditions now susceptible to treatment.

This issue has recently been explored in detail elsewhere so only the key points will be reviewed here (51). Mackenbach et al (52; 53) , drawing on earlier work by others, have identified causes of death that are amenable to medical intervention and thus, potentially avoidable. They have estimated that, in The Netherlands between 1950 and 1984, had observed changes in these causes not taken place, male life expectancy at birth would have fallen by almost a year due to increases in other causes of death. In fact, male life expectancy at birth increased by 1.9 years, so

changes in deaths from amenable causes added a total of 2.9 years to what would otherwise have occurred. Among women, who experienced an increase of 5.9 years, 3.9 years could be accounted for by fewer deaths from amenable causes.

This work was developed by Albert et al. who divided amenable causes of death into those that were amenable to medical care and those that attributable broader health policies in the region of Valencia, Spain, for the period 1975 to 1990 (54). Causes amenable to medical care included conditions such as tuberculosis, appendicitis, and asthma and accounted for 11% of all deaths. Those related to broader health policies included cirrhosis of the liver and motor vehicle accidents and accounted for 19% of total deaths. They found that deaths from causes amenable to medical care fell whereas those amenable to national health policies increased. However, they also noted that while the net trend was downward, some causes amenable to medical care, such cancer of the cervix, increased.

This finding implies that one factor preventing medical care exerting its potential impact on health is the existence of barriers to access. This is supported by evidence from a study of 'avoidable' deaths in counties in Sweden, focusing on the proportion that took place outside hospital (55). This identified some counties where there was evidence that access to care, due to distance, was impacting on mortality, as in a high death rate from diabetes from young people in one of the most remote counties.

So is there any evidence to link the specific features of a health system to changes in health? The concept of amenable mortality has made it possible to identify some evidence that differences in health care can be manifest at a national level. For example, several studies have found that death rates from causes amenable to medical care have been higher in the east than in the west (56; 57) and one study sought to quantify the contribution that such deaths have made to the east-west divide (58). Excluding early neonatal deaths, for which only incomplete data are available, it was estimated that causes amenable to medical care accounted for 24% of the east-west gap in male life expectancy between birth and age 75, varying between countries from 11 to 50%, and 39% of the gap in female life expectancy, varying from 24 to 59%.

An intrinsic problem with this concept is, however, that it takes no account of differences in the underlying prevalence of a disease. A much better approach would be to look at the number of people who contract a disease and are then prevented from dying from it. This is most easily done for cancer, although even here there are large gaps in our knowledge because of gaps in cancer registry coverage within Europe. There is now a growing volume of evidence that is showing how cancer survival rates vary between countries in a systematic way. There are widely differing rates of survival following a diagnosis of colo-rectal cancer, reflecting differences in referral systems, with patients in some countries reaching specialist care later than in others, as well as differences in treatment (59). This research found the highest cancer survival rates in Switzerland and the Netherlands, with the lowest in Poland and the United Kingdom (Figure 2). It has been argued that the poor showing in the United Kingdom may reflect the relatively low concentration of cancer specialists and the low expenditure on chemotherapy (60) but our understanding of these differences is still far from complete.

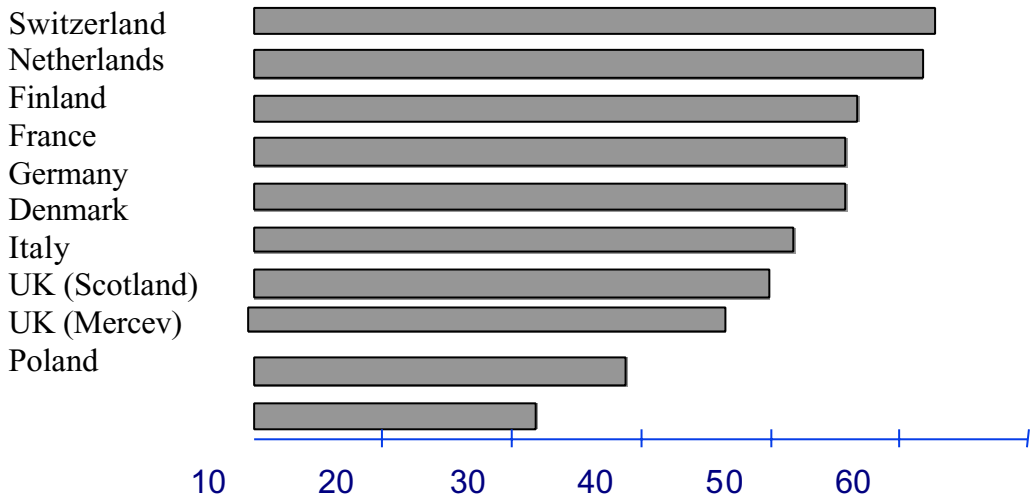


Figure 2. Survival (months) with colo-rectal cancer

It is also possible to track changes in cancer survival over time. Levi et al have shown how death rates from those childhood cancers for which effective treatments are now available, have shown greater and earlier decreases in northern Europe than in southern or central Europe, suggesting a measurable difference in the diffusion of new treatments (61). Similar results have been obtained from studies of mortality from testicular cancer in former East Germany (62) following unification and in childhood leukaemia in Russia (63).

There is also some evidence that the introduction of new treatments, such as thrombolysis and cardiac surgery, have had an impact on deaths from coronary heart disease. Bonneaux et al showed how the long-term decline in mortality from coronary heart disease in The Netherlands between 1969 and 1993 accelerated significantly after 1987, coinciding with greater availability of such treatments (64). One study makes it possible to examine this in greater detail. The WHO MONICA study has been collecting detailed, standardised data from 37 centres since the early 1980s. An analysis of data from the first ten years has just been published (65). It found that, overall, 28 day case-fatality rates declined at 0.6% per year among men and 0.8% among women. However these figures varied markedly between centres, from a fall of 4.2% to a rise of 3.1% per year among men and from a fall of 4.8% to a rise of 2.9% among women. Unfortunately, a further analysis of these data confirm the difficulty of relating clinical outcome to features of a system. First, changes in case-fatality rates in men and women are poorly correlated (r=0.56) even though both have been exposed to the same health care systems within a particular centre. Furthermore, where there is more than one centre in a country, they have often performed very differently. For example, French women treated in Strasbourg experienced a 3.6% decline each year whereas those in Lille experienced a 0.8% increase.

There are a few other studies that have examined geographical differences in outcome but, as with the studies of amenable mortality, they have typically looked a death rates rather than case fatality. For example, mortality from benign prostatic hypertrophy between 1950 and 1990 fell much more rapidly in northern Europe and North America than in central and eastern Europe and

South America (66), an observation that has been attributed to differences in the diffusion of developments in surgery and anaesthesia.

The impact of clinical interventions seems to reflect not only availability but also the organisational context within which they are delivered, with many studies showing advantages from treatment in specialised centres (67). This can also have an impact at a population level. Trent region, in England, has a pattern of decentralised intensive care units for children whereas Victoria, in Australia has a centralised system (68). The risk of death, after adjustment for severity of illness on admission, was more than twice as high in Trent than in Victoria, with the excess deaths in Trent accounted for 11% of all deaths among children between the ages of one month and 16 years.

These findings indicate that effective health care, or its absence, can now be added to the list of major determinants of health. It is not, however, possible on the basis of existing research to go beyond the evidence reviewed here. The existing evidence suggests that there are significant differences in the ability of particular health care systems to reduce premature mortality but there is unlikely to be any simple relationship between a particular financing or delivery system and good or bad performance. Furthermore, differences in outcome between facilities operating within a single system may be almost as great as those between health care systems. Consequently, efforts to link patterns of mortality to a health care system must be understood within the context of the emerging literature on determinants of clinical outcome at the level of a hospital or other health care facility (69).

It is likely that any differences will be attributable to the particular combinations of features and configurations in each system and this is a topic that is extremely under-researched. Some things are self-evident, such as that a failure to provide universal coverage is associated with poorer population health (70). Evidence concerning the effect of more subtle changes is, however, lacking. The single example of such research, the RAND Health Insurance Study, suffered from important limitations. It did, however, show that the use of co-payments was associated with a reduction in the amount of health care received by people with chronic illnesses who were on low incomes and that their health was, in some aspects, worse as a result (71).

Until further research is undertaken, it is not possible, on the basis of maximising health gain, to propose a particular model of health care provision. The poor performance of the United Kingdom and of eastern Europe in comparisons of cancer survival suggest, somewhat intuitively, that amounts spent on certain types of treatment that are known to be effective will improve health but this is no guarantee that higher levels of expenditure will not lead to more inappropriate treatment.

Consequently, it is not possible, on current evidence, to recommend what type of health care system will achieve most health gain. For the present, it is arguably more important to ensure that whatever system is chosen incorporates mechanisms by which it can identify changing needs, use evidence on effectiveness, and implement strategies that will meet them most efficiently.

5. The changing pattern of disease and its implications for health services

If health care systems are to adapt to changing needs, what is the nature of this change? This final section offers a general overview of some of the ways in which change is taking place and how they might influence health services.

One, largely predictable, factor is the ageing of populations. The conventional view is that need for health care increases with age. This is, however, being reassessed, as evidence emerges suggesting that, at least for acute care, the need for health care is a function of time before death rather than biological age. Thus, an individual will consume the same amount of health care resources whether they die at 65 or 75. The resolution of this question is a high priority for health policy makers.

While any impact of ageing on the cost of acute care may be less than was previously feared, this may not be true for long term care, costs of which are likely to rise appreciably (72). This is compounded, in many countries, by falling birth rates, so that the number of working people able to contribute to health care funds will decrease just as need is increasing, and when other demands for social welfare, such as pensions, are also increasing. The scale of this problem will, however, vary considerably, with some countries, such as the United Kingdom, being affected relatively mildly, but others, like Germany, facing substantial challenges (73). The long-term trends in central and eastern Europe are more difficult to predict because of the rate of change in fertility and mortality in recent years but the dramatic decline in birth rates in many of these countries is likely to give rise to a very small economically active population who must support growing numbers of elderly people.

Ageing populations will also lead to changing patterns of disease. In particular, there will be further growth in the number of people suffering from heart disease, cerebro-vascular disease, cancer, dementia and, especially among women, fractures. It is now apparent, from a growing body of evaluative research, that optimal outcomes for such patients require new configurations of services. Examples include regionalised networks of cancer services (74), dedicated multidisciplinary stroke units (75) and integrated packages of care that involve orthopaedic surgery, geriatric medicine and rehabilitation for patients with fractured hips. Ageing populations will also give rise to an increasing number of people with multiple disorders who will require a wide range of treatments, increasing the scope for adverse interactions of treatments. All of these developments emphasise the need to move away from a model of care that is based on individual physicians to one involving multidisciplinary teams.

One of the key findings to emerge from the review of patterns of disease in Europe is the importance of diet. This situation is, however, changing. The spread of northern European diets to countries such as Spain, and especially the growing consumption of "fast foods" containing high levels of animal fat are likely to lead to increasing levels of heart disease and to other diet related diseases such as breast cancer. It may become necessary, for example, to reassess the need for screening programmes in southern European countries with previously low levels of breast cancer.

The growth in tobacco consumption in some parts of Europe represents another major challenge for health services. In southern, central and Eastern Europe there will be substantial increases in smoking-related cancer among women, although these will continue to fall among men in some western European countries. A recent fall in lung cancer deaths among men in the countries of the former Soviet Union is a temporary effect reflecting the reduced availability of cigarettes in the late 1940s and early 1950s and will soon reverse (76). Those countries where cancer rates are increasing will face demands for additional cancer services and enhanced palliative care. In addition, smoking has consequences for general health, such as a reduction in lung function that will render more people unfit for general anaesthetics and more prone to postoperative chest infections, leading to longer stays in hospital and to higher costs.

The growth of new and re-emerging infections presents a further challenge. As noted earlier, the emergence of HIV and the introduction of effective, although not curative, treatments, has led to

a series of changes in the way care for people living with AIDs is provided. However the implications of HIV are much wider and have impacted on areas such as control of hospital infection control and screening of blood products.

Looking ahead, perhaps the most important future determinant of the configuration of health services will be the growth of multi-resistant bacteria. Patients infected with methicillin resistant Staphylococcus aureus, which is resistant to virtually all antibiotics, are being regarded as too dangerous to admit to hospital and are being treated at considerable expense in their own homes. There are enormous differences in rates of antibiotic resistance in Europe, with studies showing markedly higher levels in Spain and France than in northern Europe (77). In some countries, the lack of appropriate, enforced antibiotic policies is causing large increases in the rates of hospital acquired infections and consequently adding to both length of stay and costs. The risks from certain hospital acquired infections are already forcing some countries to reassess the ways in which they provide health care, leading in particular to the transfer of some interventions to settings other than hospitals.

As noted above, the countries of the former Soviet Union have experienced a re-emergence of poliomyelitis, diphtheria, cholera and malaria, with important implications for health services. However it is the rising incidence of tuberculosis and, especially, multi-resistant disease, that is most worrying. This provides an enormous challenge to health services everywhere but especially in the former Soviet republics, where the disease is now out of control, due to a considerable extent to the failure to tackle it adequately among the prison population. Unfortunately there is a lack of consensus about how best to manage it although there is an emerging view that it cannot be addressed adequately without a wider reform of the health care sector.

6. Where now?

The preceding section illustrates some of the many ways in which the need for health care is likely to change but any attempt to predict the future is fraught with problems. Experience shows that many of the threats to health that have appeared were essentially unpredictable and the situation is complicated even more by the possibility that new treatments will emerge that will make it possible to treat diseases for which there is, at present, no cure. These new treatments could have enormous implications for how health care is provided. The introduction of chemotherapy in the 1950s led to the closure of the large tuberculosis sanitoria and thrombolysis has revolutionised the management of myocardial infarction. Unfortunately, despite this changing environment, existing structures still reflect historical patterns of disease that no longer exist.

One thing is clear. Traditional hospital care, with treatment regimes based on a narrow medical model and with a wide range of diseases treated in general wards is no longer appropriate. New structures and packages of incentives should reflect the health care needs of the population and not reinforce obsolete models of care. Consequently those involved in health sector reform must take account of changing patterns of disease and their implications for health services.

There are, however, some other implications. As this paper has shown, while health care can play an important role in reducing mortality, many of the diseases that will contribute most to the burden of ill health in the coming decades are caused by factors outside the formal health sector. If these are to be tackled effectively it will require strategies that place the health care sector within a wider framework of inter-sectoral action.

Health care facilities can play an important role in this framework by promoting health public policies. An example is the World Health Organisation's Health Promoting Hospitals project. This seeks to increase participation in health promoting activities by patients, staff, and others outside the hospital, improving communication, and generally reorienting hospitals towards health promotion, with an emphasis on learning from experience (78).

Many people come into contact with health care facilities, either as patients or staff, and this provides an important opportunity to demonstrate support by the health care sector for health promoting policies. These include bans on smoking, which indicates clearly the importance of reducing the health impact of environmental tobacco smoke (79), provision of cycle parks, gyms and showers, demonstrating support for exercise, and ensuring that catering facilities provide healthy dietary choices (80).

In contrast, the implicit message given where there is a failure to ban smoking or to promote healthy eating choices is that health promotion is not taken seriously. In such settings, the obvious conflict between advice given to patients and the culture of the organisation is likely to make behavioural change more difficult.

In conclusion, this paper has indicated how the health care sector faces complex and changing health needs but, if services are provided effectively, it can contribute to the alleviation of the burden of disease. However it can only do so if it takes a proactive stance and develops methods of analysing trends in disease, identifying effective interventions, and monitoring their response. To the extent that systems can achieve this, they can be judged as successes or failures. Unfortunately, with the exception of a very few studies, such as the comparison of cancer survival rates mentioned earlier, there is extremely little comparative data. A model is offered by a study that examined the performance of public health systems by means of a study of how different European countries responded to the emergence of evidence that sleeping position was an effective means of preventing many cases of sudden infant death (81). Few countries performed well and, in those that did, action most commonly arose from the interventions of individuals or professional associations rather than those with formal responsibility for health policy.

As this paper makes clear, research on this topic should be a priority for those involved in health care reform in Europe.

7. References

1 Mooney, G.: *Economics, medicine and Health Care* (2nd edition). New York, Harverster, 1992.

2 Sen, A.: Mortality as an indicator of economic success and failure. *Econ J* 1998; 108: 1-25.

3 Murray, C.J.L.: Quantifying the burden of disease: the technical basis for disability adjusted life years. In: *Global comparative assessments in the health care sector: Disease burden, expenditures and intervention packages*. Murray, C.J.L., Lopez, A.D. (Eds.). Geneva, World Health Organisation, 1994.

4 *White S. Russia goes dry*. Cambridge, Cambridge University Press, 1996.

5 Chenet, L., McKee, M., Fulop, N., Bojan, F., Brand, H., Hort, A., Kalbarczyk, P.: Changing life expectancy in central Europe: is there a single reason? *J Publ Health Med* 1996; 18: 329-36.

6 Liitsola, K., Tashnikova, I, Laukkanen, T., Korovina. G., Smolskaja, T., Momot, O., Mashkilleyson, N., Chaplinskas, S., Brummer-Korvenkontio, H., Vanhatalo, J., Leinikki, P., Salminen, M.O.: HIV1 genetic subtype A?B recombinant strain causing an explosive epidemic in injecting drug users in Kaliningrad. *AIDS* 1998; 12: 1907-19.

7 Zalesky, R., Leimans, J., Pavlovska, I.: The epidemiology of tuberculosis in Latvia. *Monaldi Arch Chest Dis* 1997; 52: 142-6.

8 Viljanen, M. K, Vyshnevskiy, B.I., Otten, T.F., Vishnevskaya, E., Marjamaki, M., Soini, H., Laippala, P.J., Vasilyef, A.V.: Survey of drug resistant tuberculosis in northwestern Russia from 1984 through 1994. *Eur J Clin Microbiol Infect Dis* 1998; 17: 177-83.

9 Hoffner, S.E.: Drug resistant mycobacterium tuberculosis: some data from Sweden, Estonia and Ethiopia. *Scand J Infect Dis* Suppl 1995; 98: 17-8.

10 Anon. Diphtheria in the former USSR: update. *Comm Dis Rep CDR Wkly* 1994; 4: 191-4.

11 Ingram, M.: Cholera epidemic hits former Soviet states. *BMJ* 1995; 311: 528-9.

12 Clark, C.G., Kravetz, A.N., Alekseenko, V.V., Krendelev, Yu.D, Johson, W.M.: Microbiological and epidemiological investigation of a cholera epidemic in Ukraine during 1994 and 1995. *Epidemiol Infect* 1998; 121: 1-13.

13 Sutter, R.W., Chudaiberdiev, Y.K., Vaphakulov, S.H., Tursunova, D., Oblapenka, G., Iskandarov, T.I. A large outbreak of poliomyelitis following temporary cessation of vaccination in Samarkand, Uzbekistan, 1993-1994. *J Infect Dis* 1997; 175 Suppl 1: S82-5.

14 Leon, D., Chenet, L., Shkolnikov, V.M., Zakharov, S., Shapiro, J., Rakhmanova, G., Vassin, S., McKee, M.: Huge variation in Russian mortality rates 1984-1994: artefact, alcohol, or what? *Lancet* 1997; 350: 383-8.

15 Walberg, P., McKee, M., Shkolnikov, V., Chenet, L., Leon, D.A.: Economic change, crime, and mortality crisis in Russia: a regional analysis. *BMJ* 1998; 317: 312-8.

16 Shkolnikov, V.: Smertnost i prodoljitelnost jizni. [Mortality and life expectancy]. In: *Naseleniye Rossii 1998. Ejegodniy demografitcheski doklad* [Population of Russia. Annual Demographic Report] In: Vishnevski , A. (Ed.), Moscow, Centre for Demography and Human Ecology, 1999.

17 McKee, M., Sanderson, C., Chenet, L., Vassin, S., Shkolnikov, V.: Seasonal variation in mortality in Moscow. *J Publ Health Med* 1998; 20: 268-274.

18 Zohoori, N., Mroz, T.A., Popkin, B., Glinskaya, E., Lokshin, M., Mancini, D., Kozyreva, P., Kosolapov, M., Swafford, M.: Monitoring the economic transition

in the Russian Federation and its implications for the demographic crisis – the Russian Longitudinal Monitoring Survey. *World Development* 1998; 26: 1977-93.
19 Shkolnikov, V.M., Cornia, G.A., Leon, D.A., Meslé, F.: causes of the Russian mortality crisis: Evidence and interpretaions. *World Dev* 1998; 26: 1995-2011.
20 Gjonça, A., Bobak, M.: Albanian paradox, another example of protective effect of Mediterranean lifestyle. *Lancet* 1997; 350: 1815-17.
21 de Lorgeril, M. , Renaud, S., Mamelle, N., Salen, P., Martin, J-L., Monjaud, I., Guidollet, J., Touboul, P., Delaye , J.: Mediterranean alpha-linoleic acid-rich diet in secondary prevention of coronary heart disease. *Lancet* 1994; 343: 1454-9.
22 Bojan, F., McKee, M.: The challenges to public health in Hungary in the 21st century. *Eur J Publ Health* 1997; 7: 238-42.
23 Varasovszky, Z., Bain, C., McKee, M.: Acohol related mortality in Poland and Hungary: differences and similarities. *J Epidemiol Comm Health* 1997; 51: 167-171.
24 Bobak, M., Skodova, Z., Pisa, Z., Poledne, R., Marmot, M.: Political changes and trends in cardiovsacular risk factors in the Czech Republic, 1985-92. *J Epidemiol Comm Health* 1997; 51: 272-7.
25 Zatoñski, W. A., Boyle, P.: Health transformations in Poland after 1988. *J Epidemiol Biostat* 1996; 1: 183-7.
26 ECOHOST: *Childhood injuries: A Priority Area for the Transition Countries of Central and Eastern Europe and the Newly Independent States*. London, LSH&TM, 1998.
27 Koupilová, I., McKee, M., Holcik, J.: Neonatal mortality in the Czech Republic during the transition. *Health Policy* 1998; 46: 43-52.
28 EURONUT-SENECA: Nutrition and the elderly in Europe. *Eur J Clin Nutr* 1991; 45: 326-45.
29 Kristenson, M., Zieden, B., Kucinskiene, Z., Elinder, L.S., Bergdahl, B., Elwing, B., Abaravicius, A., Razinkoviene, L., Calkauskas, H., Olsson, A.G.: Antioxidant state and mortality from coronary heart disease in Lithuanian and Swedish men: concomitant cross sectional study of men aged 50. *BMJ* 1997; 314: 629-33.
30 Chenet, L., Osler, M., McKee, M., Krasnik, A.: Changing life expectancy in the 1980s: why was Denmark different from Sweden? *J Epidemiol Comm Health* 1996; 50: 404-7.
31 Vartiainen, E., Puska, P., Pekkanen, J., Tuomilehto, J., Jousilahti, P.: Changes in risk factors explain changes in mortality from ischaemic heart disease in Finland. *BMJ*. 1994; 309: 23-7.
32 Chenet, L., McKee, M., Otero, A., Ausin, I.: What happened to life expectancy in Spain in the 1980s? *J Epidemiol Comm Health* 1997; 51: 510-4.
33 Ngongo, K. N., Nante, N., Chenet, L., McKee, M.: What has contributed to changing life expectancy in Italy in 1980-1992? *Health Policy* (in press)
34 Holland, W.W.: *European Community atlas of avoidable death, 1985-1989*. Oxford, Oxford University Press, 1997.
35 Charlton, J.: Which areas are healthiest? *Popul Trends* 1996; Spring (83): 17-24
36 Benzeval, M., Judge, K., Whitehead, M. (Eds): *Tackling inequalities in health: an agenda for action* London, King's Fund, 1995. pp. 22-52.
37 Kunst, A. E., Mackenbach, J.P.: *An international comparison of socio-economic inequalities in mortality*. Rotterdam, Department of Public Health and Social Medicine, Erasmus University, 1992.
38 Leon, D. A., Vagero, D., Olausson, P.O.: Social class differences in infant mortality in Sweden: comparison with England and Wales. *BMJ*. 1992; 305: 687-91.

39 Senior, P.A., Bhopal, R.: Ethnicity as a variable in epidemiological research. *BMJ*. 1994; 309: 327-30.
40 McKeigue; P. M.: Coronary heart disease in Indians, Pakistanis, and Bangladeshis: aetiology and possibilities for prevention. *Br Heart* J 1992; 67: 341-2. .
41 McKee, M.: The health of gypsies. Lack of understanding exemplifies wider disregard of the health of minorities in Europe. *BMJ* 1997; 315: 1172-3.
42 Saltman, R.B., Figueras, J.: *European health care reform: analysis of current strategies*. Copenhagen, WHO, 1997. p 22.
43 Peto, R., Lopez, A.D., Boreham, J., Thun, M., Heath, C.: *Mortality from smoking in developed countries 1950-2000*. Oxford, Oxford University Press, 1994.
44 McKee, M., Bobak, M., Rose, R., Shkolnikov, V., Chenet, L., Leon, D.: Patterns of smoking in Russia. *Tobacco Control* 1998; 7: 22-26.
45 Pudule, I., Grinberga, D., Kadziauskiene, K., Abaravicius, A., Vaask, S., Robertson, A., McKee, M.: Patterns of smoking in the Baltic Republics. *J Epidemiol Comm Health* 1999; 53: 277-83.
46 McKee, M., Britton, A.: The positive relationship between alcohol and heart disease in Eastern Europe: potential physiological mechanisms. *J Roy Soc Med* 1998; 91: 402-7.
47 Wilkinson, R.G.: Income distribution and life expectancy. *BMJ* 1992; 304: 165-8.
48 Kaplan, G. A., Pamuk, E., Lynch, J. W., Cohen, R. D., Balfour, J. L.: Income inequality and mortality in the United States. *BMJ* 1996; 312, 999-1003.
49 Hajdu, P., McKee, M., Bojan, F.: Changes in premature mortality differentials by marital status in Hungary and in England and Wales. *Eur J Publ Health* 1995; 5: 259-64.
50 McKeown, T.: *The role of medicine: dream, mirage or nemesis*? Oxford, Blackwell, 1979.
51 McKee, M.: For debate - does health care save lives? *Croatian Med* J (in press)
52 Mackenbach, J. P., Looman, C. W. N., Kunst, A.E., Habbema, D.F., van der Maas, P.J.: Post-1950 mortality trends and medical care: gains in life expectancy due to declines in mortality from conditions amenable to medical intervention in The Netherlands. *Soc Sci Med* 1988; 27: 889-894.
53 Mackenbach, J. P.: The contribution of medical care to mortality decline: McKeown revisited. *J Clin Epidemiol* 1996; 49: 1207-13.
54 Albert, X., Bayo, A., Alfonso, J.L., Cortina, P., Corella, D.: The effectiveness of health systems in influencing avoidable mortality: a study in Valencia, Spain, 1975-90. *J Epidemiol Comm Health* 1996; 50: 320-25.
55 Westerling, R.: Can regional variation in "avoidable" mortality be explained by deaths outside hospital? A study from Sweden, 1987-90. *J Epidemiol Comm Health* 1996; 50: 326-33.
56 Bojan, F., Hajdu, P., Belicza, E.: Avoidable mortality. Is it and indicator of quality of medical care in Eastern European countries. *Qual Assur Health Care* 1991; 3: 191-203.
57 Boys, R. J., Forster, D.P., Jozan, P.: Mortality from causes amenable and non-amenable to medical care: the experience of Eastern Europe. *BMJ* 1991; 303: 879-83.
58 Velkova, A., Wolleswinkel-van den Bosch, J.H., Mackenbach, J.P.: The east-west life expectancy gap: Differences in mortality from conditions amenable to medical intervention. *Int J Epidemiol* 1997; 26: 75-84.
59 Gatta, G., Sant, M., Coebergh, J.W., Hakulinen, T.: Substantial variation in therapy for colorectal cancer across Europe: EUROCARE analysis of cancer registry data for 1987. *Eur J Cancer* 1996; 32A: 831-5.

60 Coleman, M., Babb, M., Damiecki, P., Grosclaude, P., HonjoS, Jones, J., Knerer, G., Pitard, A., Quinn, M., Sloggett, A., De Stavola, B.: *Cancer Survival Trends in England and Wales, 1971-1995: Deprivation and NHS Region*. London, The Stationery Office, 1999.
61 Levi, F., La Vecchia, C., Lucchini, F., Negr, E., Boyle, P.: Patterns of childhood cancer incidence and mortality in Europe. *Eur J Cancer* 1992; 28A: 2028-49.
62 Becker, N., Boyle, P.: Decline in mortality from testicular cancer in West Germany after reunification. *Lancet* 1997; 350: 744.
63 Shkolnikov, V. M., McKee, M., Vallin, J., Aksel, E., Leon, D., Chenet, L., Meslé, F.: Cancer mortality in Russia and Ukraine: validity, competing risks, and cohort effects. *Int J Epidemiol* (in press)
64 Bonneaux, L., Looman, C.W., Barendregt, J. J., van der Maas, P.J. : Regression analysis of recent changes in cardiovascular morbidity and mortality in The Netherlands. *BMJ* 1997; 314: 789-92.
65 Tunstall-Pedoe, H., Kuulasmaa, K., Mähönen, M., Tolonen, H., Amouyel, P., for the WHO MONICA Project: Contribution of trends in survival and coronary-event rates to changes in coronary heart disease mortality: 10 year results from 37 WHO MONICA Project populations. *Lancet* 1999; 353: 1547-57.
66 Boyle, P., Maisonneuve, P., Steg, A.: Decrease in mortality from benign prostatic hyperplasis: a major unheralded health triumph. *J Urol* 1996; 155: 176-80.
67 Selby, P., Gillis, C., Haward, R.: Benefits from specialised cancer care. *Lancet* 1996; 348: 313-8.
68 Pearson, G., Shann, F., Barry, P., Vyas, J., Thomas, D., Powell, C., Field, D.: Should paediatric intensive care be centralised? Trent versus Victoria. *Lancet* 1997; 349: 1213-7.
69 McKee, M., Rafferty, A-M., Aiken, L.: Measuring hospital performance: Are we asking the right questions? *J Roy Soc Med* 1997; 90: 187-91.
70 Lurie, N., Ward, N.B., Shapiro, M.F. et al.: Termination of Medi-Cal benefits: a follow-up study one year later. *N Engl J Med* 1986; 314: 1266-8.
71 Brook, R.H., Ware, J.E., Davies-Avery et al.: Does free care improve adults' health? Results from a randomised controlled trial. *N Engl J Med* 1983; 309: 1426-34.
72 Meerding, W.J., Bonneux, L., Polder, J.J., Koopmanschap, M.A., van der Maas, P. J.: Demographic and epidemiological determinants of healthcare costs in Netherlands: cost of illness study. *BMJ* 1998; 317: 111-5.
73 Chand, S.K., Jaeger, A.: *Ageing populations and public pension schemes*. IMF Occassional Paper No 147. Washington DC, International Monetary Fund, 1996.
74 Calman, K., Hine, D.: *A policy framework for commissioning cancer services : guidance for purchasers and providers of cancer services*. A report by the Expert Advisory Group on Cancer to the Chief Medical Officers of England and Wales. London, Department of Health, 1995.
75 Collaborative systematic review of the randomised trials of organised inpatient (stroke unit) care after stroke. Stroke Unit Trialists' Collaboration. *BMJ* 1997; 314: 1151-9.
76 Shkolnikov, V., McKee, M., Leon, D., Chenet, L.: Why is the death rate from lung cancer falling in the Russian Federation? *Eur J Epidemiol* (in press)
77 Gruneberg, R.N., Felmingham, D.: Results of the Alexander Project: a continuing, multicenter study of the antimicrobial susceptibility of community-acquired lower respiratory tract bacterial pathogens. *Diagn Microbiol Infect Dis* 1996; 25: 169-81.
78 URL: http://www.who.dk/tech/hs/recom.htm
79 Catford, J.C., Nutbeam, D.: Smoking in hospitals. *Lancet* 1983; 2: 94-6

80 Clarkson, J., Nutbeam, D.: Introducing healthy catering practice into hospitals: a case study from Wales. *Nutr Health* 1991; 7: 101-10.
81 McKee, M., Fulop, N., Bouvier, P., Hort, A., Brand, H., Rasmussen, F., Kohler, L., Varasovszky, Z., Rosdahl, N.: Preventing sudden infant deaths - the slow diffusion of an idea. *Health Policy* 1996; 37: 117-35.

Session 1

The Changing Environment of Health Care Services

Health care facilities – the future of the hospital, alternatives and investing in primary and tertiary care.

by

Professor Johannes Vang MD, Ph.D
Center for Public Health Sciences
Linköping University, Sweden

Content

1.The problem

The European Investment Bank has a mandate to lend money for investment in health care delivery. The problem is how to define the characteristics of a "sound" health care project. The word "sound" refers not just to an ordinary banking frame of reference for which rules, systems and routines exist. It also refers to what might be termed social and political soundness. The investment should somehow lead to a "health gain" and also be in accordance with the policy of the EU and, in this particular case, with the policy of individual member states in which future projects may be located.

By and large the problem is about how to allocate resources in health care. This is a common political and economic issue often governed by ideological views. The specific issue under scrutiny is how to predict the usefulness of health care delivery projects from the social/health perspective. Is it possible to develop "instruments" of appraisal, which will be helpful in this respect for an investor in health care projects? This question has troubled health authorities for years and fed health economists the last quarter of this century. Obviously there are no simple answers.

The Bank has access to money. Money is an important tool in the development of health services. But money is seldom the sole answer to social problems or health problems. The fact that ill-health is associated with poverty does not mean that money alone is the solution to the health problems of poverty. Poverty is much more than just the lack of financial resources. It is a state of mind, it is associated with cultural characteristics and it is deeply embedded in lifestyle and values. This is true for individuals and for societies. Money alone can not overcome this in the short perspective of a bank loan.

But clearly money is an important element in a long-term development. Money may even be the critical element in the initiation of a development.

Rather than describing traditional economic assessment instruments or looking for a universal tool for the evaluation of health projects it might be fruitful to consider in which kind of health problems money or lack of money is a crucial factor and how the social environment of these problems is characterised. It might even be interesting to speculate whether there are areas of potential investments which are governed more by future-orientated thinking and less by the conventional, inner perspective of health care. Areas to which investments might actually contribute for a renewal of health services.

2.Health services and health

Before taking the discussion further we need to enter a caveat. The title of this meeting is "Appraisal of Investments in Health". For the uninitiated this might be somewhat confusing. Investments in health are not the same as investments in health services. The relationship between the two is, in a sense, similar to and as complicated as the bank's concern with the relationship between the economic rate of return and the financial rate of return from an investment.

Let us consider health services. Health services are completely unnecessary for the survival of mankind as a species. Mankind survived and developed for thousands and thousands of years

without a health service and would continue to do so even without health services in the future. But mankind would not have survived unless a substantial proportion of the individuals had been healthy a substantial part of their lifetime. Health is obviously important, but health services are not important enough to be indispensable.

The development of health services is a cultural phenomenon much like the development of educational systems and libraries. It reflects a society's view of illness and health and, in recent social and political development, the collective concern for those who are old, weak or disabled. This view changes over time and varies from culture to culture.

The question is therefore: do health services contribute to health at all? And if so, in what way do they contribute? Can we enhance their contribution to health by further investments in health services? If yes, then how? And – if health services only contribute marginally to health, do they have other social benefits, which in turn may promote health?

2.1 From prevention to cure

From the start, European hospitals developed out of society's concern for those who were well. They were houses devoted to prevention rather than cure. The pest-houses of the Middle Ages, the forerunners of the present hospitals, protected society from those who were ill with contagious diseases by confining the ill to a "hospital" and from those who were "mad" by isolating these in an asylum. There was little concern with regard to bringing the patients back to health, since nobody knew how to. In those days concern for those who were ill was left for the family and friends. Destiny took care of the outcome. In an environment of communicable diseases, it is conceivable that these "hospitals" promoted public health by limiting the dissemination of disease.

Over the centuries, particularly during the last one, hospitals and health services increasingly became involved in the care of the ill patient. Nightingale, who introduced statistics into health care, showed that hospitals were an immense threat to the lives of their patients in the second half of the last century. Services reached "break-even", in the sense that they created as much health as ill- health, at about the time of the introduction of chemo-therapeutics and, later, antibiotics which started in the mid thirties of this century. From that time on medicine has developed rapidly especially since the Second World War. The ability to restore well-being and function, even for patients of an advanced age has increased amazingly as a consequence of fast-developing biological knowledge and medical technology.

From the time hospitals and health services were perceived as useful by the public, a market for these services developed. Secondarily an insurance market appeared. As these markets grew, they attracted political attention. Today health services in most states operate in more or less ideal monopolies. The health services are particularly monopolistic in states where health services are tax-financed, such as in the Nordic countries. Here the health authorities act on both the supply and demand sides.

2.2 The value of health services

There is no doubt today about the value of health services for the health of an individual patient, at least in a majority of cases. But there is still some uncertainty about the value of health services for the health of the population at large. Recent studies indicate that health services in

fact may have some impact on the health of the population, albeit marginal. Considering the immense cost of health services and the modest benefit of these expenses to the population's health, one might consider what it is the public is paying for.

Moving from the general health of the public to the health of the individual, things may look different. The individual may have invested very little money in health care whether it be through paying taxes or by paying for insurance. S/he will have a tremendous return of his/her investment, if s/he is brought back to health and normal function following an accident or acute illness by means of expensive, effective health care. Enough cases of this kind are seen by the public and they foster a profound confidence in hospitals and health services. This confidence is reflected in the political ambitions which support equal accessibility to health services. Thus, for ethical reasons, politics intervenes with the natural behaviour of the market.

The economics of health services therefore in some ways resembles the economics of a lottery. The balance depends on the size of the prizes, how many there are and the market for the lottery tickets, which depends on their price. The difference is that in health care the "prizes" are not just randomly allotted. They are governed by strong social and environmental forces, which might be influenced by financial inputs outside the health sector, as well as unknown biological forces which are responsible for the "randomness" in the allocation of diseases. With the increasing age of populations, the randomness is reduced and the allocation of "prizes" will become more general. The economy of health services therefore depends on the age profile, the socio-economic characteristics and the resulting disease panorama of the populations it serves.

2.3 Two non-health societal benefits from health services

Most people do not wish to be admitted to a hospital unless this is absolutely necessary in order to regain health and avoid premature death. Still, hospitals are there, just in case. This creates a feeling of security. It is this feeling of security plus the avoided deaths and the recovered functions which are the immediate returns of the investments in public health terms when, the alternative social cost of the disabilities left untreated might have been higher.

There is still another societal benefit to be extracted from health services, which may relate to health in a more indirect way. Health services offer places of work for many people. 5-10% of the population may be employed in health care. Women with various levels of education occupy most of these jobs. Health services thereby offer women an independent income, self-support and/or family support, holidays, continuous education, colleagues and a social network. All of this may improve self-worth, self-efficacy and self-respect. These feelings are generally seen as having a strong health-promoting power and may bring about "health gain". Moreover, health services and consequently these job opportunities are distributed fairly evenly throughout countries. They exist even in places where traditional industrial activities do not occur. Health services therefore act as a strong factor in the social liberation of women.

But this does not merit a capital investment from a bank. The development of health services at large is a continuous programme and not easily definable as a limited project. Depending on the overall policy of the country, it is obviously a task for the national and local authorities. Furthermore, we cannot expand health services solely with the purpose of creating work opportunities for women. This could have unintended effects on taxes, insurance premiums and salary levels in other sectors of industry and commerce. The objective of health services is health and not employment, even though employment may be health-promoting.

Still, if a hospital is needed in an area and therefore constructed, the one certain social return of the investment is that there will be work opportunities; the less obvious is the health gain. What is most difficult to measure is the feeling of security the presence of the hospital may induce. This feeling may be very important, judging from the political conflicts and public fury which usually flare up when proposals are announced that a local hospital be closed when its function and usefulness is in doubt.

Introducing a new hospital into an area may reduce the load on other existing hospitals. In a market economy setting, this means a lower income for those hospitals. They will have to review their strategy, product line and service quality. In a public sector setting, with full or nearly full third-party payment and the particular monopoly situation that exists, the new hospital, unless it replaces another one, will mean an improved level of service and increased costs to society. It may or may not have an effect on the health outcome. We will never know because this is seldom or never measured. In this case the social gain is the increased service level, the jobs, the "feeling of security" and a possible health gain if members of the population who previously had no access to health services now have it.

3. Health gain

To the above generalities about hospitals the issue of health gain should be added. Health gain comes in two varieties. One is related to the reduction of disease and premature death in a population or sub-population and the other is related to subjective health, the well-being and quality of life of individuals, populations and sub-populations.

Until recently health services were disease-orientated. The knowledge and skills of the hospital were to identify diseases and to cure the patients from the diseases. The success of the hospital was based on the evaluation of its performance in that perspective. In the late sixties, health economy was introduced and hospitals were also judged by their economic performance. Unfortunately, the concern of the administrators focused on productivity rather than on effectiveness and efficacy, partly because it was difficult to evaluate the outcome in a meaningful way and partly because it was outside their area of expertise.

Only recently has functional outcome evaluation come into focus with the introduction of health-orientation and psychometrically based measurements of health and health-related life-quality. It is this latter development which leads to health gain of the second variety, which measures subjective health. We will discuss this separately below, since this represents the “front-line thinking” in health and health service administration today.

In the meantime, let us look at traditional thinking. If the objective of health services is only to identify diseases and cure them then, the monitoring of diseases and death may become an important indicator of health service function.

3.1 Vital statistics may be useful

Reliable vital statistics gives overall information concerning mortality, morbidity and the disease panorama. If there are substantial deviations in mortality for some diseases for which there are effective treatments, these deaths are termed "avoidable deaths". Studies of avoidable deaths may therefore give an indication of the function of the existing health services. The method is not very sensitive, but with larger deviations a further analysis is important. The reason for

"avoidable deaths" may be lack of resources in general or it may be lack of a particular kind of resources. Unfortunately the cause is most often lack of skills, knowledge and ambition. Also organisational deficiencies, national or local rules, regulations and traditions, which obstruct rational problem solving, are common. Most often it is a mixture of all of these.

Even when absence of physical resources is not the dominant problem, the simple analysis of the problem and an investment into some physical resources related to the problem tend to give an improved function and thereby a health gain. This is a sort of Hawthorne effect. What is measured and analysed attracts attention and concern. Also the cure carries both a carrot and a stick.

In analogy with avoidable deaths there are also statistics monitoring avoidable diseases. These tend to reflect the socio-economic circumstances of a geographical area rather than the effectiveness of its hospitals. Nevertheless health services do also have a responsibility in limiting these diseases through health promotion, disease prevention, health education and, when this is applicable, vaccinations and the identification of the social problems behind the diseases. The responsibilities lie with all sections of the health services, but the dominant actor should be the public health organisations.

3.2 Many forces govern health gain

In some of the former Soviet republics, we find textbook examples of the existence of both "avoidable deaths" and "avoidable diseases". In these cases the lack of resources is real and sometimes substantial. The magnitude of the consequences is a result of the cultural inheritance of centralisation, a planned economy and authoritarian management. All this influences both the availability of physical resources as well as the utilization of available resources and the establishment of alternative solutions. Because of the previously highly centralised production apparatus in the Soviet Union, many of the republics lack facilities for the production of drugs and of even simple medico-technical devices. In some of these republics there is a sad shortage of drugs, disposables and equipment. Some of these things in demand could have been produced at home, in the republic, at a much cheaper price than that for which they are now imported and sold. An investment in simple medico-technical industries would seem reasonable. However, absurd inherited tax laws make it virtually impossible to establish their own production without colliding with the laws. The shortage of these items leads to the creation of a highly priced black market, which prevents large parts of the population from receiving adequate treatment for ordinary diseases.

These republics represent areas which are in need of substantial investments in health services and allied industries. In the initial analysis of the health situation, one would expect a significant return on the investment in health gain terms. However, a weak or retarded political development will reduce the expected return. The investment projects therefore have to be evaluated also with regard to political and cultural feasibility and not just from the public health perspective.

Within Europe too, and even in the European Union member states, avoidable deaths and avoidable morbidity are encountered**.** This can be studied in the “European Community Atlas of Avoidable Death” published by the Commission of the European Communities Health Service Research Series No. 6 Oxford Medical Publications, 1993 edited by W.W. Holland.

3.3 The public health organisation

As mentioned above, health services do have a responsibility in limiting morbidity through active health promotion, disease prevention, health education and, when this is applicable, vaccinations and the identification of the social problems behind diseases. These activities are in general fairly cheap and seldom require large investments. The small investments needed are however quite often ignored by health authorities. This is most often because of ignorance in the field of public health on the part of the authorities, which may not have public health specialists in their advisory committees. The reason is often the absence of public health education.

In these cases, the major investment necessary is the establishment of public health schools. These, then, act as the seeds from which the missing skills and knowledge will develop.

The fostering of public health knowledge and public health science is a prioritised field in European policy today. The Commission considers: improved health information, prompt intervention in the case of transmittable diseases and constant monitoring of health determinants important, not least with regard to the expansion of the EU eastwards.

The very idea of a free flow of goods and people all over Europe will and has changed the conditions of control not just with regard to food, tobacco and alcohol, but also with regard to infections, drugs and medical technology. Many of the earlier national controls of drugs and devices will have to be decentralised to the user level thus increasing the demand for decentralised public health competence.

In the years between the Second World War and the nineteen-eighties, medicine, in its technical biological form, dominated both health services and health care research and therefore also education. This has resulted in a backlog in public health education in Europe which calls for attention.

Public health is not concerned with which diseases a given person has, as medicine is, but with which kind of people have a particular disease. It is concerned with the risks of living and the possible actions we may take in order to minimise these risks. It is also concerned with the infrastructure of society and its role in health and disease. The health outcomes of public health interventions often have a long-range perspective. Investments in public health are therefore long-term investments and have a low rate of return in the early period if measured in health gain. One can compare them with investments in car safety. It takes time for every producer to adopt new features, it takes time for the car fleet to be renewed and in the meantime other factors such as more powerful engines, better roads and new speed limits confound the evaluation of the outcome of the intervention. In spite of these appraisal difficulties, few people would want to abolish the introduced safety measures. But then, investment in car safety is in fact a public health intervention.

For the appraisal of public health projects, it is therefore necessary to have intermediate objectives in order to evaluate them step-by-step. These should have an established relationship to health. The investor may choose such an intermediate goal as the investment object. The establishment of a school of public health, where this is needed, may be an example of such an intermediate health goal.

From the perspective of the WHO the development of public health science is mandatory for the development of health. Moreover, in recent years it has been shown that the enforcement of a

"public health perspective" within medicine and health services has been crucial for the integrated functioning of the health services; especially in hospitals, with other societal functions, particularly with regard to the care of the elderly, which we shall discuss further below.

4. Factors which may affect the investment needs now and in the future

As hospitals and health services reflect not only the social and moral values but also the culture and the socio-economic status of the society they serve, they are images of that society. Because of the present rapid societal changes taking place in many parts the world, these "images" nowadays tend to mirror a past era rather than the present one. The fast pace of change makes it difficult for most governments to model their health service systems so that they are sufficiently flexible and adaptive and able to respond to the demands and expectations of the public and still affordable for the majority of the people. The critical factor is not so much money as the intransigent frame of reference governing the judgements and decisions related to the role and function of health services.

Apart from the geographical factors and the panorama of illnesses seen, financial resources, demographic changes, technological development and the public's expectations, govern the supply and focus of hospital care. These factors are all interwoven. In fact it might be better to rephrase the above sentence to this: financial resources, technological development, demographic changes (ageing) and public expectations determine the panorama of illnesses seen. The public's expectations are based on the general level of education and access to comparisons. Also, the predominant concepts of the rights of the individual are important, since, as we argued in the beginning of this paper, health services are more important for the individual patient's health than for the general health of the population.

4.1 The population's ageing changes health services

Elderly people constitute an increasing part of the population. Increasing age does not necessarily lead to a more frequent use of health services. This is particularly obvious in privileged social groups. However, when health services are needed in these age groups, the services are often more complicated and costly, both with regard to the manpower and the technology involved. It is the number of people in this age group and the cost of the technology used which increases the needs of services and investments. The ageing of the population is a strong cost-driving factor in health services.

Let us take a quick look at the issue of the longevity of human life and the role of ageing for health policy and investment needs:

From a Darwinian point of view, the purpose of an individual's life is the attainment of maturity and the reproduction of the species. Modern theories of ageing are concerned with the influence that natural selection may have on the timing of gene expression. The ability of selection of the gene is dependent on when during lifetime it is expressed. Factors causing death before sexual maturity disappear rapidly from the population, while those expressed late in life may accumulate in a population if they enhance survival and reproduction. Survival beyond the reproductive age, say beyond the age of 50, may not be evolutionary desirable, and only to a limited extent socially beneficial. The development of longevity beyond the reproductive age

makes a series of illnesses, such as cardio-vascular diseases, Alzheimer's, Parkinson's and cancer, which are expressed in the post-reproductive period, very visible.

Before the modern era only a few people reached very advanced age. Those who did were genetically highly selected individuals who would have the social role of carrying traditional customs, practices, skills and knowledge on to new generations. Now, in all European countries more and more people are surviving into old age – even individuals who are not genetically equipped for healthy survival into old age. To deal with this problem in a humane way is the single most difficult health policy problem in Europe. In some European countries about 70 % of the hospital budget is spent on the care of patients over 70 years of age and very often during the last year of life of the individual. Since great efforts and investments are spent on reparative medicine in high age groups in Europe, these activities constantly come under media focus, are subjected to public health policy interventions and are the subject of medical ethics discussions. They also have a very high political priority for most parliamentarians and governments, since elderly citizens represent a growing proportion of the electorate.

The treatment and care of the ill old person is a moral obligation for society. There is no financial income side to this for society. From the societal perspective, we are therefore discussing a balance between costs and humanity. We are aiming at health gain and have a humanitarian objective. There may be an income at the implementation level, which is then an expense to be shared either by the co-insured or fellow citizens. From the societal point of view it can, in a somewhat simplified manner, be stated that "adding years to life" is costly for society, "adding life to years" may reduce both costs and expenditure of the moral obligations bestowed upon society.

Obviously any investment which will reduce the prevalence of diseases leading to senile dementia will have both a high level of health gain and the highest value of societal financial return, because humane care for a senile person is incredibly expensive. This is however, so far a matter for basic and clinical research, and we have yet to see the "breakthrough" in science which will form the basis for rational and effective treatment or prevention of these diseases.

While awaiting this "breakthrough", can health services do anything further than just provide care? Is it possible to harmonise biological ageing with chronological ageing by postponing the functional reductions for as many years as possible?

The effect of ageing is not simply age-related disease and death but also deteriorating functional ability. Ageing is therefore a matter of changing the life-role functions socially as well as personally. The process influences life-quality. From all points of view it is beneficial to postpone ageing. Functional ageing can, to a certain extent, be postponed, at least man-made premature ageing. In doing this, the period of ageing may be compressed to the shortest possible time before death – "adding life to years". This will reduce the societal, the social and the personal costs of ageing. Postponing man-made ageing depends partly on the lifestyle of the individual and partly on the social and societal environment in which we live. For the individual, it is a matter of active healthy living during the whole life cycle. For policy makers it amounts to a health-orientated policy and the creation of a health-orientated infrastructure. Investing in the postponement and compression of diseases will give high returns both economically and financially.

Both the social benefits and the financial opportunities of investing in health are generally overlooked by health services, which are usually activated first at the time of manifest disease. Health-fostering practices have, unfortunately to a large extent, become monopolised by the beauty industry and address appearance rather than health, and for the young and fit rather than

for those in need of support. Promoting health has become a victim of two limiting paradigms, the disease-orientation of health services and the appearance-orientation of the present culture. The false association of health maintenance with the beauty industry, performance sports and nutrition apostles have tarnished its reputation.

Nevertheless, intelligent and low-level health maintenance programmes for ordinary mature people can reduce old age diabetes and bone fractures, to mention just two very common age-related health problems, and the secondary complications of these diseases besides increasing vitality and the capacity for independent living. Why do health services not invest more interest and money in health maintenance programmes which may benefit both the patients and public finances and even give a financial return to the services for a moderate investment?

In order to pursue this reasoning further we will need to consider both ageing, the meaning of the term health and the general pattern of health services.

4.2 Degenerative diseases: back to square one

Although ageing is genetically governed, the process itself is an enzyme-dependant, energy demanding process, which is influenced by risk factors. Some of the risk factors are known, most are not. Most of the knowledge is of an empirical nature. We therefore deal with degenerative diseases such as arthrosis, cancer and arteriosclerosis as we did with infectious diseases in the days before we knew anything about bacteria and virus. We act on empirical knowledge, which may be correct, but is sometimes incomplete or wrongly interpreted or downright nonsensical. Current medical technologies dealing with these diseases are expensive and often ineffective and known as halfway technologies, since they are unable to address the cause of the problem.

These common diseases cannot be cured in the traditional sense, but it becomes increasingly possible to partly restore functions and alleviate pain and anxiety. A hip replacement is not a cured healthy hip, an eye that has had cataract surgery is not a cured eye and so on. This situation has brought the quality of life, the meaning of life and the total needs of the patient as a whole person into focus. Health can no longer be defined in the perspective of disease but should rather be defined in the perspective of the patient's ability to cope with ordinary daily life.

5. Some accepted health definitions

Health is a complex and multi-faceted experience governed by many subtle factors. It is clearly as difficult to define as, for instance, beauty, kindness or happiness.

Nevertheless there are several useful definitions of health. The best known and probably the most misunderstood is the one presented 50 years ago by the WHO. The original version states: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

The WHO defined health as consisting of two parts:

- the absence of disease, which is a professional judgement, and
- positive health: the presence of well-being, which is the judgement of the person in question.

The definition also recognises that the state of health is a social role and not just a medical definition.

Moreover, the WHO described the maximal state of health by using the phrase: "complete well-being". Most people realise that this is unattainable. It seems fatuous to require a state of total well-being, considering the dynamics of life. Therefore many people discarded the definition as unrealistic. What the WHO did was to establish a normative goal, maximal health, as a guide for health policies. This was not well understood either by the health profession or by people in general. Recently it was proposed that the WHO should modify the original definition slightly, by introducing health as "a dynamic state" rather than just "a state" of well-being, and adding spiritual well-being to the list of physical, social and mental well-being.

The importance of the WHO definition of health was that it paved the way for a much broader discussion on health and the many factors involved in the creation of health. Also, and above all, it separated the professional subjective judgement (absence of disease) from the patient's subjective judgement (well-being), thereby adding several dimensions of thought to the traditional biological disease-orientated definition.

The biological view of health is rather hedonistic. Ill-health is seen as a state with pain, anxiety or reduced mobility i.e. biological and physical disharmony as the cause of loss of life-quality. The humanist-orientated researcher takes a different approach and defines health from the perspective of the inner dialogue. Ill-health is then the collapse of meaning and the loss of coherence.

The Swedish philosopher Lennart Nordenfelt (1) has defined health as the ability to realise one's vital goals given standard circumstances. In recent years, in the course of our work with Self-Rated Health in Linköping, we have worked with a more pragmatic and quite simple formulation of Nordenfelt's view. It simply states that "health is the ability to cope with ordinary daily life".

This formulation, we think, deals with the energy (vitality) of the person and the possibilities s/he has (is given) to act in his/her ordinary daily life in accordance with his/her age, which is, in a sense, standard circumstances.

Health and disease are not contrasting, mutually exclusive concepts, although the two are often treated as such in day-to-day thinking and in everyday conversation. Health may exist in the

presence of age- related as well as other kinds of disease, dysfunction and disability if health is defined as perceived meaning of life and a sense of coherence. In fact, this is the kind of health most people over fifty years of age enjoy.

In modern society people want to define their own needs and level of well-being, under ordinary circumstances. In case of illness, it is the task of the health services to restore life to the level of the ordinary daily life of any given patient, if this is possible. If it is not possible, then the task is to create the conditions for a meaningful life in dignity, not the mechanically perfect situation at any cost and risk, but a health-related life-quality, balanced by what is technically and professionally feasible.

If this is the objective of health services, then measurements of morbidity and mortality are no longer sufficient. The evaluation of health service activities will also have to reflect to what extent the patients' health-related quality of life and the patients' self-rated health has been influenced.

As health is a subjective experience, we have no way of measuring health accurately. Still we can say of one person that he radiates good health or of another one that he does not look healthy. In other words, there are subtle signs of good or bad health, which we read and use as a basis for our judgement. It is a sort of tacit knowledge, which we share and use both professionally and in daily life when we judge the state of health of other people. When we judge our own health, our armoury of tools for judgement is much broader and it is integrated into a constant monitoring process, which is more or less subconscious.

The word "diseases" refers to more or less well-defined patho-physiological processes defined by empirical methods, usually by a professional person. Health is different. It is something that people experience. In a sense it is a feeling. We often refer to health in this sense as well-being. In its general form health is often termed global health or well-being, indicating that it is the resultant vector of several different dimensions, some of which could be classified as physical well-being, social well-being, mental and spiritual well-being. It belongs to a family of experiences such as happiness, self-acceptance and sense of identity. These are all somehow related to a feeling of meaning and coherence in life.

If we want to study health, well-being and health gain or loss, and if we want to be able to follow this reasonably well over time, and if we want to compare groups of patients with other groups of patients or persons in similar circumstances, then it is necessary to establish some reproducible, valid and reliable instruments, which reflect the patient's/person's own experience of his/her health at a given time. We need to be able to measure health.

As health and life-quality are subjective matters, they can only be rated or made visible through contact with the patient’s mind and personal life experience. The only one who can judge or rate a person's feeling of health or ill-health is that person him or herself.

Assuming that there is a strong need for the measurement of health, then the question arises: is it possible to establish standardised ways of measuring subjective matters of such a nature as health reasonably well?

Self-rated health (SRH) measurements measure a person's or patient's function and well-being as perceived by the patient or the person studied. The measurement is based on psychometric methodology developed over the last sixty years by psychologists and educators. They are scientifically sound methods for the assessment of subjective states. The literature of these

methods was until recently very little known by clinical researchers and seldom used by clinicians.

SRH usually has the characteristics of a structured questionnaire, which has been rigorously controlled for scaling, reliability and validity. There are many different instruments for Self-Rated Health measurements. Very roughly they can be divided into: general instruments measuring health or life-quality in general; specific instruments which focus on people with a particular health problem or a characteristic such as social, attitudinal or personality feature; and instruments which may be developed to use with a particular group of people such as children or the very old. The term "global" health refers to a very general description of perceived health.

The questionnaires can be administered in several different ways; for example in face-to-face interviews, as telephone interviews, mailed questionnaires or computer-assisted questionnaires. They are used to create databases for the health of populations or to study medical outcomes in longitudinal research. Recently they have entered clinical research and drug and technology assessment research. The questionnaires can be modelled so that they are read automatically. The responses from large groups of people are dealt with fairly rapidly and computer-analysed. For individual patients in hospitals they are sometimes presented on a touch screen and analysed simultaneously.

Apart from co-variation with symptoms and traditional measures of health, SRH is an accurate predictor of the use of health care services (2; 3) and is an independent predictor of survival (4; 5). SRH also seems to be useful in health service research, when studying outcome, efficiency and the effectiveness of different treatment methods.

6. Is health orientation a matter of affluence?

There are of course great differences in needs between countries at different levels of socio-economical development. Diseases such as tuberculosis, syphilis, malaria, diptheria and functional defects such as congenital hip displacement, hearing and eyesight defects, which can be treated or prevented, may dominate in the low-end scale of development. They are identified as problems in reasonably accurate vital statistics. Highly developed welfare societies are standing at the wall of ignorance with regard to their dominating diseases. This is part of the explanation for the shift of attention away from disease to health and the concern for well-being.

Health orientation, self-rated health measurements both of population groups and individuals might therefore be seen as concerns only of the affluent societies. This is not the case. The transfer of modern medical technologies, modern lifestyles and life hazards has added the problems of affluent societies to the ones existing in less developed countries. In countries with low national wealth it is even more important to consider whether the investments in health services actually contribute to the health and the welfare of the people.

6.1 The risk society

A second, major problem health services have to deal with, besides ageing, concerns the consequences of the risk society. The most common and important risk to man's health is violence, particularly organised violence. The last hundred years' industrialised killing in modern warfare has originated more death, health problems and disabilities than any known disease. Increasingly violence hits indiscriminately. Street violence, terrorism and landmines are examples. Also the increasingly frequent and larger scale catastrophes related to modern

chemical industries and nuclear industries need attention. New viral diseases such as HIV and mad cow disease have appeared, the latter a consequence of industrialised agriculture.

Also, contaminated food is causing epidemics, particularly amongst children, and are becoming more frequent as a consequence of new poverty and because a younger generation has no knowledge or routines for food handling without access to refrigerators and freezers. Legionellosis spreads to large groups of people through air-conditioning or water-heating systems. Infections with resistant bacteria evolve as a consequence of the indiscriminate use of antibiotics in humans and farm animals. A particular socially disruptive risk of modern society is that of unemployment. The consequences of unemployment vary from culture to culture, depending on the social and personal prestige employment has in that culture. Usually unemployment is linked to poverty, loss of self-confidence and the change of self image, alcohol and drug abuse.

A look at the statistics shows us that the risks for traditional diseases such as heart disease, tuberculosis, syphilis, hepatitis, cancer, and other diseases are not evenly distributed among countries. Neither are any of the other risks of modern society. A look at all European countries shows us that diseases follow social patterns of risk exposure. The statistics also indicate an increase in traditional infectious diseases, such as those mentioned above in several of the newly independent states and countries of Central and Eastern Europe. A reduced life expectancy in these countries as compared to Western European countries and a growing gender gap in mortality, with an increased mortality of males, is found in the previous Soviet republics due to violence and abuse, heart disease and cancer.

Physical risks and health risks are always created and effected in social systems. Therefore the magnitude of the risk is a function of the quality of social relations and processes. These are generally seen as out of the reach of the health services. Health services are there, only to deal with diseases as the consequences of social relations and processes and nothing else. So far societies have made very little use of the health services, particularly hospitals, in primary preventive health work, since the focus of the services has been on disease and not on health. It could be argued that this is a rational way for the systems to work. Thus, however, society's largest interface with the public in health matters and an immense fund of knowledge is discarded and lost for health development. This is the background to the call for a health-orientation of health services by the WHO member states.

6.2 Medical technology as a risk factor

Modern medicine is itself a high-risk area, where risks include the inappropriate use of potent drugs, hazardous diagnostic techniques and inadequate surgical interventions. The history of medicine, besides progress and triumphs, also presents a long chain of useless and sometimes dangerous solutions to health problems. Looking back 4-5 decades or more, many examples of doubtful measures in routine health care are revealed. These measures were often not only strange but even bizarre and sometimes extremely dangerous for the patients, seen from the present-day perspective. However, they represent the knowledge and beliefs of their time. So do present-day medical measures. In a few decades some of these measures will be regarded with raised eyebrows by a generation in possession of knowledge, skills and values which differ from ours.

As medicine is not a science in itself but an applied science, the element of judgement is dominant when applying medical methods. Assuring that a method is useful and harmless in itself does not exclude the inadequate use of the method. Apart from the analysis of the inherent

risks of a method/technique, assessment of technology is consequently very much concerned with defining the adequate use of technologies and the corresponding outcome.

Evaluating new technologies is not so easy. Ideally a method should not be brought into use until it has been evaluated in the particular setting for which it is planned. Unfortunately this takes some time. Often the new methods spread before the assessments have been concluded and sometimes the methods tested have been modified to such an extent that the assessments in the end are irrelevant. Innovation, renewal and development build on visions, entrepreneurial spirit and lateral thinking. Technology assessments are based on critical analysis, existing knowledge, values and tradition. All too often the assessments have turned out to be poor predictors of the evolving technology. Classical technology assessments seem to be more effective when used to analyse existing established technologies already in use, which is also important.

The role of technology assessment in the appraisal of investments in heavy equipment is directed towards the social costs and the risks of the spread of the use of the medical techniques which the equipment supports. Technology is in this context closely allied with what is termed evidence-based medicine. It is concerned with the expanding use of medical technologies, which may be induced by ownership of the equipment and with whether this expansion is appropriate. The analysis interfaces with the organisation of health services in the question of centralisation or decentralisation, of expensive equipment and the problems of its use and maintenance.

7. Organisation and the structural changes of health services

After the Second World War, the hierarchical health care system with primary, secondary and tertiary care was quite natural. Today, development has outdated the philosophy behind the hierarchies. Nowadays an integrated view of the "caring chain" is necessary. Much of the sophisticated diagnostic equipment should be available for all levels of care. The beds are needed less by the “high tech” than by the “high touch” hospitals, which may be run by physicians or nurses with a broad trans-sectorial education dealing with the post-intervention patient, the severely chronically ill or the dying patient.

New technology has shortened the average hospital stay and pushed a great deal of postoperative care and complicated medical care out into primary health care. The image of the general practitioner and family doctor with an encyclopaedic knowledge of medicine with a holistic, empathic approach and a broad social understanding of ill-health and the interaction between body and soul, individual and society, can no longer be maintained. At present the first line doctor also needs to master a broad spectrum of specialised skills, which are necessary to be able to care for the patients who are discharged from the hospitals often only hours or days after a complicated treatment or procedure. This doctor needs to be replaced with a first line of treatment team.

The first line of treatment teams will in the future have much broader and more diversified qualifications than is currently common. They may include social workers, occupational therapists, physiotherapists, clinical psychologists, nurses and physicians. The teams should not be responsible for geographical areas, but should represent a choice made by the patient. The mixture of skills and knowledge in these teams may vary depending on geographical and socio-economic circumstances according to the characteristics of their working area. It may even be wise to avoid the term team, which may lead thoughts to team leaders and the hierarchical structures so beloved by health authorities. A better term may be knowledge networks.

Hospitals were originally based on a belief in isolation, enemas, diet and bed rest as the mainstays of therapy. In the era of infectious diseases, isolated barracks with many beds were rational. The personnel structure was a broad-based pyramid with many nurses' aids and nurses and a few doctors. The system was extremely hierarchical .

With the increasing costs of building sites and the advent of antibiotics, hospitals became "high-rises" and the increasing specialisation turned the personnel structure into a cubic formation with about as many doctors as nursing aids, somewhat depending on the salary structures of the country concerned. With the increasingly complicated management of large specialised hospitals, the hospital accountant mutated into a management director and the organisations started to precipitate into divisions.

These large hospitals turned out to be ineffective, costly and difficult to manage. The organisations are now falling apart since it turned out that their organisational structure is not adapted to either a knowledge organisation or to the tasks of modern medicine.

Health services are not just service organisations but also knowledge organisations, which do not lend themselves readily to traditional administrative steering mechanisms. Moreover, the product is health gain, which up till now has not been measured regularly, or ever. The governing principles are ethical norms carried by tradition and translated into a number of rules and regulations in order to make them operational and manageable within limited resources. The process is controlled mainly by internal social and collegial pressures.

Somewhat simplified, one can say that administrators, managers and politicians work according to utilitarian ethics, with the objective of maximising the benefits for as many as possible while at the same time trying to minimise the total expenditure of the activities.
Doctors and nurses work from a different ethical perspective: duty ethics (deontological ethics). Each patient's health and well-being is the goal. Maximal efforts within the available resource framework are used if necessary, without regard to the alternative use of the resources.

Although these two ethics are in conflict with each other, they are both vitally important. The utilitarian ethic tries to guarantee that health care is available to everybody in society and the duty ethic secures the faith, confidence and reliance every individual should have in the health services. They are equally important politically. The tension between the two perspectives is therefore an innate and immutable factor of health services.

All organisational reforms and management models are in the final analysis attempts to overcome the consequences of this innate conflict of perspectives. Many of the administrative efforts to narrow the gap are frustrating, since the utilitarian perspective of the formal system always has difficulties in overcoming the deontological values of the ingrained informal system and therefore tends to create absurdities which are perceived as brutal.

Attempts to close the gap between perspectives through medical research and development towards more cost-effective methods are often disappointing and sometimes futile. Such efforts may lead to the introduction of even less cost-effective methods from the utilitarian point of view, since even marginal improvements measured by professional standards within the framework of duty ethics will be defined as valuable. Therefore the gap may often widen rather than being reduced. Obviously the solutions within the traditional two frames of reference do not offer any answer to the problem of rising costs and the quality of care.

A circumstance which further aggravates the situation, is the way health services monitor their activities. The input in terms of money is easily measured, the process of medical activities and

care is often quite obscure; the products: operations, days of care and visits, laboratory investigations, X-ray studies etcetera are meticulously measured, the result, the outcome, the "bottom-line", which is health gain is almost never measured. For these reasons health services are judged by their productivity.

Therefore, the traditional parameters monitored only reflect the size of the operation and the productivity but not the outcome and therefore not the efficiency. Whether or not the actual services performed have increased the level of health of the individual patients or groups of patients is left to the subjective judgement of the professional.

The yearly reports of hospitals contain large amounts of information about the number of patients treated, the number of employees, the size of the budget, the investments, even the number of operations, bed occupancy and average length of stay in different departments and many more details. However, all the patients could have died from the treatment without anything in the report needing to be changed. These reports almost never reflect anything related to the actual purpose of the services, a consequence of the intangible nature of the product.

The focus on productivity is of course of some value, particularly if there is unreasonable queuing in the system or logistic inadequacies. The focus leads to increased production as measured by reduced average length of stay and better bed utilisation and increased patient turnover.

An increased level of productivity unfortunately increases the expenses of the hospital. The expenses are generally transferred to society and the public directly or indirectly. So while the personnel of the hospital run faster and faster, the cost of care for society rises in pace with them and the increase in production. In a broader perspective these costs also relate to the age of the patients and their contribution to the public economy. So we are not certain if the personnel are producing health gain or just more costs by the increased productivity – or some mixture of the two.

Also of importance is the early transfer of the patient to post-intervention care at home assisted by primary care and social support services. These services may not be developed to cater for this and may lack the knowledge, skills and facilities to meet the needs of the patients. The part of home care which is paid for by society is often more expensive than institutional surveillance and not seldom the patient's cost in terms of anxiety is considerable, depending upon geographical and social parameters. This is particularly true for elderly patients. Most of the patients today are elderly and more will be so in the future. 75% of the hospital patients in Sweden today are over 70 years of age and they are often widows.

Increased production may allow bed reduction, which may reduce costs in the hospital budget. Indiscriminate bed reduction increases costs in the societal budget and brutalises health services. It puts strain on primary care by asking for knowledge and skills which are not normally a part of the primary health care armoury.

In summary: The most important need with regard to health services and hospitals in the future is a totally different way of measuring and monitoring health service function; one or more methods, which will include the possibilities to evaluate the actual usefulness of the activities and judge their effectiveness with regard to patients' health and life-quality. We need a method which measures health gain, and we need a different functional interaction between the different levels of care.

This state of affairs is only reached if one measures and monitors the outcome of interventions. Moreover, only when the professional judgement is balanced with the patient's own view of the result or the outcome.

7.1 Management of health services

For health service management, the measurements of health and the concept of health gain and of SRH are probably as revolutionary as penicillin was to epidemiology in the forties. Measuring the outcome of medical interventions in health gain terms, that is improved SRH, makes two things possible:

- to measure the effectiveness of health services against the stated objectives of the services: health; and
- to reorient the activities towards health, bringing the patient's judgement of his function and well-being into focus.

Previously, health services were mainly judged by their productivity and process quality. Very often these measurements were expressed in money. The "bottom line" of health services is health gain. Money is on the input side and most often a constraining factor. Therefore the productivity orientation was not very effective in steering health services.

The era of productivity orientation came to an end in the late eighties. As mentioned above, productivity orientation had created more costs – the more intensively a hospital works, the more expenditures are created – not only in the health services but also in adjacent sectors. If the activities lead to health gains for individuals or society, this is of course an advantage, provided society and the individual can afford the expenditure.

Nobody knew to what extent the activities carried out were justified from a health gain perspective, since health and health gain were not measured routinely. While it was seldom doubted that the things done were done right, there were rising doubts as to whether the right things were done. There was mounting suspicion and even some evidence that the health gains were often marginal as compared to the costs. Also some qualities of care deteriorated. Qualities which are not so easily measured quantitatively but which are nevertheless apparent and felt by patients and personnel.

The "lean" operation of health care and the rapid flow of patients through the system put increasing burdens on primary care. It moved costs to the social services of the local authorities and into people's private economies both directly, through raising private co-payment and indirectly, through increasing taxation. It escalated the workload of the personnel and depersonalised the hospital service.

The previously described psychometric methods have made measurements of health and life-quality possible. These bring the patient's self-rated health and health-related life-quality into focus. It is reasonable to believe that the new concern with the patients' well-being will bring the patients into the clinical decision process in a more concrete way. The patient might in the future not be a patient, nor a client or a customer, but rather a co-producer in health.

Such measurements will also introduce new ways of measuring effectiveness and efficiency that should be matched with the traditional professional outcome measurements. Measurements of patients' self-reported health should therefore be an integrated activity in the process of care and in the management of hospitals.

The development of health orientated outcome measurements is still in its infancy. The practical application of these measurements in daily care in hospitals and primary care particularly is only weakly developed and poorly understood and acknowledged by the medical profession in general and administrators in particular.

Within the next decade we will see a rapidly widening interest in this field. Considerable investments need to be made in the development of both methods and the routine approach to the outcome and health gain measurements in the health services. Of greatest importance is a change in the focus of managers and professionals from a disease orientation towards a health orientation. This calls for a substantial educational investment.

Some European hospitals have therefore embarked on the development towards outcome orientation and health measurements in particular. The first steps have been taken towards using patients' self-reported health, as measured by psychometric instruments such as SF-36, as an opening to a more patient-governed and health-orientated care. It is the hope that a balanced evaluation of the outcome, using both the professional evaluation and the patient's own evaluation of his/her functional ability to fulfil his/her life-roles will depict the outcome of interventions more correctly and with more nuances. If this turns out successfully, this will support priority decisions and one may finally be able to start to study the effectiveness of health services. Furthermore, it will bring the patient's life situation and preferences into focus in clinical management.

From a management point of view, focusing on measurements of health and health gain means focusing on the mission of health services: health. By measuring health by means of SRH, a clear signal is given to all personnel in health services as to what is important, since that which is measured is always perceived as important.

8. The future "hospital"

It seems natural to break down hospitals into smaller units which are economically and functionally independent organisations. The technical, heavy investment units, such as laboratories, imaging departments, operation theatres with intensive care units with a high patient turnover with large investment needs, which are personnel-intensive, need to be economically and organisationally independent firms which offer their services, in controlled competition, to the users.

The bed departments offer nursing care at a variety of levels from hotel service through ordinary medical/surgical ward service to hospice service. Even these departments should be functionally and economically independent, offering their services in competition. Any doctor, whether he/she is a specialist or a general practitioner, should have admission rights to the bed departments, so that a sound balance of the social and medical circumstances and not the ICD numbers of the supposed diagnosis govern admissions.

These changes will take into consideration the different characteristics of the various functions in the course of ill-health events. They will guarantee a better interaction with society outside hospitals and offer a better and more differentiated service to the elderly, which make up the majority of the patients. Investment needs in the various departments differ greatly and can be dealt with accordingly. Investment needs in bed departments will greatly resemble hotel investments. Investments in technical units resemble investments in any other high-tech production. The interaction between different functions and functional alliances are governed by

quality and cost-effectiveness parameters in combination with the secondary service they can offer through their alliances with social services, such as social support and home care groups. Hospitals will then be replaced by an interactive network of knowledge firms, which act interactively with each other and with other societal services. This development may also change the public/private mixture in a favourable direction with regard to competition.

The quality of care may be secured by the public transparency of the process, outcome measurements and independent, public quality control teams and complete openness to the public with regard to the findings of the quality teams. The caring chain for the individual patient is followed through the electronic storing of events and measures taken. Access to this is the privilege of the patient, who is the owner of the information. Anyone who has the patient's permission can be allowed access to the information.

Investors in health services are concerned about whether there is a market for the investment. As the market is deformed by third party payment, the concept of the patient as a naive buyer, and the monopolies of care, different systems, such as purchaser-provider systems with contractual agreements and the like, have been introduced. In these systems all kinds of intermediate actors are involved, each with an agenda of their own. In the language of health services the market is therefore defined in terms of need for the service. Needs are to a large extent defined by expectations based on experience and knowledge with regard to efficacy, costs and effectiveness. It is however also defined by some more subtle expectations related to educational and cultural background and personality characteristics both of the investor, the promoter of the investment and of the potential patients. Obviously the term "need" is about as problematic as the terms "health" and "health gain" as an instrument for the concise appraisal of health service investments. Still these concepts, need, health and health gain, are the best we have to describe the normative goals of the investments. Moreover, they are the governing elements in the management of care.

Based on the above discussion on the present characteristics of health services and the problems of governing and evaluating service functions in a health and social perspective we will now return to the questions of the Investment Bank.

9. The key questions for the European Investment Bank

Is the improvement of resource allocation in health a realistic aspiration for the Bank?

Resource allocation in health care must be governed by some normative values which can be laid down in a prescriptive policy declaration. For the Bank's purpose this declaration might ,for instance include that in order to be supported:

- a project should be defined by its objective,
- the objective should aim at the measured improvement of the health of a population or a sub-population,
- the project should be planned with indicators of health gain and costs whereby the progression of the project should be measured.

Is it ever meaningful to calculate an economic rate of return from a health sector project?

The rate of return on health service investments is evidently much lower than the cost of the capital in most cases. A successful health project may increase longevity and quality of life but may in the end lead to costly pensions over many years. If peoples' lives are valued in relation to their contribution to production and national income, very few investments in health services are worthwhile. We therefore have to evaluate the social value of having health services not so much the health value of these. As mentioned above, these are the job opportunities, the feeling of security and the adjustment of disabilities of different kinds, and sometimes an extended lifetime. The fact that people appreciate the social value of health services has made it possible to tax people and /or induce compulsory health insurance and social insurances of different types to pay for the deficit caused by the inefficiently used investment in health care.

Anything which reduces the cost for the same health gain which is now offered, and anything which increases the health gain for the same expense as is customary, is worthwhile investing in. Any project which can make credible that it will accomplish one of the two can be supported. The difference in health gain obtained or the difference in cost for the obtained health gain is the economic return. The rate of return will depend on whether the condition targeted is a common one or a rare one. It is always meaningful to carry out that analysis.

Should the Bank's appraisal concentrate on consistency with government policy within the state or the region?

The appraisal should not, but the Bank's final action should clearly be in agreement with the responsible government.

Should the focus of appraisal shift from seeking to measure outcomes to assessing process?

The Bank should focus on outcomes. It is within the Bank's competence to judge an outcome. The processes of health services are complex and subtle and reflected in the outcome. Assessing health service processes is not within the area of the Bank's competence.

REFERENCES

1. Nordenfelt, L.: *On the Nature of Health. An Action-Theoretic Approach*. Dordrecht, Reidel Publishing House, 1987
2. Ware, J.E.: The assessment of health status. In: *Applications of Social Science to Clinical Medicine and Health Policy*. Aiken, L.H., Mechanic, D.(Eds.). New Brunswick, NJ, Rutgers University Press, 1986
3. Fylkesnes, K., Førde, O.H.: Determinants and Dimensions involved in self-evaluation of Health. *Soc.Sci.Med*. 1992; Vol 35, No 3: 271-279
4. Kaplan, G.A., Camacho, T.: Perceived Health and Mortality: a nine-year follow up of the Human Population Cohort. *Am. J. Epidemiol*. 1988; 117: 292-304
5. Idler, E. L., Angel R. J.: Self-rated health and mortality in the DHANES-I epidemiological follow-up study. *Am. J. Publ. Hlth* 1990; 80: 446-452

Session 2

Data and Indicators for Health Care Investment

Macro and meso-indicators in health: a guiding tool in investment decisions

by

Jean-Pierre Poullier
Former Head of the Health Division of the OECD
Les Plessis Robinson, France

Content

1. Introduction

When the history of the second half of the 20th century will be writer, the health folio will record altogether exceptional achievements and sad failures. These reflect a willingness to invest in Medical care programmes and facilities, as well as an inability to allocate appropriately the required resources, given the objectives set. Achievements, and failures reflect thus the capacity to domesticate a range of unfavorable medical and non-medical determinants as well as a neglect to Marshall the necessary will to operate at the frontiers of social optimum or near these frontiers. An inadequate knowledge of the field in which health-enhancing investments are made is among the determinants of sub optimality. A substandard investment in information may be singled out as a part of that inadequacy: while manufacturing and market service branches invest 6 to 9 % of their turnover into knowledge about themselves, ¡t is reckoned that the order of magnitude in medical delivery institutions hovers between 1.5 and 2 % (that estimate would have to be off by four times its size to become irrelevant to the debate !).

Illustrations of the imbalances alluded to include access to an abundance of food and the persistence of malnutrition adequate housing - sanitation facilities and slums, the productivity of much of medical delivery and large waste in resources with deprivation of large segments of the field, fast rising levels of school attainment amidst large pockets of illiteracy, the high performance of much of emergency care with and a rise in violence that displaces much natural morbidity by man-made scourges. Gains in life expectancy for Western European girls have exceeded three months per year and for boys over two months per year in the past half century, in most Asian and Latin American countries the slope has been sharper still. Premature death rates have fallen sharply: two thirds of the avoidable deaths before, say age 70, have in Europe been "suppressed". Disability rates appear to be receding (though not as fast as potential). Several diseases have been eradicated, though new ones are generated by man's imprudence in managing air, soil and water assets, by lifestyles and behavior, by the aggressive pursuit of wealth.

Over 800 million people live with little or even no access to medical facilities, when elsewhere medicines are wasted and droves of patients with only a mild or no medical condition fill hospital beds. The vagaries of performance levels in the health systems of the world will fill for decades still the shelves with Green and White Papers, as well as Ph.D. dissertations. The world's health systems still fail on an absolute cost-effectiveness scale. For lack of good metrics of outcomes, society indicts more the high financial costs of the gains achieved than effectiveness itself. Health systems grow along the growth of total incomes, somewhat faster than incomes in most societies; this aggregate positive elasticity deserved the medical care industry the label of a "luxury good", a qualification in economics that identifies goods and services rising faster than averages. Health is thus expected secularly to experience a higher than average growth, but the feeling has grown and models have been developed to demonstrate fim this growth has been "excessive" and that a dose of restraint was desirable. Investment plays a treble role in that the expansion of expenditure on services is frequently preceded by that of equipment in that some restraint is obtained through investments in rationalization and an alternative composition of the capital stock and that at times of budgetary pressure, capital outlays suffer often more than current expenditure (wages and salaries).

Any organized kink in the slope of that curve is accompanied by a cohort of incantations on consumer sovereignty rights. Performance is still ill-captured on the macro-level, but on the "macro-efficiency side there has been an abundance of managerial techniques, such as Health Technology Assessment; this has prompted better monitoring and a closer identification of the

relationship between a health problem and a successful intervention. Monitoring and cost-effectiveness studies prove their worth. A challenge of society consists in a gradual enlargement of these tools and studies to the ineso-dimensior4 that of dealing with a segment of the health care system, not only single units of intervention as a step towards reconciling macro-management and micro-management. The success of macro policies often generates often micro inefficiencies, as many systemic reforms undertaken in Europe and in other parts of the world bear witness. In parallel, championing efficacy at the micro-level only may result in a calamitous overall performance, as an ample literature indicts the United States overall performance and an emerging literature suggests to be a European problem as well. Is there a chest of meso-indicators susceptible to both prolong the micro-efficiency pointers and to enhance the macro-productivity of the system?

Better ex-ante investment decisions are desirable in all health systems. Variations in common medical care practice are held to conceal a huge *social productivity* reserve. The emphasis below is placed on tools that already exist in most European countries' arsenal, thus *working with what we have,* rather than in proposing brand new tools. The two avenues are not contradictory paths towards enhanced health status at optimum cost to society.

2. The strange brief of health economists

Economics, the discipline of allocating scarce resources and of analyzing the distribution of outputs, is typically made easier by the growth of total output. Paradoxically, a majority of those dealing with the macro side of health economics in the high income countries seem to have elevated expenditure *restraint* (cost containment) to the rank of a *goal* of health systems. The feeling derived from much of the *Western* literature (embracing also Japan) in one of fear of structural transformations, such as demographic ageing, in opposition to the usual vision of economics: change is an opportunity for progress, when ¡t is not its engine.

Health economics in the *West* largely views the diffusion of much technology with apprehension, unlike in the other branches of the "dismal science" where technology is considered to be an essential vector of productivity gain. The speed with which robots spread in manufacturing branches makes still occasionally a headline<, conversely, a large endowment in lithotriptors earned a country the compliment of being "equipped to de-stone the whole of Europe". Elsewhere, public authorities alarmed at the cost of run-away health expenditure As this oversupply did not occur overnight the observation suggests that monitoring tools to determine the level (or some area) of appropriate equipment may have been (indeed still are) in short supply. Technology, for example, has in the past half century turned the sanatorium into a relic, which most practicing health economists have barely heard about. Neuroleptics and psychotropic medicines have emptied thousands of psychiatric wards. The potential for bringing under *control* diabetes or high blood pressure has been a major factor in the two thirds reduction in avoidable death since 1950 in the OECD countries, and so on. Yet, in many textbooks, technology *is the culprit.* The promises of genetic therapy at the turn of the new millennium are already being weighted against its prospective costs, as if in health a winning model had to rest on zero growth, or preferably a negative growth .

A common call in health economics is one favouring a *decrease of capacity* as if the output of the health system generated a social disamenity. A visible sign of thrift in capacity endowment has, however, been the build-up of queues. In many instances queues are an unresolved puzzle: was the level of investment inappropriate, was the geographical distribution inadequate, was the bottleneck created by underuse of the equipment or by inappropriate demand? The abundant

literature on queues has led to mountains of critiques of the organization of health systems, but somehow it has modified neither the teaching of health economics nor introduced a core of general principles that guide their recurrent emergence in most settings. Oversupply and waiting lists recur in the same health systems. In many service industries with mainly local markets and that share the characteristics of distributing capital assets with a fairly unsophisticated demographic weighting approach (n per million inhabitants) pent-up demand varies enormously: know-how and unmeasured factors make the difference. Health systems have on the whole been more impermeable to allowing similar incentives to wipe out the problem. In the example quoted, compensatory spending to reduce waiting times and pent-up demand scores initially a spectacular shrinking of the waiting lists but eventually, after a little time has past, the lists ignite anew.

A frequent explanation of such dysfunctioning is that the lacks of clear signals like prices in the health systems. Yet, comparing the outcome of neighbouring countries, one in which acute myocardial infarction generates a NATO-size display of sophisticated surgical and therapeutic technology, the other where a much cheaper technology is applied, requires a magnifying glass when comparing outcomes in terms of differences in premature deaths avoided and healthy years gained. In the two countries, which are not the classic Ruritania and Fantasyland of our textbooks but large trade partners, physicians are paid under a fee-for-service scheme; their health economists sign inflammatory articles on profligacy that harms those in most need vs. denial of quality care to large segments of the population. Do honest citizens, unequipped to deal with the sophisticated metrics of either camp, cope? Were health care the object of a truly democratic market whose organization principles and level of resources would be determined by referendum, how well educated would the voters be?

As other disciplines of economics, health economics thrives on ideology. No free market exists in health but a large share of the literature attributes the restrictive stances alluded to the financing arrangements adopted, an illusion long maintained because the country with the largest private financing share was also *the* system that least restricted *demand* (if one excepts the pent-up needs of those without adequate means to purchase needed health services). Eventually, the United States privately run managed-care institutions introduced *rationalization* stances that much resemble the *painful prescription* (or rationing stances) of Europe, Australia and Canada. The health systems of the OECD area share a relatively homogeneous global outcome that was attained asynchronically, perhaps a policy-thinker windfall in that the experience of the others may shorten the path towards the next "rational" stage short of revising the postulates on which the systems rest. [Actually, there are important differences in outcomes, the bulk still in need of satisfactory explanations but these are not yet amenable to simple macro-models notwithstanding an abundance of off-the shelves *instant* solutions. The hypothesis of homogenous global outcome applies only at a kind of Sirius-like view of planet Earth which - as this Symposium deals with investment issues, not the full spectrum of health services research issues - may perhaps be papered over).

A concise recall of the main post-World War II historical episodes of the growth of demand and supply in health services may facilitate the selection of criteria susceptible to guide more appropriate investment decisions in the future. Needless to warn, neither the fresco, nor the list of criteria will be exhaustive. The rationalization-rationing path has consisted in throwing relatively complex instruments to respond to the idiosyncrasies of complex health systems and intermingled variables in a policy environment that has seldom favoured full transparency. Listeners or readers are invited to extend the model, bearing, however, in mind that eventually the variables added should not only be theoretical simulations but should preferably lend themselves to some quantitative (non mathematical) expression, thus be susceptible to become a tabular or graphic policy indicator. Listeners or readers are also invited to correct in most

(though not all) instances for the once poverty of the English or American language: health goods and services are "medical" goods and services, when medical generically applies to paramedical, pharmaceutical and bio-engineering services and goods, and within the "medical" sphere mainly to the cure and care ends, less to the preventive and promotion determinants of health, some of which are "medicalised". There is an ample consensus that health is multi-determined, but linguistic imperialism prevents that distinction without the (paradoxical) attribute "non-medical" determinant. The French and the German language, in contrast which display a considerable poverty to deal with an array of needed concepts like case-mix or throughput at the broadest conceptual level, assert that the bulk of health economics deals with diseases and disability, not well-being: *1' assurance maladie or die Krankenversicherungg*. Might it be that part of our inability to properly deal with "health" lies in the imperialism of linguistics? The question not being on the agenda, an answer is skipped to deal with a sequence of indicators that impinge on the investment in "medical" facilities.

3. Declining investment trends in medical care facilities

Responding to a global diagnosis of market failure, the dominant form of financing health systems' financing in the European Union is government funding (including Social Security schemes compulsory for a major segment of the population in the public sector). The principal sources of revenue are compulsory premiums for the majority of the population and/or general taxation with a modest complement brought by a variety of co-payment and user charges. The "and/or" reflects the growing sophistication of the health systems' financing approaches; several schemes and mechanisms co-exist in al] European countries (for linguistic convenience the singular is used more frequently than the plural). There has been an evolution from systems mainly based on one form of revenue towards systems that blurred the distinction including through the growth of parallel (private) insurance schemes. A sophisticated audience does not require to dwell on the subtleties of the myriad of financing arrangements designed during the past half century -- several hundred publications claim to guide their readers through this maze - awareness suffices. Awareness is, however, indispensable because often once the principle of diversity is stated, there is a tendency to forget about the existence of multiple incentive and disincentives in the system.

The European Union area experienced an unprecedented period of high economic growth from the 1950s through the early 1970 during which governments were in a position to raise almost effortlessly National Insurance premiums or general revenue. Disposable incomes had never risen so fast; households opposed thus little resistance to rising taxation levels, the willingness to accept a shift in favour of publicly supplied goods was high. The build-up and the restoration of human capital have been among the favourites of the electorate. Economists debate about the nature of these services: consumption or investment but voters and politicians did not. Anyhow, governments being rich, their demand for health economists was small. The proclivity to spend on services was accompanied by one to raise the capacity to deliver services, all the more so that a belief prevailed that a more industrial form of medicine - bringing the patient for observation and for therapy in a specialized place - would yield economies of scale and generate productivity. Even in the United States, which denied to President Truman a scheme that would make access to "health" services more affordable, the Burton-Hill Act of 1948 generated the construction of hundreds of publicly subsidized hospitals. In many European countries, a priority was given to the reconstruction and expansion of the manufacturing infrastructure, but eventually most Continental countries experienced a hospital investment booms. As may be inferred from Tables 1 and 2 below, the share of investment in expenditure on health has been generally high in the sixties and seventies, declining in the nineties.

The environment of the second half of the 1970s dramatically altered the proclivity observed, albeit the -awareness of changed times was not immediate and only gradually penetrated the cenacles of decision-makers. Whatever the origins of the so-called oil crises of the 1970s and the subsequent pace of economic growth - halved on average in relation to the third quarter of the 20th century, nonetheless positive for the fourth quarter of the 20th century as a whole - governments became almost overnight poor. New calls on public finance, notably to react to unemployment and rising poverty, to restructure the nations' production apparatus, generated initially timid , later more overt resistance to further taxation; deficit financing set in across the board and, in a few cases, reached astronomical proportions. In Belgium or in Italy, for example, the cost of servicing the public debt exceeds the amount of public monies earmarked for health. The ability to meet past pledges of virtually open-ended financing of new demands in health goods and services was thus battered. The syndrome of the late 199os: should publicly funded health systems pay for Viagra? what impact would the universal prescription of AIDS tri- or quadri-therapy have on mental care budgets or on the ability to expand interventions in favour of the disabled? started more than two decades ago, the process being more cumulative than a succession of anecdotal episodes.

A slowdown in the rate at which new benefits have been added to the nomenclature of medical goods and services reimbursable under publicly funded schemes may be observed from the late 1970s. Negative lists (pharmaceutical products not eligible for a public subsidy) started to become sizeable preceding the emergence of positive lists. The construction of new hospitals slowed down (the commitments shrunk sometimes dramatically as hinted in Tables 1 and 2, which exhibit the relative decline of investment in total expenditure on health), the fairly limited vocabulary of health services research which virtually had until then mainly declined equity as a postulate: "increase in access" was virtually synonymous with "increase in capacity" (physical assets as well as qualified manpower) enriched itself with a new objective: efficiency. That constraint was quickly recognized as a policy challenge: "to do more with roughly the same relative resources". OECD's *Public Expenditure on Health,* which unwittingly launched the motto, was promptly relayed by Chancellor Helmut Schmidt [the causal relationship is most probably weak but the quasi-simultaneity interesting, as it demonstrates that necessity generates many times sin-úlar solutions: publicly funded health expenditure should grow no faster than the financing basis on which it rests (the total wage bill).

Table 1 - Total expenditure on medical facilities in twenty two high-income countries, 1960-1997 (Share of total expenditure on health, %)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
European Union										
Austria	3.9	6.2	5.5	5.6	4.9	5.8	5.1	3.6	3.7	3.1
Denmark	..	..	..	8.2	3.2	3.0	2.7	2.7	2.8	2.4
Finland	9.7	8.9	8.7	7.4	4.9	4.7	4.6	2.8	2.7	3.2
France	..	..	4.0	4.5	3.5	2.3	2.6	3.1	3.0	2.9
Germany	..	..	4.9	4.1	3.9	3.4	3.1	3.2	3.2	3.0
Greece	2.8	..	1.5	..	2.7	..	3.4	3.7	..	..
Ireland	..	..	5.6	7.2	6.2	6.1	4.3	4.0	..	..
Italy	3.2	3.0	5.0	3.8	9.7	4.9	4.6	3.0	3.4	3.4
Luxembourg	..	..	..	..	6.9	8.4	..	..	..	..
Netherlands	..	..	..	..	6.4	..	5.8	..	..	..
Portugal	..	..	5.9	3.4	5.1	2.2	1.7	1.9	2.5	3.0
Spain	5.6	8.4	7.8	6.7	3.8	3.4	4.0	2.3	..	..
Sweden	10.0	11.6	13.9	7.5	6.7	6.8	4.3	4.1	3.9	..
United Kingdom	4.0	6.7	6.9	6.8	5.5	6.1	6.7	..	..	..
Non European Union										
Australia	..	5.8	7.6	9.0	4.9	5.4	4.6	4.4	4.9	..
Canada	9.2	7.5	5.8	4.4	4.4	4.2	3.5	3.1	2.9	2.8
Iceland	..	..	..	7.9	4.5	4.5	3.0	2.4	1.9	2.2
Japan	..	..	3.9	3.8	3.8	2.8	3.4	4.2	4.2	..
New Zealand	..	..	..	10.2	8.9	8.4	2.8	..	..	..
Norway	7.7	7.3	8.6	10.4	7.8	3.9	5.7	5.8	..	..
Switzerland	..	..	..	5.8	3.3	2.6	3.3	3.2	2.8	..
United States	3.7	4.7	4.6	3.9	2.5	2.0	1.8	1.4	1.4	1.6

Source: *OECD Health Data 99*

Note: The ratios shown are orders of magnitudes. Notwithstanding efforts at measuring both the numerator and the denominator in a comparable way, the underlying information is still too disparate to provide more than an approximation. The trends are more reliable than the levels.

In two decades, the conversion to an efficiency *constraint* made large inroads in Europe, often consciously embodied in policies, sometimes impelled by urgency. In the early 1970s, for instance, Ireland, whose social protection benefits were not on par with those of its future European Community partners, opted to raise these faster than its level of real income would lead to a "natural" catch-up. . Eventually, by 1980, public finance in Dublin choked and was prescribes a severe slim down cure. Over time, as the European Union countries strengthened their economic convergence criteria, the public finance burden of their health systems and the toll they exerted (still exert in some cases) on macroeconomic management induced important institutional reforms designed to increase the responsiveness of the systems to quasi-capitates expenditure targets. Italy in 1992-1993 (and again in 1999) ¡Illustrates this prognosis, as does Belgium which in 1997 - the year when the Maastricht convergence criteria in respect of deficit financing and the public debt were

Table 2 - Public expenditure on medical facilities investment in the European Union countries, 1960-1997 (Share of total expenditure on health, %)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Austria	3.9	6.2	5.5	5.6	4.9	5.8	5.1	3.6	3.7	3.1
Belgium	..	..	3.2	1.7	2.1	0.3	..	..	..	..
Denmark	..	..	..	8.2	3.5	3.3	2.8	2.7	2.8	2.4
Finland	9.7	8.9	8.7	7.4	4.9	4.7	4.6	2.8	2.7	3.2
France	..	..	4.0	4.5	3.5	2.3	2.6	3.1	3.0	2.9
Germany	..	..	4.9	4.1	3.9	3.4	3.1	3.2	3.2	3.0
Greece	1.4	..	1.7	..	1.5	..	1.3	1.8	..	..
Ireland	..	..	5.6	2.3	6.1	3.9	1.9	2.9	2.4	..
Italy	3.2	3.0	5.0	3.8	5.6	1.9	2.5	1.50	1.6	
Luxembourg	..	..	..	..	6.9	8.4	..	..	..	..
Netherlands	..	..	..	..	6.4	..	..	..	..	..
Portugal	..	..	5.9	3.4	5.1	2.2	1.7	1.9	2.5	3.0
Spain	4.7	6.7	6.4	5.7	3.0	3.3	3.6	2.3	2.1	..
Sweden	10.0	11.6	13.9	7.5	6.7	6.5	3.8	3.1	2.9	..
United Kingdom	4.0	6.3	6.6	4.7	4.8	5.1	1.0	0.7	..	..

Source: *OECD Health Data 99*

Note: the public expenditure numerator has been defined to include both direct investment and capital transfers to the private sector for medical facilities (but not tax expenditure which, in some countries, would raise the ratios shown, significantly in terms of facilitating private investment, marginally in terms of the ratio levels shown for European countries). Social Security expenditure is included into public expenditure. The intercountry comparability reflects orders of magnitude for levels and is more reliable for trends.

to be "monitored" at central level. Countries vying to enter Euroland, which had not yet trimmed their health systems, did so in the years preceding the January 1, 1999 target. The Parisians walked during three weeks in November-December 1995 when the need to restore financial health to the Social Protection system had become an inescapable priority, denied by most unions. (Few studies are on record to evaluate the benefit of these three weeks of pedestrian activity on the aggregate health status of the Parisian and French populations). The sequence of Germany's reform episodes also reflect public finance austerity; notwithstanding a modest benefit of sickness insurance bodies in 1997 and in 1998 resulting from the 1988 Blum and the 1992 & 1996 Seehofer reforms, the Green Minister of Health is seeking further savings from 2000 onwards in addition to shifting costs previously incurred by the Lander budgets towards the Sickness Insurance bodies. In Italy and Spain, whose multiple systems operate at Regional or at *Autonomia* level (only 10 out of 17 as of 1999 in the Iberian Peninsula) fiscal frugality more than competitive largesse dominates the agenda. On the fringes of Euroland, the Swedish Riksdag curtailed in 1988 potential impulses of the counties to raise the health kronor; Sweden and Finland are two countries whose relative expenditure levels have declined in the 1990s (even after discounting "statistical" shifts). Thrift has become an integral part of health systems management throughout Europe.

Long held to be a plight of publicly-financed systems, the greater acuteness in the perception of the requisites of globalization has in the 1990s generalized the theorem to all third-party funded systems, public and private alike. The viability of all insurance-based and tax-based systems rests on the employed population. Gains in flexibility may here or there be gained through devolution of delivery to private actors, a little breathing space may be secured through a partial

shift of the total burden to private insurance and to direct out-of pocket outlays. But a doubling, trebling or more of the private share of funding would merely slow down ever more exacting demands on the health systems. Table 3 suggests that combined, the latter two sources remain modest (a few spurious entries suggest double counting more than counter-intuitive examples). The implicit motto of the 1990s is one of shifting from *doing more with a stable amount of resources* - the pace of medical advances has continued unabated since the niid-1970s and social demands, as illustrated by demands for entitlement for in vitro fertilization, organ transplantation, a range of sophisticated medicines,…..are not choked off by the plight of public finance - *towards doing more for less.*

Though quantitatively modest in most European countries, private financing sources may play a more than proportional role in both the total demand for care (notably in its composition, such as elective surgery in Italy, Sweden, the United Kingdom, for instance) and in investment in the related health care facilities. They may also contribute to raise the awareness of appropriateness and cost-effectiveness among medical suppliers (this should not be equated with rational behaviour: anecdotes of inappropriateness in private billing pile up) (at what threshold do anecdotes become evidence?) but such behaviour mainly translates the inadequacy of the prevailing incentive/disincentive structures, not ignorance. The prevalence on inappropriate incentive structures requires attention too in devising investment criteria more on this below). The European countries may have experienced different fortunes in respect of aggregate expenditure on health and in re-arranging the financing of health services, but they share a severe curtailment, which, in some cases has been pursued for two decades, in the share of the health euro that is devoted to investment in facilities.

Table 3 - Non-tax and non-compulsory sources of health care finance in eighteen OECD countries, 1960-1997 (% of total expenditure on health)

A. Private for-profit insurance schemes

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Austria	6.8	7.8	8.1	7.2	7.6	9.8	9.0	8.6	8.1	7.4
Belgium	..	..	0.3	0.6	0.8	1.2	1.6	2.0	2.2	..
Denmark	..	..	..	0.7	0.6	0.8	1.3	1.5	1.5	..
Finland	1.1	1.1	1.2	0.8	0.8	1.2	1.7	2.0	1.9	2.0
France	..	..	1.4	2.4	1.4	2.0	2.5	2.7	2.8	..
Germany	..	..	7.5	5.8	5.9	6.5	7.2	6.7	6.8	..
Greece	..	..	..	..	..	..	0.9	..	..	..
Italy	..	..	..	..	0.2	0.5	0.9	1.3	1.3	1.4
Netherlands	..	..	14.9	15.6	..	11.6	12.8	14.3	..	..
Portugal	..	..	..	..	..	0.2	0.8	1.4	1.5	1.7
Spain	..	..	3.3	2.6	3.2	3.7	3.7	5.2	5.3	5.5
United Kingdom	0.4	0.6	0.9	0.9	1.2	2.5	3.3	3.5	..	..
Australia	..	..	11.8	7.7	15.8	9.3	10.8	10.7	10.5	..
Canada	..	..	..	..	..	5.7	8.2	8.4	8.5	..
United States	21.9	24.4	22.2	23.9	28.2	31	34.3	32.6	32.3	31.9

B. Private non-profit insurance

Finland	1.2	0.7	0.5	0.6	0.6	0.6	0.5	0.4	0.4	0.4
France	..	..	..	..	..	5.8	6.8	7.6	7.7	..
Ireland	..	..	..	..	..	..	..	..	9.6	9.1
Luxembourg	..	..	..	..	..	1.6	1.4	1.4	1.5	1.5
Canada	..	..	..	..	..	..	2.3	2.0	2.1	2.1
Switzerland	..	..	..	..	..	..	..	10.6	..	..

C. Household Out-of pocket payments

Austria					16.3	19.6	22.4	23.7	25.1	
Denmark				16.2	9.7	10.4	12.0	12.5	12.6	
Finland	43.6	31.3	23.8	18.7	18.4	18.3	15.5	20.5	20.2	19.9
France								12.7	12.6	
Germany			13.9	9.6	10.3	11.2	11.1	10.8		
Ireland						14.4	15.1	12.9		
Luxembourg					7.2	9.2	5.5	6.2	7.3	7.0
Portugal						45.4	46.3	44.6		
United Kingdom	3.6	2.2	2.6	2.2	2.5	3.3	3.4	2.7		
Canada							14.2	15.7	16.2	16.5
Czech Rep.								7.3	7.5	8.3
Hungary								13.4	15.1	
Iceland	16.7	18.9	16.1	12.5	11.8	13.0	13.4	15.9	16.4	16.2
Korea						60.1	53.0	52.0		
New Zealand					12.0		17.6	22.8	23.5	
Switzerland						30.8	29.1	29.8		
Turkey								29.9	31.7	
United States	48.7	45.1	34.0	29.1	24.4	23.5	20.7	17.2	17.1	17.2

Source *OECD Health Data 99*

Notes: the legal structure and the economic function of the various health financing schemes vary from first dollar coverage to legal opt-out schemes to complementary schemes of a social insurance scheme. The levels are thus comparable only after qualification of the underlying schemes.

In summary, while diverse across countries, the production and financing of health in the high-income countries share features of rising demand, social constraints, and implicit investment criteria. Some of these criteria are, for acute care, an emphasis on capacity replacement and not on capacity build-up (amongst hundreds of examples, the reconstruction of city center Strasbourg hospital: 1150 beds in several dozen buildings soon to be replaced by 700 beds in two buildings) , a greater emphasis on diagnostic-intensive treatment in acute wings and on integration of medical and social care in chronic wings than on the hostelling-domiciliary functions, ...

These macro-constraints are unlikely to be a practical criterion. Would a public hospital that did not meet national planning and accreditation criteria approach a public investment bank to fund a major project? Is there some value in considering comparative quantity and quality indicators before applying and might some of these be pre-requisites in processing an application. There is growing evidence that there are wide variations in installed medical care capacity and in the use of medical care facilities. Should investment criteria not systematically pursue a reduction in

these disparities, thereby raising the over-all productivity and the overall level of quality of the health system for which investment assistance is elicited?

4. Accounting for variations in endowment and in usage

While macro-economic stances are important, needs should also (perhaps above all) be appreciated in terms of patient-specific and of local catchment area factors, since the demand is more a local one than a national one (rare and catastrophic diseases, orphan drugs aside). The "health services" literature does, however, not defend the threefold, fourfold, sometimes sevenfold variations found in measuring "non-complex" appendicectomies, cholecystectomies, prostatectomies, or in the treatment of pulmonary tuberculosis, diabetes, otitis, or in post-partum recovery. These are common across the European Union and non-European OECD countries, accounting for between one and two fifths of intercountry differences in activity (no cross-cutting surveys appear to exist but most surveys applying to one or several specific conditions and to determined geographical areas, usually regions or catchment areas within a single country; administrative records accessible for a range of medical and surgical procedures and for a large number of countries suggest that the rate of variations between countries is at least as large than that between regions or districts or small areas within countries). Many five-year plans - which in many countries have up to the beginning of the 1990s steered macroeconomic management and guide public infrastructure investment -- have been cast in terms of input norms : n psychiatric beds per thousand population, n scanners per million population, etc. The large experience acquired through cost-effectiveness studies (cf. notably the Health Technology Assessment contribution to this Symposium by Alicia Granados) suggests, however, that the bulk of the variations observed are clinically unjustified and that only a small part of, say, longer length of stay and admissions for in-patient surgery (when day surgery is available) is explained by "social' considerations.

Should thus public investment criteria not require that the new facilities planned provide evidence of a greater social rate of return than that they already exhibit? Should this not be cast in quantitative terms, not so much to exact a precise number as to instill discipline?

Should "comparative" information on the local catchment area, on the region (or other geographical aggregation), on the nation on other European countries, not become a standard requirement of any loan application? Purpose: to supply the explicit benchmarks against which the investor-to-be expresses the willingness to be assessed, the target reduction of the gap between best or second hest and actual performance. From the information available - only a token of the information that should be available on line - it would seem that seldom does a facility systematically operate at the frontiers of best practice, almost all applications lead to enhancements in the prevailing level of productivity and best practice. For multi-purpose facilities, such as beds (hardly a clinical parameter, yet a cost center) or average occupancy rate, this would be across the board. For other indicators, such as the average length of stay, this might be conducted at the level of the main medical and surgical specialties anticipated and in terms of the relevant case-mix system used in the country. Whereas the differences between various brands of case-mix (several Diagnosis Related Groupers in Belgium, Ireland, the Nordic countries, Spain, the *Groupes Homogenes de Malades* in France, the Patient Mix Classification in Germany, etc.) rely on clinical attributes that do not permit an indiscriminate clinical use, to establish the relevance of a claim that the projected length-of-stay of the specialties under consideration aim at raising the therapeutic efficiency and effectiveness of the country where the project is located, these imperfect comparisons appear to provide an adequate target. The development of European-wide case-mix studies that involve teams in most European Union countries and the diffusion of case-mix instruments as part of national activity-monitoring and,

increasingly, payment instruments, furthermore, turn this proposal in a cheap way to diffuse awareness of best practice throughout the European Union. A couple of illustrations indicate that crude comparisons already exist and that the cost of accessing the information and refining ¡t is not prohibitive (table 4).

At investment level, quantitative indicators will by nature aim at enhancing the productivity of a given establishment or a given hospital system. Only very broad indicators have been used. These can apply at the level of specific equipment. A regional authority has just used this approach to highlight that the decentralized decision -making apparatus had led to a level of high-technology equipment much higher than that of other countries (more underused too, but this required an additional survey, a point which requires to be stressed: many administrative records only monitor the potential availability of an equipment, they do not monitor its use (under use or inappropriate use). A criterion of public funding by a public bank should obviously be future annual reporting of such uses). lt is essential too that investment criteria be linked to raising the quality of medical attention. Before turning to this subject, a reminder that a monitoring at hospital level can often only be at activity level or at outcome level such as avoidance of complications, but were a public investment project relate to the modernization of an entire hospital system - as might happen when Eastern and Central European countries will join the European Union - macro-outcome targets, such as specific gains in avoidable death, targeted gains in disability reduction, might be desirable in addition to activity affidavits or preferable if a choice between the two sets had to be imposed. .

Table 4 - Is there an oversupply of hospital care facilities in Europe ?

Acute care beds per thousand population, 1965-1997

	1965	1970	1975	1980	1985	1990	1995	1996	1997
Austria				6.5	6.6	7	6.6	6.5	6.4
Belgium	6.41	4.8	5.2	5.5	5.8	4.9	5.3		
Czech Rep.			8.8	8.6	8.6	8.5	7.2	6.9	6.8
Denmark			5.9	5.6	5.0	4.3	3.8	3.6	
Finland	4.4	4.84	4.8	4.9	4.8	4.3	4.0	3.7	
France			6.3	6.2	5.7	5.2	4.6	4.5	4.3
Germany	7.2	7.5	7.9	7.7	7.6	7.5	6.9	6.7	6.6
Greece				4.7	4.2	4			
Hungary	5.1	5.7	6.0	6.6	6.8	7.1	6.3	5.8	
Iceland						4.3	3.8	3.7	
Ireland				4.6	4.3	3.4	3.3	3.4	3.3
Italy				7.6	6.8	6.1	5.1	5.5	
Luxembourg				7.4	7.5	7.0	5.7	5.6	5.5
Netherlands	5.3	5.6	5.5	5.2	4.7	4.3	3.8	3.8	3.8
Norway			5.6	5.2	4.7	3.8	3.3	3.3	
Portugal	4.1	4.1	4.0	4.2	3.7	3.6	3.3	3.4	3.4
Spain					3.5	3.4	3.1	3.0	
Sweden			5.4	5.1	4.6	4.1	3.0	2.8	2.7
Switzerland	7.8	7.0	7.0	7.1	6.7	6.5	5.5	5.2	
United Kingdom				2.9	2.7	2.3	2.0	2.0	

Source : *OECD Health Data 99*

Quality assurance is dealt with separately and in greater depth in this Symposium, is thus referred to only notionally at this stage in order to stress that new investments provide the opportunity to require compliance with established standards and to go beyond existing requirements when these do not yet regulate the implementation of best practice that may be expected to gradually extended to all facilities. Regulation *stricto sensu* falls outside the brief given for this session, but insofar as monitoring actual performance is concerned, accountability to society dictates that the recording requested when new facilities are erected or old facilities are refurbished be comprehensive, consistent and systematic. That includes complications and co-morbidity since these affect the reference production function (and usually lead to shifts in payment schedules that usually take account of the higher costs. More exacting standards - which have a cost -- are justified first by their research content: it is often easier to set the extent and pace of a socially more desirable production function in a new environment which - benefiting from investments at a preferential rate - should be invited to repay not only the interest and the principal of their loan but also documentary evidence on superior performance to reduce the width of the gap between actual and best practice in the health system as a whole. The release of data on complications leading to a systematic inventory of the cost of negligence and of the benefits of non-negligence. Is a step towards the condemnation of negligence at large, possibly incentivated by the introduction of a wider array of payment schedules, sometimes through regulation.

On the occasion of a national campaign against nosocomial infection, the French population learned that more people died on account of this complication than people die in road traffic accidents. Little publicity was given in the media to the details: French rates for causes other than resistance of germs to antibiotics were similar to those countries for most causes except those related to antibiotherapy, a domain in which the indicators point a resistance of germs thirty five times worse than that found in Northern Europe. As, quite independently from this survey, the high consumption of antibiotics is a priority public health concern, as furthermore neither the physicians (whose prescribing habits translate in part a poor pharmacological education received during their medical studies) nor the general population is aware that emergency rooms are filled with patients consulting for severe side-effects of medicine

Table 5 A measure of wide and continuing variations in common medical care practice

Average length-of-slay for circulatory disorders, 1960-1997 (days)

	1960	1970	1975	1980	1985	1990	1995	1996	1997
Austria	26.2	23.0	20.6	18.2	15.8	16.4	13.5	15.9	
Belgium							8.4		
Czech Republic							12.1	11.0	10.9
Denmark				15.9	13.2	10.6		8.5	
Finland	16.6	17.7	19.2	24.6	23.3	21.2	17.3	16.3	
France			20.0					9.3	
Germany			26.6	23.5	21.1		13.8	13.2	
Greece		15.0	15.0	13.0	11.0	11.0			
Hungary			15.7	14.4	13.4	13.3	12.8	12.7	11.2
Iceland		11.7	11.4	11.5	10.7	9.8			
Ireland		22.4	18.0	17.1	13.6	10.7	10.6	10.1	
Italy		18.4	21.9	17.1		13.7		9.5	8.9
Netherlands		25.1	20.6	17.5	14.6	12.9	11.1	10.9	10.8
Norway				13.4		9.6	8.1	7.9	7.7
Portugal				23.7	13.7	11.6	9.9	9.5	9.2
Spain				16.2	14.6	13.8	11.5		
Sweden			37.8		37.4	30.5	8.1	7.4	7.2
Switzerland			32.5	24.2	22.7	19.7	17.4	13.4	
Turkey			8.9	9.8	9.0	8.6	7.2	7.0	
United Kingdom			32.7	31.1	24.5	19.6	14.9		
Memorandum: other countries									
Australia			15.2	17.6	12.7		6.6	5.9	
Canada	22.8	22.0	20.6	18.2	15.8	16.4	13.5	15.9	
New Zealand	24.7		25.4	25.5	22.0	17.0	9.9	7.7	
United State	11.7	12.0	10.9	10.0	7.9	7.3	5.8	5.5	

Sources: *OECD Health Data 99*

Notes: orders of magnitude only. The definition of acute care is not uniformly applied nor is nosological instruments such as the International Classification of Diseases or activity nomenclatures (whether I.C.D or case-mix, e.g. D.R.G.), uniformly implemented. The order of magnitude resulting from more comparable figures should, however, not be dramatically altered: the large intercountry variations observed statistically reflect huge real behavioural differences across countries.

Intake, the recurrent publication of national and local data on adverse effects of medical procedures and medicine intake might contribute to improved stances by the stakeholders. Table 5 only supplies information about fatal outcomes. The disability toll of nosocomial infections and other complications is impressive. Surgery, like accidental wounds, involves risks. The prevention of these consequences is on the agenda of most OECD countries, but the partial records accessible suggest that the effort is in many hospitals not rigorous enough. As part of the criteria leading to an investment decision applicants should commit themselves to scrupulous and comprehensive monitoring of complication factors susceptible to arise in surgical and medical procedures and to contribute to quality enhancement standards.

A similar principle applies to the functioning of equipment and to appropriate working conditions for staff. The toll exacted by faulty equipment design, by inadequate procedural design is equally high. In the British National Health Service, over 3500 nurses retire every year from active duty on account of back injuries. Permanent injuries affect 1,500 staff per year. Emotional exhaustion adds to the toll of sickness absenteeism and lost productivity inviting to develop simultaneously criteria for architectural appropriateness, ergonomic equipment design and clinical governance that combine to improve clinical outcomes, to enhance patient safety, to reduce costs. The solicitation of banks to finance investment should stimulate the emergence of terms of reference requiring greater operational efficiency and greater effectiveness (in the form of reduced avoidable complications and better outcomes), not merely financial solvency and a return on assets to repay the loan. As adviser to his client, the banker has a duty to instill through incentives and exacting terms of reference a greater economic and social productivity than that obtained from the existing capital stock.

Table 6 - Adverse Effects of the Consumption of Medicines in 26 OECD countries, 1980-1997

(Fatal outcomes per 100,000 population)

	1980	1985	1990	1995	1996	1997
European Union						
Austria	0.18	0.05	0.10	0.06	0.01	0.01
Belgium	0.49	0.27	0.23	..	..	..
Finland	..	..	0.17	0.05	..	..
France	1.04	0.81	0.90	0.98	..	..
Germany	0.06	0.10	0.07	0.05	0.07	0.04
Greece	0.01	0.09	0.03	0.01	0.01	..
Ireland	0.07	0.22	0.09	0.01	..	..
Italy	0.04	0.05	0.01	..	..	..
Luxembourg	0.01	0.01	0.01	0.01	0.01	0.01
Netherlands	0.13	0.07	0.08	0.08	..	..
Portugal	0.11	0.12	0.16	0.09	0.15	..
Spain	0.16	0.12	0.15	0.27	..	..
Sweden	..	..	0.01	0.02	0.01	..
United Kingdom	0.04	0.03	0.06	0.05	0.07	0.05
Non European Union countries						
Australia	0.11	0.15	0.22	0.18	..	..
Canada	0.10	0.17	0.10	0.09	..	..
Czech Republic	..	..	0.05	..	..	..
Hungary	0.14	0.10	0.10	0.09	..	..
Iceland	..	0.01	0.01	0.01	..	..
Japan	0.02	0.03	0.08	..	..	..
Korea	..	0.01	0.05	..	..	..
México	..	0.32	0.37	0.27	..	..
New Zealand	0.30	0.07	1.39	..	..	..
Norway	..	..	0.01	0.04	..	..
Poland	..	0.19	0.19	0.16	0.14	..
United States	0.07	0.07	0.06	0.07	0.09	..

Source*: World Health Organization*

Illustration of patients' priorities: in Sweden, at the beginning of the 1990s, topping the list was a demand for courteous handling in hospitals. Within three months, this failing had been set right in many establishments. Beyond subjective assessments, surveys also yield precious information on architectural and equipment design to minimize risks, enhance the comfort of patients and staff, improve therapeutic performance, for instance, in respect of compliance in medication. In all these functions, conceptual and practical advances are continuous and do not necessarily require a total break with past ways. Frequent denunciations related to hospitals, which have not been inaugurated, suggest, however, that those standards are not systematically pursued and attained, that occasionally savings are sought on the initial capital expenditure at the cost of subsequent operating costs. An illustration of the size of "excessive" operating costs that can be shaved through remodeling of facilities is provided by the energy conservation effort undertaken by the National Health Service in England in the early and mid- 1980s : savings on the energy bill of seven hospitals paid for the total remodeling costs of the next hospital. Barrier free design for elderly patients in institutions catering for these, ceramics for easy cleaning, floor covering alternatives, bed-fall prevention..... are areas deserving attention in a "life-cycle" costing of investment. While public investment banks and commercial financial institutions lending to hospitals do not have in their mission the responsibility to develop the environmental guidelines applicable to performing hospitals, they can instill a sense of urgency in requiring high standards of operating efficiency, consistent with the efforts of governments to promote cost-effectiveness in the health systems of Europe.

Table 7 - Prevalence of day surgery ~ selected procedures, 1995

(% of total surgical interventions for each procedure)

	AUS	BEL	CND	DNK	FIN	IRE	ITA	NLD	NZL	GBR
Knee arthroscopy	39.	33	95.3	44.9		50.7	10.9	83	57.4	
Cataract surgery	34.8	26.1	99.7	59.2	33.3	11.1	10.2	30	43.1	33.2
Inguinal hernia repair	12.6		50.2			5.7		23	37.8	26.1
Abdominal hernia	22.7		23.4			0		25	36.8	21.7
Dilatation, curetage	45.5	56.7	94.9	45	51.6	39.9	31.3	51	57.4	
Vein ligat., stripping	11.1	23.1	65.4	32	27.2	16.1	9.4	35.2	40.2	62.3
Tonsil. w/adenoidect	1.7		55.1		3.7				29.6	
Adenoidectomy	34.3		85.2		82.9			97	50.3	
Myringotomy	47.5	75.6	99	36	85.2	78.2	29.4	98	86.8	75.7
Laparoscop.sterilisat.	36.7	83.2	5		57.7	9.4	91	81.6		
Squint surgery	34.8	12.8	97			16.7	24.6	69	73.8	
Sub-mucuous resection	55.2	2.8	68.9	19		6	7.9	9.9	3.1	5.2
Excision breast lump	37.9	25.3	87.8	38	16.6	60.9	15.6	40	55.1	
Circumcision	44.3	60.5	27.3	44.9	59	55.3	26.5	92	69.7	66
Dupuytren c. release	24.1	47.8	91.6	37	43.6	5.6		62.8	38.3	
Carpal tunnel decomp.	40.4	64.7	97.1		58.8	32.7	33.8	79.7	75.1	
Orchidopexy	37.2	10.1	60.2	18.7	16.8	30		58	38.9	
Cholecystomy, laparoscopy	0.6	0	17.1		0	0	0	0		

Sources: *International Association of Ambulatory Surgery and OECDHealthData98*

Note: (1) the survey comprised a larger number of procedures. The procedures selected here do not respond to a specific agenda, but serve only to ¡Illustrate wide variations across countries in common

procedures. A monitoring process that would verify the prevalence of day surgery should include the full array of procedures commonly performed in a day setting, break these down into regions or payment schemes as cultural and socio-economic factors affect performance. 8"9 The Canadian entry refers to four provinces only, but separate data from Quebec - where a "virage ambulatoire" policy applies - suggest that Canada at large has a strong propensity to operate in a day setting where this is feasible and medically appropriate.

A major planning difficulty is the appropriate balance between an effective production function dealing with today's technology and that of tomorrow. A decline in mean length of stay of half a day a year suggests that between the design of a hospital and its opening, the average length of stay will have declined by two days or more. Planning on the basis of current best practice implies excess capacity on inauguration day, anticipating a smooth adjustment ignores differentials between medical and surgical specialties. Same day surgery illustrates the principle: by essence, ambulatory surgery involves no mobilization of a bed. Alignment on best practice by a hospital investing in a totally new facility or undergoing a total renovation allows (except for the best but no country occupies the top position for all surgical procedures as shown in Table 6) justifies substantial resource savings; future best practice is less easy to project.

As for most indicators of health care, the variations between countries are often considerable behind which there is a story. Across the board, measuring all procedures referenced in the survey (a larger number than that shown above, but not a ratio of total surgery as many procedures are not or, at least not yet amenable to same day release), the four Canadian Provinces for which data are aggregated in Table 7 are the area with the widest prevalence of day surgery: 70.1 '/o, Australia availed itself only of this opportunity in 33.1 % of the cases, Denmark in 40.9 % of the cases but it may be noted in that country that it has one of the highest rates for cataract and, in contrast that in the United Kingdom (England) which is perhaps Europe's country that most promoted ambulatory surgery at official level tonsillectomy (not shown in Table 6 because the underlying data were not obtained for all years but they were for adjacent years) is barely practiced in day surgery: a little over 2 % against a third or more in several other countries. The quest for explanations is still on. Prima facie, the role of learned societies is important. lf the consensus had been, say in 1990, that a procedure was not ripe to be recommended for day surgery and no re-evaluation occurred in the next half decade, notwithstanding the availability of new anaesthesics and new surgical instruments, a shift from conventional in-patient surgery to day surgery is slowed down, if not blocked. Conversely, a single specialty such as ophthalmologists may take a bolder attitude. In a French overseas island, over 99 % of all cataracts are performed on an ambulatory basis because a private clinic offers it only on that basis, the public hospital offering it on an in-patient basis; the patients vote with their feet. In SchlesleswigHollstein, cataract surgery involved a two-week hospitalization when it was already performed in many countries on a same day release basis. The Krankenkassen offered to pay half the of the difference between the actual and the mean length of stay for that procedure; the two clinics that offered it in three days were actually paid for five days because as patients rushed to these clinics the average length of stay for the Land fell by half

Ambulatory surgery provides an interesting example because the "production function" entails a more careful screening and diagnosis of patients (since, by definition, they will not be around in case of post-surgical complication), it is performed with at least the same attention in respect of final outcome, and evidence piles up that it may be a cheaper process [part of die costs are shifted to households and is hidden from the accounts but post-surgical recovery appears to be in many of the documented cases shorter than similar in-patient surgery, providing an indirect saving]. The interest goes beyond in that it involves a patient as well as a supplier decision, except where - as is now the case in the Province of Quebec - the nomenclature of professional services no longer offers the option and it involves the other stakeholder: the third party payer,

which may have to adapt the fee schedule when the cost structure between the two modes vary. It further demonstrates that quality gain is a quantity, a shift to a service with different attributes than what it may be compared to, such as a service with lower downtime periods for recovery (analogous to larger mileage between servicing for cars) The corollary is that quality can frequently be monitored at low cost and that reducing the gap between best and actual practice should become a more systematic investment criterion. Excellence should neither be viewed as professional performance or least cost but as a continuous reduction in the impact and burden of illness, injury and disability, at least cost for a given outcome.

5. Further steps towards quality

Reducing the underlying causes of illness, injury and disability in societies where this burden is man-made more than it is the outcome of a natural sequence is naturally a priority. Local action programmes, including at investment level - an important concern of this workshop and a relevant one since it has been noted that the design of a hospital and of equipment can enhance the well-being of patients and reduce injury of the staff. This is, however, not further developed. Neither is the research on new treatments and evidence of effectiveness, which are an integral function of principally the teaching hospitals.

Ensuring the appropriate use of medical care services, reducing medical care errors, increasing patient' participation in their care are three chapters alluded to above which can be enhanced through the establishment of criteria included in the pre-investment criteria, such as the evidence based targets to bridge the gap between actual local and European best practice, such as the requirement of an error reporting system, such as the establishment of a voluntary appeals process if the national legislation does not already provide for it. If the required infrastructure exists, the lender could bring together several borrowers to establish an infonnal fonun for health quality comprising all borrowers to pool information and exchange experiences. The greater public confidence enjoyed by these institutions would contribute to speeding up the accountability of all institutions throughout Europe without the burden of additional regulation. Bad money may chase good money, but quality may be valued sufficiently by patients to displace negligence.

As information systems are critical to quality, and as ¡t is non-quality that may be expensive, lenders should consider die opportunity to develop information systems as a service to their borrowers, accessible to other stakeholders at cost value.

Session 2

Data and indicators for Health Care investment

How Should We Measure the Output of Health Care Systems?

by

Jacques Bonte
Eurostat European Commission
Luxembourg

Gunter Brückner
Statistisches Bundesamt
Wiesbaden, Germany

Content

Summary

It can not be denied that health care has reached the status of an important business sector in all Member States (MS) of the European Union (EU) and in virtually all highly developed countries. Nevertheless, from an economic point this does not become clear when looking at the "production value" of this business sector. There are no commonly defined goods or services. Even a standard product classification to be applied when measuring the output of the health care system has not emerged so far.

This does not mean, however, that the activities, by which the health care systems attempt to improve the health status of the population, would go unevaluated. On the contrary, the existing systems of health statistics aim at comprehensively measure the effects of health care treatment, among others. In the past, all influences were measured with respect to their effects on mortality. Following experts' judgement, this indicator will loose importance in the future as life expectancy may approach a natural upper limit, and as it remains unclear whether additional gains in life expectancy will also increase the "healthy" life span of the population. Yet the focus is shifting towards measurement of healthy life spans. Scientific debate concentrates on improving this indicator by defining better measures of *health outcomes*. These indicators also reflect the final impact of the quantity and quality of health care and are candidates for measuring output, therefore.

As the framework conditions for health care tighten in all MS with ageing populations and social security pressures, efforts for making health care efficient and effective are ubiquitous. *Evidence-based medicine* for example requires avoiding all treatment forms, which have not proven their effectiveness in scientific studies. Experts assume that the *freedom of therapy* as a basic rule in medical care may shortly loose its importance due to economic and social pressures.

For various reasons and from different perspectives, introducing a completely new nomenclature system for classifying the output of health care systems is both a persuasive suggestion and an intimidating perspective – and a long-lasting initiative, to say the least. First of all, it will be difficult to agree on a common set of requirements to be fulfilled by such a new nomenclature system. A both systematic and comprehensive concept, which is intuitive, self-explanatory and easy to feed with existing data, can hardly be created simultaneously. It seems to be most acceptable, if the new nomenclature system could focus on a limited number of selected treatment types, which all MS agree to continuously monitor. Such list could grow and shrink over time to adapt to new needs. All activities not on the list could be monitored in one position "not elsewhere classified" or subcategorised into additional classes to improve insight. This would allow flexibility and simultaneously avoid dealing with unnecessary and uninteresting details at macro level. It would also enable us to encounter treatment, which does not follow "standard definitions".

Collecting the requirements to be fulfilled by the new nomenclature system on health care outputs may well lead to differing and possibly even contradictory results, which seems unavoidable, however, because of health care delivery being organised so differently in MS. So far, mainly health planning units in health ministries or respective government agencies can be expected to formulate requests. It may be well appropriate to also take into consideration additional aspects such as the one necessary to put private investment into health care on a solid basis and thus to reduce the information costs. (The authors volunteer to act as contact in case of need.).

As a European-wide system resulting from the above-mentioned development process will not be available shortly, it may be interesting to check, whether existing data could be used as substitute data for the time being. Quite some of the existing data seem to be relevant from the point of view of economic decision-making.

Following the Treaty of Maastricht, public health statistics in the European Union has been given a boost for supporting Commission Programmes. Meanwhile, various initiatives aiming at this target have been started; the European Health Monitoring Programme may serve as one example, the Community Statistical Programme 1998-2002 as another.

Furthermore, international organisations like OECD and WHO being active in the field of comparable data on health-related subjects for decades already have also started initiatives to improve on their information systems. All activities are co-ordinated; thus best use can be made of the existing expertise. Substantial progress has been made already, and the participants are optimistic to reach the targets within time plan.

The persons and organisation involved aim to have a fully operational system of health care statistics by the year 2002, many parts being implemented already. Such a system will be designed for addressing interests of politicians, researchers, health care workers, public and private business and the general public. It may provide the basic data and framework for complementary information requested by the different interested parties.

1. Introduction

Health Care is an important business sector in all Member States of the European Union (MS) and other highly developed countries. The percentage share of health care in total economic activity (GDP) ranges from around 7% to 11% in Europe. However, for international comparisons, MS agreed only recently to apply a common methodology to calculate health care expenditures and to draw the borderline between health care and non-health care.

All MS follow a long tradition of monitoring other data related to health care, some of them for more than 100 years now. The national perspective still prevails and truly comparable data on health care have not yet emerged from on-going activities in international organisations such as OECD and WHO. With the Treaty of Maastricht this may change for the EU MS, especially as it has become interesting for all MS to look over the fence in order to learn whether neighbouring countries get along better with the common challenges such as ageing populations, economic problems and bursting social transfers.

Any international comparison of data related to health care is hampered by the differences in the organisation of health care provision and the financing of it, which has developed on different historical grounds. It can be expected that many differences will remain unchanged due to the responsibility for health care remaining with the MS. Thus, making data comparable across MS will require finding commonalties in a persistent system of differences. Experts agree that the output of health care systems in MS may well develop to an “island in rough see”, as it is well-known that medical treatment does differ by far less than the existing work-sharing between providers of health care in the MS.

3. Health care output – uncharted territory

For decades, on-going efforts in virtually all MS aimed at introducing meaningful classifications for categories of health care output or at improving existing nomenclature systems. These efforts addressed health care activities in general and focussed specifically on the various forms of medical and non-medical treatment of diseases and disabilities. Nevertheless, experts are dissatisfied with the results reached. They claim that it is still difficult, if not impossible to analyse and to compare health care output across MS on the basis of any one of the nomenclature systems developed so far.

In virtually all MS existing categories for health care output are defined via the provider of these goods or services; "hospital care" or "public health service" can be used as examples. The responsibilities of these providers vary substantially across MS, however, due to the different forms of work sharing institutionalised between the various providers within the common organisation of health care in a MS. The problems associated with this form of definition are worsened, as the boundaries, which separate health care from other economic sectors, in particular from social care, are remarkably different. Thus, if two MS report nursing home care services, one may be tempted to directly compare the results, assuming the definition of a nursing home being self-evident and the "product palette" of this institution implicitly defined. This comparison will not yield any meaningful data, however, as in MS A patients with a given disease are to be treated in a hospital whereas the same patients in MS B will only be admitted to a nursing home.

Not only does such inconsistency root in the existing framework conditions of the market for health care output; it also induces identical consequences in most cases:

- This market is not competitive by any standards; it serves as a perfect example for illustrating imperfect markets in economic textbooks rather. Every criterion ever used to define an imperfect market or to classify the goods traded on that market as "public goods" can be found here. Examples include zero price elasticity, prevalence of external effects, lack of consumer sovereignty, imperfect knowledge, suppliers acting simultaneously as consultants to the consumers, disentangling of good and money streams with financing bodies acting as agents in price negotiations and with potential moral hazard behaviour.

- Because of these conditions, many MS decide to have health care provided by Government bodies. This includes direct Government production e.g. in public hospitals as well as Government purchase of goods and services from private producers like self-employed physicians.

  Even the introduction if the System of National Accounts (SNA) which contributed substantially to making economic activity comparable across MS did not help here. Until recently, health care has exclusively been treated as Government consumption, which results in the production value to be estimated via the factor costs of the production factors.

Thus, SNA rules reassured the prevailing habit of defining output via institutionalised production factors as described above. They may also have substantially contributed to the quite impressive collection of data covering virtually all facets of health care provision, which can be found in all MS, and which partly can rely on a tradition of more than 100 years. The elements covered by data collection include:

- Available resources (both capital and manpower) such as hospital beds and medico-technical equipment or medical professionals;
- In-patients according to discharge diagnoses or surgical operations;
- Out-patients according to complaints, and
- Health expenditures by patient or disease groups etc.

From the broad range of data categories mentioned here, data on medical procedures such as surgical operations are probably coming most close to what will be needed to define health care output; most other type of data give at best some rough idea on it. Therefore, even the most appropriate category of data available at the moment such as the ones on medical procedures may only be used as *substitute output data.* It must be well understood, however, that most of these data have been historically developed within an administrative context. They were used to report on activities of a provider institution or to comply with regulations or rules, e.g. on meeting standards for buildings, beds, and occupancy of operations theatres.

Thus, real output data may also be scarce, because planning and steering of health care provision got well along without focussing on output or even by directly neglecting it. Some MS may nt even have strict accountability, since in most cases treatment had to be provided regardless the costs. Furthermore, prices often developed along rather artificial formulae in the past.

…but the impact of health care has always been monitored

Very soon, most MS also started to develop measures for evaluating the impact of health care provision. The health status of the population plays an important role in this respect. It reacts in a sensible way on all changes of health care: Improved treatment techniques will boost health status, any shortage of resources and any decline in the quality of care will hamper it. Even the time lag between the activity of the health case system and the respective change of population's health status is comparatively small. Economists may be tempted to parallel health status changes induced by health care activity with utility changes resulting from economic activity in other sectors of the economy.

For the greater part of the 20th century *mortality* played a prominent role in monitoring health status and thus the impact of health care. Until now, high *life expectancies* are associated with high quality health care systems. Life expectancy, on the other hand, just mirrors age- and sex-specific mortality pattern. More insight in the ability of the health care system to cope with selected diseases or health risk categories may be gained by analysing disease-specific mortality data.

With life expectancy approaching the upper 70 age groups for men and the 80s for women in all MS the impact of health care may no longer be reliably, correctly and timely signalled. Subsequently, substantial efforts were undertaken to improve both the validity and reliability and the meaningfulness of the underlying indicator values. The improved versions of life expectancy added to the already existing complexity by breaking down the life span from birth to death into years with and without suffering from disease, disability or handicap. *Disability-free life expectancies* (DFLE) and *disability-adjusted life years* (DALY) have been suggested.

Just recently the debate broadened and defining common concepts for measuring *health outcomes* has become a prominent topic in international meetings. Such data on health outcomes are a natural candidate for measuring health care output, as they reflect the degree to which a given treatment was able to cause the intended change of the health status. Inappropriate treatment will worsen this health status or leave in at best unchanged. New and improved

treatment forms may not only cure the disease but cause less pain during treatment than traditional alternatives.

However, health outcomes do not only react on health care activities, but also on changes in the patient's health determinants such as the attitudes towards health risks like life styles, environmental factors and working conditions.

2.1 Output in a multi-layer evaluation system of health care provision

To define the role of health care output in a comprehensive system of indicators on health care impact requires a systematic analysis of the various factors influencing the health status of the population. In Table 1, these influences are shown in different layers and attributed to different agents.

Table 1: Multi-layer system for evaluating factors influencing health-related wellbeing.

Means and Targets	Contribution to Production	Health Typical Indicator
*Level 6:*General utility	Welfare and life quality	None
*Level 5:*Outcomes	Operationally defined targets to be reached	Health outcomes, e.g. quality-adjusted life-years
*Level 4:*Services demanded	Operationally quantified demand to be serviced	Vaccinations, radio-diagnostics, ambulatory surgery used
*Level 3:*Services supplied	Goods and services provided for consumption	Vaccinations, radio-diagnostics, ambulatory surgery supplied
*Level 2:*Resources	Available personnel and equipment	Number of physicians, nurses, medico-technical equipment
*Level 1:*Expenditures and financing	Money spent	Expenditures by output, providers and financing units

This Table 1 has to be read from bottom to top. Completely reaching the target defined for any given level is a necessary bot not a sufficient condition for reaching the target at the next higher level. If for example sufficient money is spent on health expenditures, then the necessary resources *can be made available*. This is not to guarantee, however, that those resources *are made available*. Rather this can turn out to be impossible in the short run, especially if qualified personnel are scarce and if education capacity is insufficient.

Health care output occurs twice in Table 1, once referring to the supply and once to the demand of such service. Both levels formulate necessary conditions for improving health outcomes, but respective changes of health outcomes cannot unambiguously be attributed to health care output or to influences at lower levels such as health care resources or health expenditures.

Thus from a conceptual point of view, even a perfect combination of high-quality data on health outcomes and on input factors for health care can only provide incomplete information. Health care output is needed as the missing link to get the picture complete.

To validly analyse inefficiencies in production – goods and services, which could have been produced by the resources available, but weren't – requires both input and output data. To isolate

inadequate treatment forms – treatment resulting in no or in undesired changes of health outcomes, i.e. the focus of evidence-based medicine – requires output and health outcome simultaneously. If output data are available and if differences across MS or population groups exist, one may even monitor insufficient demand for health care in a peer comparison setting.

2.2 How can health care output be measured

From the arguments presented so far it may be concluded, that health care output can be measured directly as well as via a substitute or a combination of such substitutes. Measuring health care output has not been used so far; introducing a nomenclature system will thus require additional efforts. On the other hand, the results achieved thereby may well provide unparalleled insights into the health care production process, and may be associated with a substantial improvement in the efficiency and effectiveness of medical treatment.

It may not be easy to decide which of the principle possibilities should be given preference, as every alternative incorporates both advantages and disadvantages, which have to be weighed against each other to obtain a well-balanced judgement. It has to be taken into consideration, furthermore, that using substitutes may be a good suggestion for short and medium term analysis only, because the relations between output and input or health outcomes used as substitutes respectively are subject to long-term shifts, which limit the validity of the results obtained.

2.3 Defining output via factor inputs

It is rather popular in quite some economic sectors to define output indirectly via the amount of input factors used within the production factor. The System of national Accounts (SNA) uses this technique in the area of public goods such as the armed forces and political administration as well as with the production of goods by private non-profit organisations. Methodological reasons put forward to justify such behaviour refer to an unknown willingness to pay which does not allow to use both market and shadow prices.

Using input factors as a substitute for health outputs is especially appropriate, if the production process is extremely complex or non-standardised. In these cases, little is sacrificed by not being able to monitor idle production factors or elements of inefficient production, and little can be gained by focussing analysis on output categories, as virtually each good or service has a unique non-repetitive character. This will be the case, if standard treatment procedures can only seldom be used or if unspecific diseases are predominant.

On the other hand, estimating health care outputs by input factors incorporates one main disadvantage: Nothing can be told with respect to efficiency of production, limitational factors, potential output or quality of treatment. It has to be assumed, furthermore, that idle production factors do not exist or that the potential output implicitly defined for a given factor is used at a constant rate.

Defining health care output via input factors cannot deal with limitations. If an urgent demand for hospital treatment cannot be serviced although hospital beds are still available, but nurses are not, then such a situation will go unrecorded, if output is estimated via input factors. The same holds true in the case where the demand for image processing cannot be serviced although both the medico-technical equipment and the service personnel are available, but nobody ordered the necessary spare parts.

Thus, using input as an estimate for heath care output should only be used on justified cases; often the results gained will be hampered, because the assumptions necessarily underlying a meaningful analysis are not valid.

2.4 Defining output via health outcomes

Health outcomes is an instrument not only well suited to act as a substitute for health care output, it may well be called the first choice rather than a substitute. The OECD Manual on the System of Health Accounts (SHA) defines health care as institutions and persons in a country pursuing, among others, the goals of:

- promoting health and preventing disease;
- curing illness;
- enhancing the quality of life of persons affected by chronic illness;
- enhancing the quality of life of those with health-related impairment, disability, and handicaps.

If health care contributes to pursuing these goals, then this can directly be seen by induced respective changes of the population health status. A health outcome is a sensible indicator, which abstracts from all influences not directly contributing to the specific targets. If e.g. people are treated in a hospital occupying beds there, being taken care of by qualified personnel and causing substantial use of resources without any change of the treated disease occurring, then the health outcome value does not change. If, on the other side, a disease can be treated successfully by both classical and minimal-invasive surgery, while the patient is exposed to less infection risks in the latter case, then health outcome is able to tell the difference. In short, the advantages of health outcomes result from being able to monitor both quantitative and qualitative changes and from being able to tell the difference between effective and non-effective treatment forms.

Changes in health outcomes may, on the other hand, well be recorded without medical treatment having taken place, as they are rather a result of influences other than health care. Health determinants may change as well as the patient's perception of the risks he is exposed to; even the patient's general level of satisfaction is object of change. A new lab test yielding unexpectedly positive results may cheer up the patient and insinuate a health status improvement, which is subjectively perceived without objectively existing. Every physician and every nurse have experienced patients exposed to psychological swings occurring without matching physical influences. Thus, health outcomes may also be subject of misinterpretation, especially if too short periods are monitored and if the results have not been double-checked to the necessary degree.

Furthermore, health outcomes are unable to distinguish efficient treatment forms being produced ineffectively or with poor quality from efficiently produced treatment forms known as useless or ineffective. The steps necessary to raise the overall quality of health care will have to be substantially different, however; in the first case, improvement has to address personnel, in the second, different treatment forms have to be chosen.

The disadvantages of health outcomes are too small to discredit the usefulness of this indicator in principle, however. Health outcomes are and will always be an important element, needed for evaluating the impacts of health care provision. Should all facets of the production process be subjects of sincere efficiency analyses, then health outcome measures will have to be augmented by additional data on the physical amount of health care provided.

2.5 Defining output directly

Defining health care output directly will provide unique information and help to close a gap, which even remains in those cases where both health care input and health outcome data are made available. Economists would strengthen that health care as an economic sector cannot be properly analysed without such output data.

Beyond any doubt, health care output can be defined directly. All existing fee-for-service remuneration systems prove this statement to be true. Evidence-based medicine may serve as a second example for this thesis. If such output measures are available together with both information on input factors and health outcomes, then the process of health care provision can be optimised in any desired way. Peer comparison can be used to isolate areas of inefficient production, routine checks for the sole application of treatment forms complying with the requirements of evidence-based medicine are no longer a problem. Even the additional work associated with the new data collection is comparatively small, as all necessary data are mandatory part of the respective patient records.

Defining a system of health output is not an exactly easy piece of work, though. One may rather expect cumbersome discussions to take place, as no prototype exists for the new classification system needed. Will there be a joint classification for institutionalised and non-institutionalised care? Will the classification incorporate disease-related information or will such cross-reference have to be added later? What is the reference period for such output measures? – A treatment episode, a patient contact or even a part of such contact only? How are unclear health problems requiring trial and error forms of treatment to be dealt with? If categories of health care output are to be introduced, then pragmatic answers will have to be found for the questions above.

2.6 How to measure health care output directly?

There are many different ways to measure health care output: Patients treated are one example, treated cases of a given disease another, applied standard treatment forms a third one. With any of the three basic forms of data collection one may want to separate whether the health care intervention led to a complete cure, to an improvement of the health status, to a generally better quality of life, or to death being prevented or postponed. One may even want to consider explicitly the underlying health problem or take care of the special case that a patient feels better although his or her objective health situation did not improve or even deteriorated.

It has to be well understood, that with every additional clarification the single case becomes more intuitively intelligible, whereas simultaneously the resulting general classification system becomes less useful. Increasing the level of details adds to uniqueness and thus reduces comparability. The information may soon become so rich that meaningful analyses are no longer possible.

Thus, all candidates to be used for a new nomenclature system to classify the output of health care systems will have to be checked whether or not they are able:

- to mirror the "production" process in health care and to be easily adapted to monitor technological progress in form of new treatment forms;
- to support the requirements of evidence-based medicine by easing the respective case-control studies;

- to act as a basis for efficiency and effectiveness analyses and thus to become a rationale for serious cost containment efforts;
- to create a common basis for comparing health care across the MS. On-going efforts use exactly "health care functions" as reference to adjust for the persistent differences in the MS's organisation of health care.
- It must not be forgotten, however, that quite some discussions will be associated with introducing such a new nomenclature system. The exact contents of such discussion cannot be anticipated, one may expect, however, to listen at least to the following arguments:
- From a *clinical* point of view, the terms of reference are the patient, the disease, and the therapy plan have to be included. During a typical treatment episode a variety of different treatment forms may be applied, either following a pre-defined plan, or as a row of consecutive changes resulting from a *trial and error process*.
- From an economic point of view it is completely irrelevant whether a lab test or a scanner diagnosis is related to a given disease A or B, as long as identical resources are encountered.

2.7 Measuring health care output directly – the next steps

One cannot but to advise modesty when it comes to suggest the next steps. Aiming too high will necessarily lead to failure. It is virtually impossible to define a nomenclature system which is comprehensive, easy to use and easy to adapt to new requirements at the same time.
Both economic and statistical analyses usually focus on major categories of influencing factors, whereas less important ones are temporarily isolated under the *ceteris paribus* conditions. They are only reintroduced into analysis, after the consequences resulting from the major influencing factors have been finally taken care of. Applying this technique to the problem at hand here, could result in the following steps:

1. Start with a list of activities as detailed as possible. In every MS we have such lists for one or the other purpose, in most cases for remuneration (it can be a list from a public insurance body but also from a private health insurance only).
2. Define homogeneous groups for a number of positions mentioned. The resources necessary for the groups should be comparable, but need not be identical.
3. New treatment forms may be added, old ones deleted or regrouped.
4. Do not attempt to find detailed positions for all treatment categories; "Other unspecified forms" are a valid alternative. It just means that both the topic and the money used are not important enough to justify a more detailed analysis.

The efforts described above and the next steps suggested for the introduction of output categories for health care provision will be discussed in Eurostat's TF and WG on health statistics as parts of the programme for the improvement of health statistics in general and of health care statistics in particular.

In the European Union, following the Treaty of Maastricht, public health statistics has been given a boost for supporting many health and health-related programmes. One of the best known programmes in this respect is the one adopted in June 1997 by the Council and the European Parliament, on a proposal of the Commission: a programme of Community action on health monitoring (1997-2001). Statistics required also for the Health Monitoring Programme (HMP) are included in the Community Statistical Programme 1998-2002.

Until mid-nineties health statistics in Eurostat were not systematically organised in one single framework. They were dispersed and partly hidden under other headings, e.g. causes of death under demography. Many non-health statistics on the other side included health-related topics, like the ones on sickness insurance or on price indices. There was one exception: statistics on safety and work, covering statistics on working accidents and occupational diseases. During the Statistical Programme 1993-1997, Eurostat started a systematic approach of health statistics.

From 1997 onwards this effort was supported by a new form of partnership, called LEG Health (Leadership groups), and established by the Statistical Programme Committee (SPC). LEGs are a form of partnership in which the responsibility for developing (parts of) new Community statistical projects in fields, not (totally) covered by legal acts, is delegated to one Member State which co-ordinates the activities of a limited group of Member States together with Eurostat under the basic assumptions of shared responsibilities and control of the SPC.

The LEG Health involves a direct participation of a group of the following leading partners: France, Germany, the Netherlands and United Kingdom together with Eurostat. All other MS being partners, contributing mainly active in the work of Task Forces (TF). The leading partners advise and support Eurostat in particular for the preparation and chairing of TF meetings, for the implementation of Eurostat projects, and for expert and technical advise.

Based on the input from TFs, the LEG partners together designed a framework for a coherent and consistent system of health statistics around three sub-systems: Health and health related surveys, causes of death and health care statistics. The first two domains jointly cover the so-called "status of health". The third domain can be subdivided in statistics on manpower, money and providers or facilities. The use of the services is mainly an integral part of health care statistics, although at least some data on individual use of services may also be obtained from surveys.

In each domain, inventories of existing sources are made and frameworks for the development of statistics at Community level are set up. The main problems to overcome thereby are associated with differences in the organisation of health care and in the respective data collections which in turn affect the comparison of results.

The effect of these difficulties are greatly underestimated, as the initiatives aiming at improvement mainly focus on isolated or single events or on selected types of services. It is often forgotten, that even the so-called perfectly standardised rates or ratios need to be taken care of in a joint organisational context because otherwise true comparability cannot be achieved.

So far, output of the health care system has already influenced the work going on in the respective European bodies. Health care output was given special priority during the exploration of sources; furthermore it directly influenced the established frameworks and it played an important role while agreements were reached on technical approaches and on data collections. Health care output received special interest, mainly because the majority of work dealt with health accounts and with meta information, which both show especially tight links to output categories as comparable data cannot be achieved otherwise.

2.8 Intermediate solution – quick and dirty results

Health care statistics is one of the most common regular sources for continuously reporting on most or all health care services, like on hospital patients, patients in ambulatory care, types of

treatment and patient characteristics. Combining such figures with data on population projections yields in estimates of expected demand and simultaneously allows – at least to some degree – to also estimate output data in several countries. Due to the existing differences between MS such estimates can serve as indications rather that as accountable facts. Additional research is needed to quantify the error margins, to estimate the relative size of the differences and to look for the underlying reasons.

Most of health care data are rather traditional and can be derived from administrative registers. At the moment, the existing data sets belong mostly to the category "substitute output-data"; the real output data as described above are seldom, if they exist at all.

One should not disregard the existing data sources hastily, however, as the "optimal" solution following the conceptual way described above may not be available at once. From an economic point of view, some quite interesting substitute data sources may attract interest. When looking more closely to these data one can make a first clean distinction between *quantitative output measures* and *qualitative output measures.*

The first category refers to the simple numbers on output, e.g. number of discharged patients, inpatient-days, occupancy ratios, visits to general practitioners. The second category indicates the type of services provided to the type of patients, e.g. according to diagnosis, surgical procedures, function, complaints, age and sex, type of insurance.

Another category of data could also be selected as substitute output data: specific data on quality of treatment can give a certain impression of output. Examples are avoidable causes of death such as maternal death, and some case fatality ratios like appendicitis.

Eurostat is preparing an overview of data already available as part of a publication which will be disseminated in 2000. For some MS some data are not available, however, and a range of explanatory notes is needed because of the differences of concepts and definitions in the MS and because of the different organisations of health care services in the MS. Thus, such an inventory is an important step towards better harmonisation.

3. Conclusions

Data on health care are collected, analysed and disseminated since many decades. The majority of data root in administrative records; they are used for reporting and for remuneration. Each country has a specific set of data reflecting the national organisation of health care services and the financing of it. The majority of these data refer to input factors such as resources and to general performance. Respective indicators indicate the number and type of institutions for inpatient care, the number of bed-days, admissions, diagnoses, surgical operations as well as the age and sex of the patients inclined.

Data on outcomes are virtually non-existent on the other hand, but interest for such data is undoubtedly growing. Health outcomes, however, do not only reflect the impact of health care, but at the same time, react on changes of other health determinants, e.g. life style and environment.

Output data on health care are the missing link relating traditional input analysis to elaborated data on health outcomes. Output data can be defined on the basis of different approaches. For the alternative suggested here, a modest classification should be developed. But as this will not be

achieved shortly, but require some time rather, substitute measures selected from the existing data on health care may well prove useful for the time being.

4. Bibliography

1. Decision No 1400/97/EC of the European Parliament and of the Council of 30 June 1997 adopting programme of Community action on health monitoring within the framework for action in the field of public health (1997-2001), OJ No L 193, 22.7.97, p.1
2. Eurostat: Public Health Statistics; Statistical Programme Committee, meeting 17 September 1998, Brussels.
3. Eurostat: Developing a Comprehensive Framework for Health Care Statistics (Brückner, G., Huber, M., Montserrat, A., Rasmussen, E.), Population and Social Conditions, 3/1998/E/no.13.
4. OECD: OECD Health Data – Health Expenditure Account Manual DEELSA/ELSA/WP1(98)4.
5. Sarrazin, H.T.: *Konzept einer Ausgaben- und Finanzierungsrechnung für die Gesundheitsberichterstattung des Bundes*; WIRTSCHAFT UND STATISTIK 3/1999, p. 225-236.

Session 2

Data and indicators for Health Care investment

Efficiency in Theory and Practice

by

Alan Maynard
Professor of Health Economics and Co-Director of the York Health Policy Group
University of York, York

CONTENTS

"Doctors prescribe medicines of which they know little, to cure diseases of which they know less, in human beings of whom they know nothing."

Voltaire

1. Introduction

The purpose of this conference is to examine issues around the appraisal of investments in health and health care. The perspective taken in this paper is that of a health economist and is inevitably selective.

The first section discusses some preliminary issues of general importance. The second section reviews the knowledge base in one area (i.e. the relationship between volume and mortality, costs and access) and advocates evidence based policy making rather than investment based on narrow provider perspectives. The final section addresses the issue of translating knowledge of what is efficient into the delivery of cost effective patient care and focuses on provider incentives.

2. Some Preliminary Issues

There is a propensity to confuse fundamental issues in the analysis of health and health care. The purpose of this section is to outline a series of propositions which are the keys to the understanding of this market.

2.1 The distinction between inputs, activity and outcomes

Inputs can be in financial units (resources) and physical units (e.g. doctors, nurses, hospital beds, equipment and drugs). Inputs are combined to produce activities: primary care consultations, outpatient visits and diagnostic procedures, inpatient care, rehabilitation, palliation and social care. A patient episode is made up of various combinations of inputs and activities. Hopefully the use of inputs are the provision of health care activities produce outcomes, in terms of improvements in the length and quality of life. Duration of survival is usually measured poorly on a routine basis because of fragmented information systems: hospital mortality is more easily observable when the patient is discharged (vertically or horizontally!) rather than after six months or a year. Quality of life, or survival, is rarely measured systematically even though researchers have validated many instruments which can be used to monitor changes in, for instance, psychological, social and physical functioning as well as pain.

Some policy and management problems:

- public debate, and management responses, focus on inputs (is spending "adequate"?) and activity (are waiting times "too high"?) rather than on whether inputs and activity are improving health of patients (outcomes).

- outcome measurement is crude, improving but not a priority of management in the public and private sectors.

2.2 Supplier induced demand

There is an asymmetry of knowledge between users (patients and their carers) and providers (particularly doctors) who are seen as "experts". Because of ignorance, the patient delegates his demand making role to the 'experts'. If they act neutrally, offering only interventions which are cost effective, resources will be used efficiently. However, providers, be they doctors, hospital managers or pharmaceutical manufacturers may, because of knowledge asymmetries, induce demand to enhance their income rather than the health of patients. Traditionally both insurers (public and private) and Governments have been weak purchasers of health care, leaving providers to induce demand and inflate expenditure. Health care reform in the last decade, both in insurance markets (1) and in public systems, has focused on developing the power of the purchaser to counter inefficient supplier induced behaviours and protect the insurance consumer and the taxpayer by shifting risk to providers (2).

2.3 Variations in medical practice

At all levels of medical practice there are major variations. Wennberg et al (3) published a study of hospital services in two geographical areas in New England and found major difference for populations of similar characteristics. They asked "are hospital services rationed in New Haven or over-utilised in Britain"? There are also major variations between countries and between clinicians in local hospitals (4). For instance the number of cataracts carried out in a half day session in English hospitals varies two and three fold. Such variations are well established everywhere, caused by factors known (e.g. private practice) and unknown, and extremely difficult to alter.

2.4 Evidence based medicine

Variations in medical practice are, in part, explained by variations in opinion about the appropriateness of many procedures. The evidence base in medicine is poor: most interventions have not been evaluated scientifically. This problem was emphasised by Cochrane (1972) over a quarter of a century ago and, in the last decade, has been translated into the Cochrane Collaboration (5) which is an international network which has begun the enormous task of systematically reviewing the evidence base.

Whilst this is an overdue and welcome initiative, its purpose needs clarification. Much of the work is focused on clinical effectiveness (does the intervention affect health status?) and this facilitates the abandonment of useless procedures. However public purchasers are concerned to allocate resources on the basis of the patients ability to benefit (i.e. relative cost effectiveness). This approach ensures that the maximisation of improvements in population health from given (global, cash limited budgets) and requires that all new health technologies are demonstrably cost effective. Without such evidence they should not be reimbursed as happens in Australia and will happen in the United Kingdom (6).

Thus evidence based medicine (EBM) which focuses on clinical effectiveness alone is an insufficient method for the achievement of efficiency. What is required is health technology assessment, and the adoption of its results, which is focused on cost effectiveness i.e. economics based medicine is the appropriate form of EBM!

2.5 Accountability

Doctors act as the agents of society in interventions for patients. Because of the existence of supplier induced demand, variations in medical practice and the poor evidence base, their behaviour may not be efficient. Traditionally the social contract between doctors and society has been based on trust. But such trust has been eroded by the failure of the profession to evaluate practices and practice EBM. One cause of these problems is perverse incentives and the absence of a framework of accountability for the use of patients' funds.

Remedying these problems is not easy as there has been little investment in defining the evidence base for policy. Typically private and public decision makers reform their systems of financing and providing health care with much emphasis on rhetoric and opinion and little reference to whether changes facilitate the achievement of policy goals such as cost containment, efficiency and equity. The arrogance and ignorance of such decision makers is a nice mirror image of the same qualities found in doctors who emphasise clinical freedom i.e. the freedom to practice inefficiently.

The evidence base to inform the design of efficient systems of accountability is poor. Perhaps it will involve more sophisticated and better monitored systems of incentives together with investment in reaccreditation systems, which ensure practitioners keep up-to-date in terms of knowledge about changes in technologies as well as proficient in manual tasks and counselling/dealing with patients.

2.6 Overview

Doctors are the primary agents in the allocation of health care resources. In market systems they are required to ration care to those willing and able to pay. In State systems they are required to ration care on the basis of need or ability to benefit.

Doctors can create demand for their services (supplier induced demand), are reluctant to measure and manage in relation to effect (improved health status) and cost, and offer consumers wide variations in practice. They ration access to health care implicitly, inefficiently and inequity (7). However their role is vital and irreplaceable. The challenge is how to establish rationing rules which are acceptable to society and how to manage these into practice and ensure open accountability. Decision making in public and private health care systems are just beginning to invest in these fundamental practices.

3. Economies of Scale in Hospital Production: the Evidence Base

3.1 Introduction

Medical practitioners, concerned about outcomes for their patients, form a powerful group of advocates who emphasise the need for hospitals to be large. They argue that increased scale or volume produces better patient outcomes, usually measured in terms of 30 day mortality rates. Whilst such measures ignore the quality and longer term duration of survival, their primary limitation is that policy formation and investment cannot be predicated on this measure alone. As scale increases, quality (in terms of reduced mortality) may improve, but this impacts on other key determinants of policy in hospitals, in particular costs and patient access to care. Decision-makers must not be driven by 'quality' alone. They have to articulate and manage trade-offs between competing desirable attributes of hospital development. Large volumes may improve outcomes but at the same time increase costs and reduce patient access to care by

increasing travel and other access costs, particularly of socially deprived population groups who currently have greater needs and lower utilisation.

The evidence base about the relationship between hospital volume and health care outcomes, costs and patient access is uneven and incomplete. However, the available evidence provides information which is central to decision making. Evidence-based policy making is still lacking, particularly in the opinion-driven advocacy of increases hospital size and continued specialisation by the professional medical organisations (e.g. in the UK, the Royal Colleges). When the value of evidence based medicine is not disputed but is incomplete, it is surprising that an evidence based approach to policy is often absent. In late 1996 the NHS Centre for Reviews and Dissemination published an Effective Health Care Bulletin on the links between hospital volume, costs and access.

3.2 Volumes and outcomes

The authors of the NHS-CRD report (8) identified over 200 published studies of the relationship between volume and patient outcomes. Most of these studies were observational, and reported generally that outcome (usually measured in terms of the hospital mortality) improved as volume increased. Unfortunately many of these studies are biased because of the failure of the researchers to adjust their data for differences in patient case mix between hospitals and doctors. Higher mortality (and lower volume) may be caused by a higher proportion of emergency, urgent and severely ill cases. Lower mortality (and higher volume) may be the produce of 'cream skimming' the lower risk patients. Without adjustment for such case-mix differences, results may be biased. For example, the NHS-CRD team found that after adjusting UK mortality rates after coronary artery bypass graft (CABG) by severity scores (using the APACHE index), the higher mortality rates found in smaller units were no longer significant: smaller units were treating more severely ill patients. Most studies reviewed in the NHS-CRD study failed to take account of severity.

The research is also limited by the incomplete measures of outcomes used, usually 30-day mortality rates. Another problem is that most research has been concentrated on hospitals rather than clinicians. Any hospital results are likely to be the produce of a process and the work of a team rather than an individual clinician. A final caveat about this research is that even if an outcome-volume relationship is established, this may be a produce of one or two hypotheses:

- 'practice makes perfect': if you do more, you are better at it.
- selective referrals: outcomes may be better because your hospital attracts less severely ill patients.

In addition, higher volume hospitals may also attract better staff, both clinicians and other team members. As a consequence of these factors, observational studies are limited in usefulness, potential biases are numerous and results, so strongly advocated by clinicians, may be right or wrong.

The authors of the NHS-CRD report looked at English Trust activity and the evidence base for CABG, angioplasty and breast cancer surgery.[24]

[24] The NHS-CRD review did not address the issue of a possible relationship between the degree of specialisation by clinician and outcomes.

Table 1 : Volume thresholds from the best studies and current activity in NHS Trusts

Procedure (OPCS 4R codes)	Annual hospital volume threshold	Annual doctor volume threshold	% of Trusts in England below hospital volume threshold	% of procedures in England carried out in Trusts with below hospital volume threshold
Coronary artery bypass graft surgery (K40-K44)	200		20%	0.04%
Percutaneous transluminal angioplasty (K49)	400	50	71%	41%
Cholecystectomy (J18)	168		56%	36.7%
Breast cancer surgery (B27-28, B29-37, & ICD9=174).		29	12%	1%

Source: NHS-CRD (1996)

The NHS-CRD team offered three conclusions after reviewing the volume-quality literature:

- because of the failure to adjust for case mix, the size of any link between volume and quality is probably exaggerated;
- the volume-quality relationship needs careful evaluation by specialism and generalisations should be avoided (table 1);
- indeed because there is no evidence about how increasing volume over time affects outcomes, the available research offers no evidence about whether volume changes would, over time, improve outcomes in low volume units.

3.3 Volume and costs

Economies of scale exist when the long run average costs fall as scale or the volume activity increases. This is an effect of 'fixed costs' being spread as volume rises. Usually these effects are limited, and diseconomies of scale emerge when the limits of the fixed (cost) capacity is reached.

The NHS-CRD team identified 100 studies of varying quality; again case-mix adjustment is an important potential cause of bias. The team concluded that average costs can be reduced if scale is less than 200 beds and that it is likely that large hospitals (more than 600 beds) will suffer from inefficiencies and rising costs.

The literature on mergers offers little evidence of financial advantages arising from reconfiguration. The available evidence, mostly from the USA, shows few gains in operating practices or savings.

Table 2 is taken from the NHS-CRD report and infers that financial perspective gains from further scale increases may be small and the majority of hospitals are already in excess of their least cost size in England.

Table 2 : Distribution of English acute hospitals by size (including acute sites in combined Trusts)

Number of beds	Number of hospital (acute)	% total hospitals (acute)	Number of beds (acute)	% total beds (acute
<100	90	22.0	5002	3.05
100-200	59	14.4	8491	6.0
200-300	51	12.5	12513	8.9
300-400	55	13.4	19260	13.7
400-500	48	11.7	21147	15.0
500-600	39	9.5	21224	15.1
>600	67	16.4	533320	37.8

Source: NHS-CRD 1996.

3.4 Volume and access

The NHS-CRD review identified 47 studies on patient access, i.e. studies of observed rate of utilisation and distance, as a proxy for access. Most studies were cross sectional and poorly controlled for confounding variables.

The evidence, such as it is, suggests a reduction in access as volume (size of hospital) increases, particularly where patient perceptions of need and importance are low (e.g. mammography, cervical cytology and alcohol aftercare) and in self-referral to accident and emergency. Cancer utilisation rates do not appear to be affected by distance. Mortality from asthma, diabetes and perinatal mortality increased with distance.

The effect of concentration may be to shift costs from the health care system to patients. This effect, in addition to those on utilisation and outcome, needs careful consideration when planning hospital investments.

3.5 Implications for investment in hospital services

A recent study analysed the association between hospital volume and survival after acute myocardial infarction in elderly patients in the United States. This
retrospective cohort study of almost 100,000 patients suggests a positive relationship between volume of cases and survival. Patients in the quartile admitted to hospitals with the lowest volume were 17 per cent more likely to die within 30 days of admission than patients in the quartile admitted to hospitals with the highest volume (hazard ratio 1.17, 95% CI 1.09-1.26). Although attempts were made to reduce bias from case-mix differences, this study is again observational rather than experimental, and again uses survival as the only outcome measure.

An editorial accompanying this article (9) emphasised the problems of bias and direction of causation in ways similar to the authors of the NHS-CRD review. Thus the issues are:

(i) where volume and quality (usually 30 day mortality) are associated, causation may be two way, and there is no evidence, from prospective studies or time series data, that increasing volume improves outcomes.

(ii) where volume-quality links are established, these few cases (set out in the NHS-CRD report) should be implemented carefully and evaluated further by purchasers and clinicians.

(iii) understanding and managing the causes of improved outcomes as volume increases is essential. If clinical 'experience' is a driver, this may justify either large units or working across several small unit sites.

(iv) more evidence is required to detect and manage the effects of large scale on costs and access. Larger units and lack of competition may breed inefficiency. If larger scale is needed to achieve quality (and evidence is uneven and may be biased upwards), costs will rise and access fall. Clinical focus on quality must not be allowed to let managers ignore inevitable trade-offs and compromises between quality costs and access.
Purchasers, public and private, should cease to be passive recipients of professional advice about medical staffing 'norms' and the 'optimal' size of hospital. The latter are generally motivated by a desire to pursue quality, may exaggerate volume-quality effects, and ignore opportunity costs in terms of costs and access.

(v) those who invest in hospitals have a duty to monitor quality, costs, and access. Management needs to be explicit in setting targets and managing performance e.g.

(a) establish baseline costs, quality (outcomes) and patient access data;
(b) define the cost savings to be achieved by mergers and reconfiguration;
(c) establish management systems to monitor the effects (on costs, quality and access) for evolving configurations of hospital care, primary care and social support.

(vi) to manage quality, and build large units on medical advice (rather than evidence from the knowledge base), in isolation from cost and access considerations will produce inefficiency and inequity.

4. Physician Incentives

Given the many imperfections in health care markets, public and private, how can financial incentives be used to mitigate inefficiency? The market for labour in all health care markets is highly unionised, particularly the market for physicians. The professional associations of physicians throughout the EU exercise monopoly power and maintain a high rate of return to their members. When 'surpluses' of manpower emerge, remuneration does not fall [e.g. the last decade in Germany]. The State finance of health care creates, in principle, some monopsonistic power but politicians are often reluctant to use this because of electoral consequences.

Physicians can be paid for fee per item of service (FFS, as in Germany), by salary (e.g. UK hospital doctors) by salary with bonuses (to enhance productivity) and by capitation (e.g. in UK primary care). Each of these systems creates a different set of risks for payer and provider. These risks are summarised in Table 3.

The primary conclusion to be drawn from this table is that payment mechanisms have to be designed on the basis of the known effects and clear articulation of goals. Let me illustrate this in relation to the UK.

In UK primary care prior to 1990, general practitioners were paid by capitation and by fees (basic practice allowance, a seniority payment etc.). The Thatcher Government wanted GPs to be more responsive to consumers and to increase activity. So they increased the capitation element to, on average, 60 per cent of total remuneration and introduced some new service fee arrangements. The latter (FFS) had a nice effect. The fees, graduate according to extent of list coverage, for childhood vaccination and immunisation and for cervical cytology, increased

coverage very effectively. However other new fees were less successful e.g. payments to GPs to do minor surgery were introduced to reduce demand in the hospital sector but demand there remains high, and GPs are doing a considerable amount of this activity.

Table 3 : Paying Physicians: financial risk and incentives

Payment mechanism	Basket of services paid for	Risk borne by		Provider incentives to			
		payer	by provider	increase no. of patients	decrease activity per consultation	increase reported illness severity	select healthier patients
FPS	each item of service and consultation	all risk borne by payer	no risk borne by provider	yes	no	yes	no
Salary	one week or one month work	all risk	no risk borne by physician	no	n/a	n/a	yes
Salary and bonus	bonus based on no. of patients	salary portion	bonus portion	yes	n/a	n/a	yes
Capitation	all covered services for one person in a given period	amount above 'stop loss' ceiling	all risk borne by provider up to a given ceiling (stop loss)	yes	no	no	yes

Source: Hsiao (1996).

UK hospital doctors are paid a salary (of about £58,000), are eligible for performance related pay (distinction awards) and can carry out private work (which generates considerable revenues in surgery, anaesthesia and radiology). A political priority is the reduction of waiting times and waiting lists for cold elective surgery. Increases in the stock of hospital doctors can lead to increased GP referrals to hospital and increased numbers of inpatients i.e. supply creates its own demand. (In part this is a product of the need to have a reservoir of NHS 'waiters' to fuel private practice!)

Reform of hospital doctors pay might include a basic salary plus fees per item of service to increase activity and a bonus to control demand from general practitioners. Whatever is done more precise protocols to determine GP referrals and hospital doctors' decisions to treat are needed to reduce medical practice variations and supplier induced demand.

Financial incentives affect provider behaviour but providers soon learn to 'game' the system. Managers and planners have to be clear in their goals and prepared to 'fine-tune' continually incentive systems to improve behaviour at the margin. However, it should be recognised that there is not a simple task. As the Canadian health economist Bob Evans remarked, it is necessary to change the system every 2 years because by then providers have usually devised ways to ensure it is working to their advantages!

5. Overview

The purpose of this paper has been to analyse some of the complexities of the health care market. Any investor in this market has to recognise that the monopolistic powers of doctors, hospitals, pharmaceutical companies and medical device providers are considerable and difficult to constrain. Both private insurers and Governments are seeking to shift the financial risks of over production and inefficient production to providers. This process is expensive (for instance US managed care firms spend 20 to 25 cents in the health are dollar on administration, marketing and information technology (10; 11; 12).

More European health care decision makers are yet to recognise fully and invest appropriately in the creation of IT systems and the elucidation of the knowledge based in medicine and in health care funding and finance. The deficits in these areas will be costly to remedy and are unavoidable investments for those wishing long term involvement, rather than short term "cream skimming" in these markets. The latter appears to be the objective of many US manager care companies operating in Latin America and elsewhere (13; 14).

Finally it is essential to remember that health care is only one way of producing health. Income redistribution, education, housing, nutrition, environmental and other investments may give much higher rates of return (in terms of improving the health of
the population) than investing in policies for hospitals which ignore the evidence base and perpetuate inefficiency in the health care system.

> *"The role of the doctor is to amuse the patients, whilst nature takes it course"*
>
> *Voltaire*

6. References

1. Maynard, A., Bloor, K.: *Managed care: panacea or palliation?* Health Economics Series, paper 8. London, Nuffield Trust, 1998.

2. Maynard, A., Bloor, K.: Introducing a market in the UK National Health Service, *New England Journal of Medicine* 1996; 344: 604-8.

3. Wennberg, J.E., Freeman, J.L., Culp, W.J.: Are hospital services rationed in New Haven or over-utilised in Boston? *Lancet* 1997; 8455: 1155-85.

4. Anderson, T.F., Mooney, G. (Eds.): *The Challenges of Medical Practice Variation.* London, Macmillan, 1990.

5. Maynard, A., Chalmers, I. (Eds.): *Non-Random Reflections on Health Service Research*. London, British Medical Journal Publishing, 1997.

6. Maynard, A., Bloor, K.: Regulating the pharmaceutical industry *British Medical Journal* 1997; 315.

7. Maynard, A, Bloor, K.: *Our Certain Fate: Rationing in Health Care*. Occasional Paper. London, Office of Health Economics, 1998.

8. NHS Centre for Reviews and Dissemination, Hospital volume and health care outcomes, costs and patient access. *Effective Health Care*, 2, 8, Churchill Livingstone, 1996.

9. Hannan, E.L.: The relation between volume and outcome in health care *New England Journal of Medicine*; 340, 21: 1777-79.

10. Inglehart, J.: The American health care system: expenditures. *New England Journal of Medicine*; 340, 1: 70-75.

11. Bodenheimer, T.: Physicians and the changing medical market place. *New England Journal of Medicine* 1999; 340, 7: 584-88.

12. Bodenheimer, T.: The movement for improved quality in health care. *New England Journal of Medicine* 1999; 340, 6: 488-493.

13. Stocker, K., Waitzken, H., Ircart, C.: The exportation of managed care to Latin America. *New England Journal of Medicine*; 340, 14: 1131-36.

14. Perez-Stable, E.J.: Managed care arrives in Latin America. *New England Journal of Medicine* 1999; 340, 14: 1110-12.

Session 3

Methods for the Appraisal of Investment in Health

Health Technology Assessment: The analysis of the scientific evidence and the health care context to inform decision making.

by

A. Granados, M.D., Ph.D.
Director Catalan Institute of Health
Barcelona, Spain

CONTENTS

1. INTRODUCTION

The information needs of decision makers in health care systems are growing at the same pace as the need to manage economic and health care resources with more rigour. In the new socio-economic and demographic scenarios, and in a well informed society that asks for explanations about how and in what their tax-money is spent, is where we find the source of this need and of the valuation of scientific knowledge as a way to inform the different types and nature of decisions taking place in health care systems.

The processes of decision-making in health care may be based on different attitudes which differ qualitatively, among other factors, in its higher degree of subjectiveness or objectiveness. The rationality underlying the term Health Technology Assessment is to base recommendations for decision making in the results of scientific studies, in order to achieve a higher objective validity of health care decisions in specific settings.

Health technology Assessment is then, part of an international intellectual, scientific and professional movement promoting the utilization of the results from scientific research to inform decisions that take place at different levels of health care systems.

The scope of technology to be potentially assessed is broad, as are the uncertainties in relation to both the benefit and the opportunity to adopt, diffuse or refuse specific forms of health care for the prevention, prediction, diagnostic, treatment or rehabilitation of diseases. The term Health Technology thus encompasses equipments, devices, medical and surgical procedures, pharmaceutical drugs and the different forms of health care delivery such as home care, ambulatory surgery, minimally invasive surgery among others.

2. CONCEPTS

Research and evaluation oriented to inform decision may come from different types of studies. These are designed to answer also different types of questions.

The measure of the effect of a technique, drug or health care intervention is conceptualized differently depending on the research design used to measure it. Thus efficacy is the measure of the effect, or what is the same, of the result obtained by a therapeutical technique by means of a randomized controlled trial; that is, under experimental conditions. Differently, effectiveness is the measure of the technologies effect obtained under every day clinical practice conditions, through observational designs.

In both cases, the effect of outcome indicators may be natural units of disease, such as survival rates (gained years of life, number of saved lives), morbidity (types and rates of complications or side effects), or quality of life measures (patients´s perceived health status). The measure of patients' preferences and perceptions of benefit as an effect indicator may be stated as utilities. If we refer to diagnostic tests, the outcome indicator will be the detection of the disease itself. Other type of clinical outcomes may be biological markers such as blood pressure, cholesterol, PaO2 among many others. However, these ones are usually known as surrogate outcomes indicators, to distinguish them from the former, the so called final or real outcome indicators. It should be noted that studies using surrogate outcomes indicators to measure the effect of a therapy should be reviewed carefully, since its co-relation with final outcomes may not always be inferred.

Other outcome measures are those related to health care provision processes, such as the number of re-hospitalizations, or patients satisfaction with the received health care.

Safety is the measure of the unwanted effects that may be produced with the use of diagnostic and therapeutical technologies, both within experimental studies and within everyday clinical practice.

The effectiveness of a diagnostic test is expressed by the term accuracy. It is measured with specific indicators, such as sensitivity, which measures the proportion of patients in which the diagnostic test has detected the disease; specificity, which measures the proportion of healthy individuals considered as such by the diagnosis test; and positive or negative predictive values, which represent respectively, the probability that a person with a positive or a negative value in a diagnostic test is really sick or not, given the epidemiology of such a condition in that particular context of care. The effectiveness of a diagnostic test depends therefore on its safety (risk-benefit ratio) and on the prevalence of the clinical condition to be diagnosed. Thus, when the prevalence of the disease is low, the probability of obtaining a false positive diagnosis is higher. Therefore, the less frequent the disease is, (i.e. colorectal cancer in an asymptomatic young patient) the more advisable is to use the most specific diagnostic test, in order to avoid the probable risk of getting a false positive. On the contrary, if a clinical condition is more frequent, more prevalent, (i.e. chronic obstructive pulmonary disease in a smoker middle-aged adult) the test should be the one showing the highest sensitivity, to avoid the risk of getting a false negative.

As regards the opportunity to invest in preventive, diagnostic o therapeutical technologies, aside from the above described, the concepts of need, appropriateness, equity and efficiency should be introduced.

Needs is the measure of the provision requirements of a determined technique, service or programme in a specific health care context, and may be measured with epidemiological, demographical or economical criteria and studies. Moreover, other social and environmental variables and factors could also be of relevance.

Appropriateness can be measured comparing the results of the available scientific evidence with the current patterns of use of a determined technology in every day clinical practice and its effectiveness.

Equity is the measure of the existing inequalities in the access or utilization of specific techniques, procedures or services.

Efficiency is the measure of the cost of opportunity of the investment and utilization of a technology compared with other alternatives and according to the intended effects and costs.

3. THE HEALTH TECHNOLOGY ASSESSMENT (HTA) PROCESS

HTA is not merely a method to appraise investments in health. HTA is the application of systematic processes of analysis that may include the following stages:

1. Identification and prioritization of the HTS or health problems in need of assessment.
2. Translation of the health or health care problems into research question/s (needs? efficacy? safety? effectiveness? appropriateness? equity? efficiency?)
3. Search, review, synthesis and/or production of scientific evidence.

4. Context analysis (effectiveness, efficiency, appropriateness, equity, legal, ethical, organizational aspects, social, values, epidemiology)
5. Recommendations for public or professional decision-making (public health strategies, clinical practices guidelines, among others).
6. Dissemination, and when possible, implementation of results.
7. Impact analysis of the HTA recommendations.

The HTA processes are described as: systematic, for they intend to access to all the available information; structured, for it is defined by different stages or phases; and explicit, since it determines the different types of designs constituting each of the stages (1).

Budgets and expertise for HTA are unfortunately limited. The number of possible assessments greatly exceeds the capacity to conduct them. Prioritization is therefore an integral part of the HTA process. Moreover, HTA is undertaken by a number of organizations, both public and private, for a variety of goals and in a number of institutional contexts. The goals and contexts will influence the approach taken to identifying priorities for HTA (2).

The stage of translation of the health or health care problem (policy question) into a research question means framing the problem in terms of specific sets of scientific evidence, specific tools, and specific measures of effects.

4. METHODS AND DISCIPLINES INVOLVED

Types of information used in HTA process

Primary data	Secondary data	Data synthesis or integration
1.Controlled clinical trials	1.Clinical data-bases	1.Meta-analysis
2.Longitudinal observational studies	2.Epidemiological data-bases	2.Clinical decision analysis
3.Cross-over observational studies	3.Administrative data-bases	3.Economic analysis
4.Clinical series	4.Economic data-bases	4.Qualitative data analysis
5.Surveys	5.Census	
	6.Patterns	
	7.Registers	

The term HTA encompasses different analytical activities and different approaches. The methods available for HTA are also broad, see Table 1. The components usually belong to four different types: search techniques, information sources, criteria to assess the validity of the available scientific evidence and production of new scientific knowledge.

The search of information stage is carried out in generic database, such as Medline, Embase, HealthSTAR, or the Cochrane Library; as well as in those from specific disciplines or in the so called grey literature. The objective of this stage is to search for already published studies designed to produce direct, or primary, evidence responding the question which originated the review. This information may be complemented with the analysis of the indirect, or secondary, scientific evidence. The latter concept defines information that, despite being collected for a different finality than answering the research question, also contributes to find an answer by means of statistical analysis or the application of observational designs. Indirect evidence is the one included in diseases registers, administrative database, clinical records, hospital discharges records, epidemiological surveys, or hospital accounting systems. A third option, complementary to the previous ones, is the design of specific research oriented to produce new knowledge, answering the question associated to the policy problem that may not be raised from the results of the above mentioned search and analysis strategies.

Once the information has been obtained, this may be presented in evidence tables summarizing the results of the different scientific studies reviewed according to the features of their design, which helps to assess their homogeneity. The following stage is the classification of scientific evidence according to the quality of designs and the methodology used. When analysing the efficacy of a health intervention, the classification criteria defines as of more quality those studies with higher homogeneity, or internal validity, in the appraisal of the effect of a health care intervention. The internal validity criteria is essential in randomised controlled trials (RCT) with prospective longitudinal patients' follow-up, and with statistical power allowing to detect significant differences between the experimental and the control interventions. Randomisation of the patients to a group receiving a new therapy or to a control group, where the alternative is the standard therapy for that disease, or a substance that is inactive in itself called placebo, allows to attribute the difference in the outcomes obtained after comparing the effects of both therapies to the different nature of the interventions. In other words, the RCT allows to attribute a cause-effect relationship of the intervention on the evolution of the clinical condition in the study patients. The quantitative synthesis of the results of different RCT designed to answer the same question in a similar population usually takes the form of a meta-analysis, and it constitutes, when it is feasible, the following stage of the process.

4.1 Contextualization

Once the efficacy of an intervention drug or technique has been valued, its effect in every day conditions or clinical practice can then be measured. This means a shift from the measure of the efficacy to that of effectiveness, so that, once the effect measure obtained with experimental designs showing internal validity is known, it may be tested with observational designs to assess the external validity or generalisability of the effect in a general population of patients. In other words, the measure of effectiveness means applying in every day conditions the effect measured under experimental conditions. This contextualization process implies integrating direct and indirect scientific evidence, so, besides including the measure of effectiveness of the interventions, its cost should be taken into account, as well as, specifically the cost-effectiveness compared to other available alternatives. This would imply measuring the efficiency of decisions. The appropriateness of a decision may be calculated by comparing the results obtained in a systematic review of the scientific evidence with those observed in a specific health care context. It is also advisable to review the available information regarding the social and legal consequences associated to a decision.

Health technology both affects and is affected by the organizational structure and other aspects of health services. To achieve general improvements of functions when new technology is

introduced, careful adjustment of organizational structure and daily routines are frequently necessary.

In many cases, despite evidence that technology can prevent or relieve physical or mental suffering, ethical and moral perspectives make it difficult to reach an agreement on the preferred course of action. Therefore, an HTA professional often must frame claims and concerns in such a way that ethical dimensions are explicitly articulated.

4.2 The role of expert opinion

The adequate place of expert opinion is a topic of debate among health technology assessment evaluators. The two extreme positions are that expert opinion adds no value to the assessment, or that experts, by virtue of their hands-on experience with technology, can provide better information than experimental studies. The truth will lie somewhere in the middle. In many instances, the evidence available from scientific studies will be inadequate for answering a specific policy question. In other circumstances, the scientific issues will be settled, and the question related to the opportunity to adopt certain technology will rest on individual and societal values regarding the cost and benefits of the technique or health intervention. In such instances, systematic elicitation of informed opinion can be a valuable part of technology assessment. Nevertheless, whether the methods to collect the opinions would lead to the right answer is currently an unanswered question. Associated with this uncertainty is what factors influence the conclusions of an expert panel and the degree to which the outcomes are sensitive to panel choice and composition (3).

The specific methodological emphasis of the current agencies on the use of one methodology or another depends on both the mandate and the analytical skills they may have. Uncertainties in health care are both diverse and complex. Therefore, answers do not seem to be simple or monodisciplinary. Clinical, epidemiological, and statistical research, and social, political and economical sciences are knowledge areas and a source of quantitative and qualitative analytic methodologies, which cannot be rejected in the HTA process, when we are looking for explanations to improve the population's health and the quality of health care services.

Knowledge of sociology evolves, and so traditional barriers between professional and scientific disciplines are fragmented to be able to explain, from a multidisciplinary approach, the effects: of the multiple interventions —preventive, diagnostic, therapeutic, rehabilitative and palliative; of predictive medicine; of the different models and types of health care provision and organizations upon health, quality of life, the patients' values, expectations and economies, and also upon those of society as a whole.

5. APPLICATIONS OF HTA

Potential uses of HTA at the different levels of care

The potential of the HTA process to inform decisions in health care is summarized in Table 2; the product of the evaluation would depend on the nature of the information needs of the different decision makers in specific health care contexts (from technology or services needs assessment, to efficacy, effectiveness, appropriateness, efficiency or equity analysis).

The following are some practical examples of the application of HTA for decision making at macro, meso and micro level in a specific health care model: Catalonia (Spain).

5.1 MACRO: Informing health care policies

The introduction and coverage decision of a health technology

Transmiocardial revascularization by laser is an example of the introduction of a technology that shows a disagreement between what is legally correct and what is scientifically questionable. Lasers for transmiocardial revascularization obtained in 1996 CE mark from a Notified European Body, as established in the Community Directive 42/94. The CE mark allows any HT to be marketed in any country within the European Union without any legal obstacle. The CE mark ensures that the device has been manufactured guaranteeing its quality and safety from the technical point of view. That Directive also requires the presentation of evidence regarding clinical efficacy and risk-benefit ratio. Compliance of the former requirement, however, does not receive the same accuracy as purely technical requirements, as it was the case with transmiocardial revascularization lasers. When this medical device was first marketed in Europe (some three years ago), the CAHTA, through a systematic review of the scientific evidence, showed that laboratory studies with experimentation animals were then very scarce and inconclusive regarding both effects and safety. On the other hand, available studies in humans were very limited. At that time, the number of studied cases was small (about 200 cases in all the world) and the methodology used for those studies was of low quality. Actually, there was no

randomised controlled trial published probing the clinical efficacy and safety of this new procedure.

The main recommendation of the evidence based assessment of Transmiocardial revascularization by laser for severe coronary disease was that if decision makers considered its introduction, it should take place in a health care center of excellence, and under a research protocol that would provide answer to the uncertainties regarding efficacy or effectiveness of this technique (4).

Public Health

The method of scientific evidence integration allowed to apply the data obtained in a meta-analysis in a public health decision. Thus, for instance, a decision analysis comparing up to 8 different prenatal screening strategies for the detection of Down syndrome allowed us to compare and prove the also different consequences of the adoption of each of the strategies analysed, both in terms of Down syndrome cases detected and of iatrogenic miscarriages produced. Also cost and ethical implications were assessed. The main recommendation was to stress the need for women's or couples' involvement in the final decision, so their preferences and values were respected (5; 6).

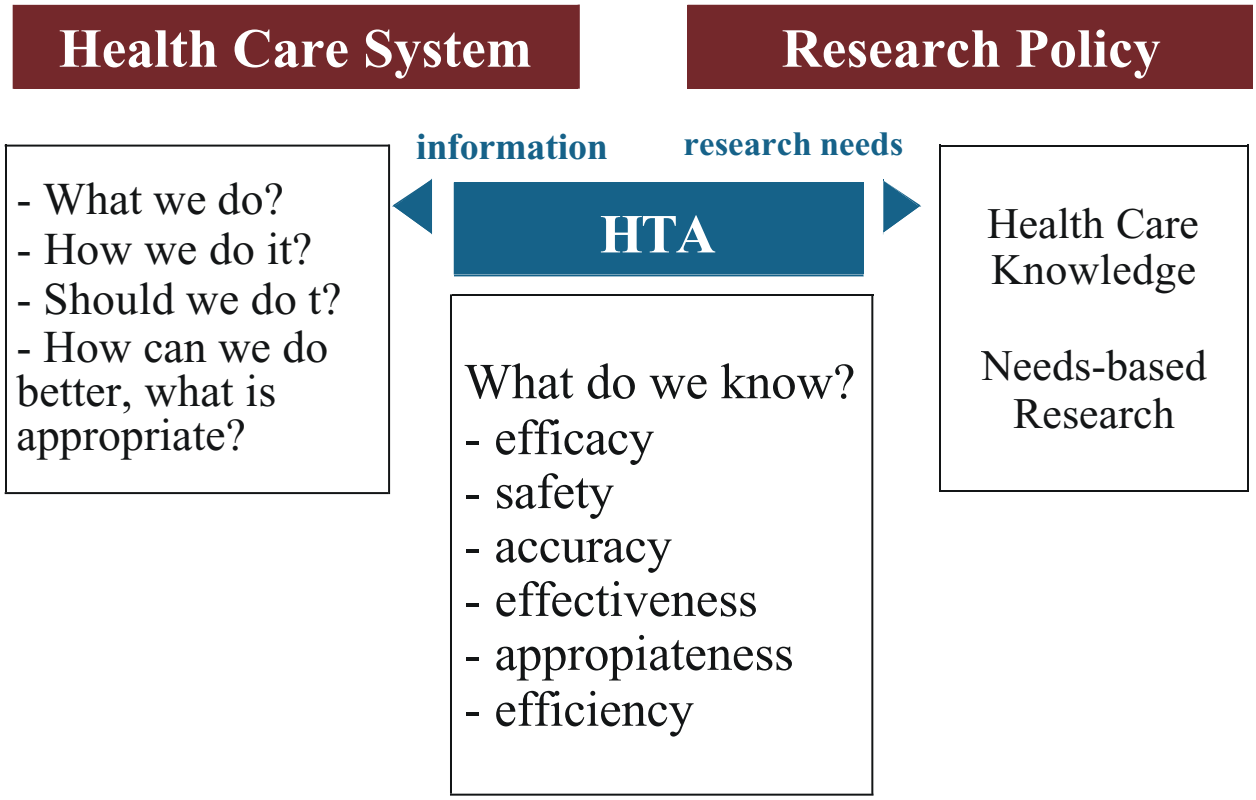
The opportunity to recommend screening population for osteoporosis by means of bone densitometry to predict and prevent fractures in the elderly has been debated. Systematic review of scientific evidence allowed to identify the lack of enough evidence to recommend the population measure of bone mass in asymptomatic persons, since densitometric diagnosis techniques do not allow to reliably predict which osteoporotic individuals are going to suffer from fractures in the future. This should be added to the limited therapeutical proved effective options for the prevention of fractures currently available, and the implementation cost of such a population screening programme (7; 8; 9).

Health care policies reforms

Health care reforms are a form of health care innovation that deserves at least the same scrutiny as other innovations in health care, in relation to their effects. An assessment in terms of health services equity provision was recently performed in Catalonia. The decentralization processes, followed by the transference of health care resources by the State to Spanish Autonomous Communities within the new (1978 Spanish Constitution) regulatory framework, was considered a good setting for the above mentioned evaluation as a way to measure whether equal needs led to equal provision of health care services at regional level. This study allowed to compare these results with data from Spain and from other international studies using a similar methodology (10; 11). Further, the study identified several patterns of use of health care services, the equity degree of which is acceptable comparing it internationally. It was found that mixed systems of services provision (public-private), such as the Catalan model did not contradict the principle of global equity of European health care systems (12).

Health and Health Care Research Policy

One of the most frequent findings in searching, reviewing and synthesizing the current available knowledge is that not enough scientific evidence is available to answer specific questions, or that what is known is not definitive. The HTA process is becoming also a good tool to identify knowledge gaps as a first step to set priorities for health research investment. See Table 3.



Health care system, research policy and HTA

A Health services research strategy has already been consolidated in Catalonia (Spain), through a public callings for research projects. This initiative was an unprecedented opportunity for the Catalan scientific, clinical and managerial community, to be involved in both the identification and prioritization of topics susceptible of being assessed, and in the production of the local scientific data. This strategy allowed to have information regarding the effectiveness, appropriateness, and efficiency of health care interventions and activities in hospital or primary care, home care or emergency care, in specific diagnostic, therapeutic, or rehabilitative alternatives, as well as in those ones derived from health promotion and diseases prevention or palliative care activities (13; 14).

The attributes of this research strategy were: its relevance for our health care system, the participation of different professionals and knowledge fields, the transparence of the prioritization and research assessment processes, and the community 's commitment to contribute to the development and improvement of our health care system. However, this formal initiative to stimulate and spread the culture of assessment is not devoid of challenges, the greatest of which is achieving impact; that is, that the information thus obtained can be translated into knowledge, which in turn should be increasingly integrated into the different reasoning processes, and into decision-making in our health care and service provision system.

5.2 MESO: Decision making at health care centres

Informing investments

Hospitals often analyse investment opportunities and options in given HTs that are associated to potential clinical and economic advantages reported by medical devices manufacturers. However, the extensive technical information supplied with the products, as well as, sometimes, the broad range of models offered –generally with different prices– makes it very difficult for managers (and even sometimes for clinicians) to decide what HTs will offer the best clinical and economical advantages for their centres. An example in this field refers to the different health care product comparison activities performed by the CAHTA upon request of the Market Analysis Unit (Catalan Health Service), specifically the assessments of pacemakers, valves and intraocular lenses marketed in Catalonia by different distributors (15; 16; 17). The request of assessing the above products came from the observation of substantial differences in the prices offered by the different manufacturers for the similar type of products.

The project involved analysing the available scientific evidence in order to identify if the differences observed in the design and composition of the mentioned products could lead to differences in the observed clinical outcome. The analysis was performed jointly with bioengineers and HT evaluators. The results of the analysis showed that, for a determined health care product, the different models marketed, grouped by similar technical characteristics, did not present substantial differences capable of influencing the clinical outcomes of patients for whom they were indicated, nor did they justify the, sometimes huge, differences in the offered price. The recommendation was that the main parameter to consider in the purchasing decision of a product should be an homologation certificate –specific for each type of product– in force in Spain, followed by the offered price.

Contributing to the improvement of health care quality

The study on the comparative effectiveness of heart surgery performed in Catalan hospitals through the analysis of heart surgery and the mortality adjusted to risk, is an example of contribution of HTA to provide information for the improvement of specific health care activities. This study was carried out upon request of the Catalan Society of Heart Surgery. The analysis showed statistically significant differences in the risk profile among health care centres, but did not find significant differences among centres in mortality associated to this procedure, upon adjusting for the surgical risk of the patients being attended. However, the study was found to be a valuable tool for the self-assessment of the centres performing this procedure, by means of the use of the results as a starting point to identify the elements of the health care process that may be improved (18; 19; 20).

5.3 MICRO: Clinical practice and society in general

Support to the development and implementation of evidence based clinical practice guidelines

Another specific example of the applicability of the HTA processes are clinical practice guidelines which apply the methodology of systematic review in the elaboration of recommendation for clinical practices. These guidelines should not be mistaken with the concept of protocol, in which recommendations are based on consensus. Both the case of the recommendation of a selective indication strategy for low osmolarity radiological contrasts (21), and the guidelines for the eradication treatment of gastric ulcer associated to *Helicobacter pylori*, are examples of how the assessment process can effectively produce clinical practice guidelines (22).

6. HTA: AN ARENA FOR INTERNATIONAL COOPERATION

HTA is not a new concept, nor an isolate fact in one or a few countries in the world. In 1985, the International Society of Technology Assessment in Health Care (ISTAHC) was created. It gathered clinical practice researchers and professionals, health and service policy makers, economists and social sciences and policies research professionals. Its mission is: to promote the scientific debate on the field of HTA, to effectively spread information on the most relevant assessment works, as well as to support educational activities in this field. These objectives are achieved by means of: the organisation of an annual meeting-an excellent forum for scientific debate and exchange of ideas; the quarterly edition of the society's journal (International Journal of Technology Assessment in Health Care), where HTA studies and articles can be found; the publication of the ISTAHC newsletters, where activities and news of interest for the Society's members are presented; and finally, with the organisation and financial support of educational activities around the world. Inside the ISTAHC, the so- called Special Purpose Interest Groups (SPIG) have been created. These are devoted to a specific activity of interest for the Society's members. To name one, there is an interest group for information resources, and another to promote HTA in developing countries. The growing international interest in the field of HTA is reflected in the impressive increase in the number of members of the ISTAHC in recent years. The ISTAHC hosts a web site where it shows its activities and contact addresses of HTA devoted organisations.

The globalization of knowledge, the increase in the number of institutions or organisations devoted to HTA around the world, and the need to cooperate and share information generated in different cultures and health care contexts led, in 1993, to the creation of the International Network of Agencies for Health Technology Assessment (INAHTA). The institutions member of the INAHTA are non-for-profit organisations, which depend partly or totally on national or regional governments, and which are financed in 50% with public funds. Currently, the Network encompasses 29 institutions from 16 countries, representing Australia, Asia, USA, Europe, Canada and New Zealand. INAHTA's main objective is the exchange of experiences and information among its members, and the implementation of international collaboration projects where the different cultures and health care contexts of the world are represented. The first international project carried out by the INAHTA was addressed to the evaluation of the effectiveness of the diagnostic and treatment of osteoporosis (Hormone Replacement Therapy and Inhaled Salmon Calcitonin) for the prevention of hip fractures. Currently, other assessment projects are in course. The INAHTA publishes a newsletter and hosts a web site where its activities, and those of its members, can be found, as well as nearly 500 titles of assessment reports performed by its members. Most of INAHTA's members have their own web sites where their activities, the topics covered and the ongoing projects can be consulted. Generally, access to documents and information is free of charge.

Besides the existence of these organisations as available resources for the access to HTA information, there are other databases that can be accessed, free of charge, in the search of information that may be useful to decide the implementation of a HT, or to identify evaluation documents on a specific topic that has already been carried out by another agency. The US National Library of Medicine allows universal free access to the HealthSTAR database. This database gathers evaluation documents, as well as other types of works carried out by governmental or other type of institutions that have not been published in peer-reviewed journals.

The collaboration, exchange of information regarding experiences, and the building of a culture of evaluation in the different health care systems, takes place not only through formally

constituted organisations (such as the ISTAHC or the INAHTA). There are collaboration projects among agencies belonging to the same continent, answering the need to settle the conceptual and methodological bases of assessment that gather the health care and the social and cultural characteristics of different countries. The first of these experiences took place in Europe through the EUR-ASSESS project.

In 1991, the European Union defined HTA as a key tool for improving the management of the scarce resources available for health care. In 1993, the EU financed the EUR-ASSESS project aimed at promoting coordination of HTA among the States member of the EU. The objectives of the project were: a) to contribute to the effectiveness and cost-effectiveness of health care in Europe by means of the promotion and coordination of initiatives and activities in the field of HTA carried out in this context; b) to improve the prioritisation methods for HTs to be assessed in the European programmes; c) to develop, formulate and apply a common method to evaluate HTs, emphasizing particularly the international applicability of the results obtained in the evaluation; d) to guarantee the effective dissemination of the assessment results in Europe and to analyse their impact, and e) to contribute to the improvement of decision-making by free insurance companies, as well as by other financiers of health care, promoting the use of HTA results in decision-making. Each of these objectives was developed by 4 workgroups —priority setting, dissemination and impact analysis, methods, HTA and health care services coverage— in which each of the European HTA agencies or institutions was represented. Also, representatives from European countries without a formally created HTA institution attended the different working sessions. The work of the different groups led to a recommendations document addressed to the EU, and referring to different papers published in the International Journal of Technology Assessment in Health Care.

The efforts made along with the success of the EUR-ASSESS project were the basis for the second European HTA project, the HTA-EUROPE Project. The objective of this new project, which was completed recently, was to present the HTA experiences of each European country, and how this was implemented in the different health care systems. One of the activities carried out was the elaboration of a paper by each country, which presents the characteristics of its health care system and the development of HTA agencies, as well as their influence on the health care system. These papers will be published in short time in the ISTAHC's journal. Another example of the activity performed were the discussion forums with working sessions and workshops, in which specific topics of interest were openly discussed, both regarding the evaluation agencies and the institutions and the health care systems. The forums dealt with the following topics: HTA and its current and future role in present day health care systems; health technology assessment agencies and collaboration in international projects; and emerging technologies. Finally, the last project also included prevention studies carried out by evaluation agencies in specific topics such as breast cancer screening, giving up smoking.

The information generated by already consolidated assessment agencies, units or institutions, and the fruit of their international collaboration experiences are a sound source of information for these countries that have not implemented organised assessment activities yet.

Although there are no initiatives like the HTA European ones in Latin-American and Caribbean countries, in recent years these countries have shown a growing interest in the development and promotion of HTA in their health care systems. Different members of the well-established evaluation agencies —mainly from Europe, USA and Canada— have carried out training activities in the above mentioned countries. These activities came from both the direct request of the Ministries of Health, and from some Universities, with the support of international organisations —Panamerican Health Organisation (PAHO), WHO, ISTAHC. These initiatives have already flourished in some countries. In Chile a Health Technology Assessment unit has

been created (ETESA) within the Ministry of Health. The Cuban Ministry of Health also has an evaluation unit, and has recently organised the first international workshop of health technology assessment within the reforms of the health care sector in the Caribbean area, with the support of the PAHO and the ISTAHC. Finally, there are other HTA initiatives in Brazil, Argentina and Colombia. These institutions and their activities may be a good resource in countries beginning their way in HTA, sharing experiences and difficulties in the sometimes difficult task of developing and implementing HTA units.

7. THE LIMITS AND CHALLENGES

Quoting K.R. Popper in his book *Objective knowledge*, "The object of science is not the finding of the truth but the likelihood; it is to find a satisfactory causal explanation of what we think needs an explanation." Thus, we should not fear to recognise, on the verge of the 21st century, that in clinical practice and in health care resource management, there are uncertainties in need of an explanation, and advances that will be enriched with assessment but from the understanding of the advantages, the limitations, the implications of the use of scientific studies and the need of a multidisciplinary appraisal.

The experimental approach to evaluation seeks to apply the principles of experimental science with the aim of producing strong internal validity of the conclusions about the outcome of a particular service through the control of variables, the simplification of the question under scrutiny, and resulting in quantitative data. Nevertheless, the main limitations of experimental studies is their low external validity, which means lack of generability to specific contextual features. Thus, the effects which are proved in experimental conditions are not always maintained in every day practices.

Qualitative research is increasingly used because of the need to understand complex behaviours, needs, systems, cultures, and values.

The multi-method assessment which draws on the strengths of different methods, and thereby counterbalances their respective weakness, is becoming to be understood as the best approach to assess complex problems in an increasingly complex health care context.

It has been advocated that the availability of information is not enough to change the decisions to occur. Dissemination activities as a mean to actively spread a HTA message is stressed as an active step of the HTA process. However, scarce objective information is available on the impact (effectiveness) of the different dissemination strategies currently implemented (23).

To translate information into knowledge is not enough to produce it, edit it, and send it by mail. The recognition of this fact has led to some HTA organizations to assume a new role in training and education, designing and implementing specific programmes for different decision makers in order to spread the culture of evaluation and to provide specific conceptual and methodological tools to learn how to search, evaluate, interpret, and use the best scientific evidence to answer the several type of questions related to current decision making in health care.

8. FINAL REMARKS

One of the greatest challenges of current health care systems is how to face a situation where the demand of health care services grows at a faster rate than the available resources devoted to its financing and delivery. This situation, which is the consequence of scientific and social progress, has led to a surplus in the technological alternatives in health care. Differences between capacity for innovation and capacity for public financing make it unavoidable to choose among the

alternatives. That is, to priorize. If explanations- objective information- are available, a selection among options can be made by patients, doctors, managers and policy makers with desirable autonomy and responsibility.

Information sources feeding the decisions will be crucial. The future of health care systems depends, in great part, on how knowledge will be managed, since decisions in health care do not only determine the patients health outcomes and quality of life, but also the economic sustainability of health care systems. It seems reasonable then to state that in today's and tomorrow's health care systems, knowledge coming from scientific research can be one of the best Medicine.

Aknowledgement
I am grateful to Pedro Gallo for his comments to a previous version of this manuscript.

REFERENCES

1. Granados, A.: La evaluación de las tecnologías médicas. *Med Clin (Barc)* 1995;104:581-585.
2. Henshall, C.H., Oortwijn, W., Stevens, A., Granados, A., Banta, H.D.: Priority setting for health technology assessment. Theoretical considerations and practical approaches.*Int J Technol Assess Health Care* 1997;13:144-185.
3. Liberati, A., Sheldon, T.A., Banta, H.D.: EUR-ASSESS Project subgroup report on methodology. *Int J Technol Assess Health Care* 1997;13(2):186-219.
4. Pons, J.M.V.: La revascularització transmiocàrdica amb làser. Barcelona:Agència d'Avaluació de Tecnologia Mèdica. Servei Català de la Salut. Departament de Sanitat i Seguretat Social. Generalitat de Catalunya, agost 1996.
5. Serra-Prat, M., Gallo, P., Jovell, A.J., Aymerich, M., Estrada, M.D.: Trade-Offs in Prenatal Detection of Down Syndrome. *Am J Public Health* 1998;88:551-557.
6. Cuckle, H. Rational Down Syndrome Screening Policy. *Am J Public Health* 1998;88:558-559.
7. Hailey, D., Sampietro-Colom, L., Marshall, D., Rico, R., Granados, A., Asua, J.: The effectiveness of bone density measurement and associated treatments for prevention of fractures. An international collaborative review. *Int J Technol Assess Health Care* 1998;14(2):237-254.
8. Hailey, D., Marshall, D., Sampietro-Colom, .L, Rico, R., Granados, A., Asua, J., Jonsson, E.: International collaboration in health technology assessment: a study of technologies used in management of osteoporosis. *Health Policy* 1998;43:233-241.
9. Hailey, D., Sampietro-Colom, L., Marshall, D, Rico, R., Granados, A., Asua, J., Sheldon, T.: *INAHTA Project on the effectiveness of bone density measurement and associated treatments for prevention of fractures*. Edmonton (Alberta), Alberta Heritage Foundation for Medical Research, 1996.
10. Van Doorslaer, E., Wagstaff, A., Rutten, F.: *Equity in the finance and delivery of health care: an international perspective*. London, Oxford University Press, 1993.
11. Le Grand, J.: The distribution of health care revisited: A commentary on Wagstaffa, van Doorslaer and Paci, and O'Donnell and Propper. *Journal of Health Economics* 1991;10:239-245.
12. Gallo, P., Serra-Prat, M., Granados, A.: Equidad en la provisión de servicios sanitarios en Cataluña. In: XIX Jornadas de Economía de la Salud: necesidad sanitaria, demanda y utilización; 1999 June 2-4; Zaragoza, Spain.
13. Granados, A.: Why CAHTA is calling for research projects [editorial]. *INFORMATIU AATM* 1996; (7):1.
14. Granados, A.: 1998 CAHTA calling: from ideas to action once more [editorial]. *INFORMATIU AATM* 1998;(14):1.
15. Departament d'Enginyeria Electrònica (Universitat Politècnica de Catalunya), Sampietro-Colom, L.: *Comparació de productes sanitaris: Marcapassos, desfibril? ladors, sondes i elèctrodes*. Barcelona, Agència d'Avaluació de Tecnologia Mèdica. Servei Català de la Salut. Departament de Sanitat i Seguretat Social. Generalitat de Catalunya, juny 1996.
16. Pons, J.M.V.: *Comparació de productes sanitaris: Els implants valvulars cardíacs*. Barcelona, Agència d'Avaluació de Tecnologia Mèdica. Servei Català de la Salut. Departament de Sanitat i Seguretat Social. Generalitat de Catalunya, octubre 1995.
17. Departament d'Òptica i optometria, Universitat Politècnica de Catalunya i Sampietro-Colom, L.: *Comparació de productes sanitaris: Lents intraoculars*. Barcelona, Agència d'Avaluació de Tecnologia Mèdica. Servei Català de la Salut. Departament de Sanitat i Seguretat Social. Generalitat de Catalunya, febrer 1996.

18. Pons, J.M.V., Granados, A., Espinàs, J.A., Borràs, J.M., Martín, I., Moreno, V.: Assessing open heart surgery mortality in Catalonia (Spain) through a predictive risk model. *Eur J Cardiothorac Surg* 1997;11(3):415-423.
19. Pons, J.M.V., Espinàs, J.A., Borras, J.M., Moreno, V., Martin, I., Granados, A.: Cardiac Surgical Mortality. *Arch Surg* 1998;133:1053-1057.
20. Pons, J.M.V., Moreno, V., Borràs, J.M., Espinàs, J.A., Almazán, C., Granados, A.: Open heart surgery in public and private practice. *J Health Serv Res Policy* 1999;4(2):73-78.
21. Grup Català d'Agents de contrast de baixa osmolaritat: *Recomanacions per a la utilització clínica: administració dels agents de contrast iodats de baixa osmolaritat*. Oficina tècnica d'Avaluació de Tecnologia Mèdica. Departament de Sanitat i Seguretat Social. Generalitat de Catalunya, abril 1994.
22. Jovell, A.J., Aymerich, M., García-Altés, A., Serra-Prat, M.: *Guia de pràctica clínica del tractament eradicador de la infecció per Helicobacter pylori associada a úlcera duodenal en l'atenció primària*. Barcelona, Agència d'Avaluació de Tecnologia Mèdica. Servei Català de la Salut. Departament de Sanitat i Seguretat Social. Generalitat de Catalunya. Setembre 1998. BR98002.
23. Granados, A., Jonsson, E., Banta, H.D., Bero, L., Bonair, A. et al.: EUR-ASSESS project subgroup report on dissemination and impact. *Int J Technol Assess Health Care* 1997;13:220-286.

Session 3

Methods for the Appraisal of Investment in Health

Economic Evaluation of Health Technologies

by

Martin Buxton
Professor of Health Economics and Director
Health Economics Research Group
Brunel University, UK

Content

1.Introduction

In the last ten to twenty years a considerable amount of effort has gone into the development and application of formal, systematic and accepted techniques for the economic evaluation of health care technologies. As a result, these techniques are increasingly being used in a number of formal contexts within health care systems, as well as being employed more generally in a less formal manner to illustrate the implications of investing in particular technologies and to assist in decision-making at a variety of levels.

The broad need for economic evaluation in health care is both well understood and yet often reluctantly accepted. In many health care systems, there is a political dislike of the way in which economic approaches to priority-setting, make very explicit the inevitable scarcity of resources and resultant rationing. No matter what the political rhetoric, no health care system can provide all technically feasible and potentially beneficial health care to all its members.

This paper cannot reasonably attempt to explicate in full, and critique systematically, the various techniques of economic evaluation: there are many existing sources that already do that well. More modestly, it provides a brief summary of the main methods available, reviews some of the formal contexts in which these analyses are currently being used, sets out what are some of the key strengths and weaknesses of the approaches, and finally gives an indication of the forms of investment that these approaches might most readily inform.

2. Summary of the main techniques

Most accounts of the methodology of economic evaluation identify four forms. All economic evaluations must involve comparative analysis of the costs and consequences of alternative courses of action, and should be concerned with what are the extra costs and additional 'benefits' as against a comparator, usually representing current practice. The precise specification of the comparator is a critical factor in undertaking and interpreting economic evaluation results. The four main forms of analysis all handle costs in the same way but differ in terms of their methods relating to the health outcomes. The main differences are set out in Figure 1.

Cost-minimisation analysis is the simplest form of economic evaluation, relevant only where evidence already exists, or where it can be demonstrated within the study, that the options do not differ in terms of any relevant dimension of outcome. In such restricted circumstances, an economic evaluation can simply look at the differences in cost, with a decision criterion of preferring the cheaper option. [This is not the same as a cost-analysis which simply looks at cost without evidence of the outcomes: cost-analysis is not a form of economic evaluation.]

Cost-effectiveness analysis allows for differences in health outcomes, but these have to be expressed in terms of a single, principle effect measured in natural units (eg life-years gained, cancers detected, or a reduction in a risk factor). The technique may be most useful in comparing alternatives within a narrowly defined therapeutic area. Table 2 provides an example of how cost per life year gained can be used to compare the available evidence from economic evaluation studies for health checks to reduce cardiac risk in asymptomatic middle-aged men (1). As seen in that example cost-effectiveness will be expressed as a ratio of additional cost per additional unit of effect.

Unless an option is dominant (ie it has higher (or equal) effect and lower (or equal) cost), in which case it is clearly preferred, then the decision criterion involves a judgement as to whether the incremental cost-effectiveness ratio is acceptable: that is to say the intervention creates additional effect at a cost that is perceived as being less than the 'value' of that effect.

The problem is that often the important outcomes cannot easily be expressed in a single natural numeraire. For example, surgery may induce quality of life impairments that need to be balanced against mortality gains, or a cancer screening programme may produce undesired false positives which need to be balanced against the true positives detected.

Cost-utility analysis was developed explicitly to handle the limitations of being limited to a single natural unit of effect in cost-effectiveness. It measures health outcomes in terms of a 'utility' index that combines mortality differences (if any) with differences in health related quality of life (if any). There are a number of methods for combining these, but the most common and most widely accepted approach estimates 'quality-adjusted life years' (QALYs) as the outcome numeraire. [Cost-utility analysis is sometimes regarded as a specific form of cost-effectiveness analysis.]

There are a number of instruments available to estimate QALYs. The most widely used in Europe is certainly the EQ-5D classification system developed by the EuroQol Group (2), and the set of health state values obtained in the UK from a large representative population survey undertaken by Williams and colleagues at the University of York (3; 4). Cost-utility analysis has the very substantial advantage that in principle it enables the outcomes of all forms of health care to be expressed in terms of a common numeraire and hence comparisons made as to which interventions, looking right across the health care sector, represent the best 'value for money'. This approach leads to the presentation of 'cost per QALY' league tables (as exemplified in Figure 3) in which interventions are ordered by cost-per QALY, with a decision rule that aims to maximise the 'health gain'', expressed as the number of QALYs gained, within a given health budget. The technique cannot however directly inform the debate as to how large or small that health budget should be.

One construct much used by the World Bank and WHO is the DALY (disability-adjusted life year) and 'cost per DALY'(5). Whilst DALYs are essentially a similar concept to QALYs, they have a number of characteristics which make them conceptually far less appropriate for resource allocation within countries. This paper is not the context in which to debate these important issues of detail, but the arguments against DALYs have been well summarised by Williams (6).

Cost-benefit analysis is the classic form of economic evaluation firmly based in welfare economic theory, in which not only the costs but also the (health) outcomes are valued in monetary terms. This enables costs and benefits to be directly compared and a net-benefit from an investment calculated. This then has the result that the value of investments in different sectors can be directly compared, and the relative size of sectoral budgets can, in principle, be optimised. In practice cost-benefit analysis has been little used in the health sector because of the practical and ethical problems in placing explicit monetary values on years of life and on illness and suffering. However, there is now a renewed interest in using willingness to pay techniques to estimate the monetary value of health changes, particularly where these changes involve modest differences in prognosis but vary in terms of aspects of quality of life and patient convenience (7; 8; 9).

In addition to the four forms of evaluation summarised above, a category of *cost-consequence analysis* should be added. In this widely used approach, the net costs and consequences of an intervention are described and quantified but the consequences are not expressed in a single

numeraire which could form the numerator of a cost-effectiveness or cost-utility analysis, nor are they valued in monetary terms. Effectively the results are presented as a matrix of important outcomes, to which formal or informal methods of multiple criteria decision analysis have to be applied. Alternatively, a number of partial cost-effectiveness ratios may be calculated each reflecting only one of the component outcomes.

All five techniques share common features: they are all necessarily comparative and are concerned with incremental costs and effects. Cost-analyses and cost of illness studies are not economic evaluations as they describe the existing position regarding use of resources and states of health rather than providing an incremental analysis of the net differences between two options.

Clearly in the context of making broad decisions about investments in health the two most relevant techniques are cost-utility analysis and cost-benefit analysis. The former essentially can provide an ordering of investments aimed at producing health gain (QALYs) within a predetermined level of available resources. Cost-benefit analysis can potentially provide an indication of how much should be spent on investment in health or a basis for allocating available investment resources between health and other objectives. Much depends on the social/political willingness to see health gains (including life-years gained) explicitly valued in monetary terms and, if that is acceptable, the empirical validity of the values used.

3. Formal applications of economic evaluation criteria

In recent years, economic evaluation has moved from being a mainly academic process, only spasmodically employed by health care authorities. Now, a number of countries have introduced mechanisms that require the provision of such information to support particular decisions. For example the decisions to reimburse or cover new pharmaceuticals under public sector-funded health insurance schemes are increasingly being informed by economic evaluation studies, and in some countries, pharmaceutical companies are required to provide such evidence to support the listing of new products on what effectively are limited drug formularies. The earliest countries to do this were Australia and the Province of Ontario, Canada, but now many other countries have followed with either formal requirements for, or clearly articulated expectations of, there being such evidence (10). In the UK the recently instituted National Institute for Clinical Excellence will operate an interesting extension of this approach (11). Whilst it will not require economic evidence for all new drugs, it will, in co-operation with the Department of Health, identify a number of technologies which are believed to have, or to be likely to have, a significant impact on the NHS. These may be new technologies: as yet unlicensed drugs or new indications for existing drugs, or other new technologies not yet routinely available in the NHS. Equally NICE may identify technologies already widely used but which still require evaluation. Nice will either require economic evaluations from the sponsors of the technology or commission economic evaluation studies from independent researchers. NICE will then appraise the evidence and consider the cost-effectiveness from the perspective of the NHS. It will then issue guidance to the NHS about the appropriateness of their adoption or diffusion. If necessary, it will link its recommendations to the development or revision of appropriate Clinical Guidelines. Although the consultation document clearly anticipates the use of cost per QALY, this is not universally accepted as the right methodology (12).

3.1 Range of existing studies

Our state of knowledge of the cost-effectiveness of health care interventions is still very limited when we consider the vast number of technologies, and the even greater number of different

applications of these technologies, that form part of routine health care in most countries. However, the evidence base of methodologically sound published studies is increasing rapidly. For more than twenty years there has been an accelerating flow of applied economic evaluations of health technologies, produced mainly in academic contexts with the objective of informing policy. This can be shown with numbers from databases of such studies, and illustrated from more selective reviews.

Within the Office of Health Economics/International Federation of Pharmaceutical Manufacturers' Associations Health Economics Evaluations Database (HEED) there are now (as at June 1999) some 5660 references relating to applied economic studies (13; 14). The breakdown of these is shown in Figure 4. It can be seen that of these are economic evaluations, representing a very substantial source of evidence on a very wide range of health interventions. Of these studies, the largest proportion are cost-consequence analyses, followed by cost–effectiveness analyses. Still only a small proportion are cost-utility analyses, and even fewer cost-benefit analyses. This picture is confirmed by data from the overlapping but rather more restricted database produced by the Centre for Reviews and Dissemination at the University of York (15). As of June 1999, this database included 1360 entries relating to cost-effectiveness studies and 164 relating to cost-utility studies.

A recent paper from the US (16) reviewed the US literature for studies providing estimates of costs per life year gained, or cost per QALY, for interventions aimed at four important public health problems: cancer, heart disease, trauma and infectious disease. The authors reported data relating to a selected subgroup of 13 cancer interventions, 17 interventions relating to coronary heart disease, 14 interventions to reduce accidents, and 21 interventions to prevent infectious diseases. Theses are summarised in Figures 5-8. The cost effectiveness of these interventions, which included primary, secondary and tertiary prevention models, ranged from those which were cost-saving to those that cost more than $1 million per year of life gained. Most of the cost-utility ratios reviewed clustered in the range of $10,000 to $100,000. These examples emphasise the well known, but often disregarded, point that cost-effectiveness, is not an inherent characteristic of a particular intervention, but depends crucially on the comparator and the specific population to which the intervention is applied.

3.2 Methodological Standards

If economic evaluation is to be used as one important decision-criterion in determining what technologies are used in health care systems, then there has to be confidence that the methods in use are sufficiently robust and reliable for the results of studies to be used in this way.

The state of the art of such evaluations is not static but constantly evolving, and there is growing sophistication in the way studies are analysed and presented. For example, for a number of years there has been considerable recent focus on the handling of uncertainty in economic evaluations, particularly those using stochastic patient specific data (17; 18; 19). More recently, there is a move towards using Bayesian approaches rather than standard frequentist methods (20; 21; 22).

Nevertheless, there now exist a number of authoritative statements about current best practice. Some of these represent statements of what individual professionals, or consensus panels, deem to be good practice (23; 24; 25; 26; 27; 28). Others represent formal statements of the evidence required by particular authorities in particular circumstances, for example the guidelines relating to pharmaceutical submissions in Australia and Canada (29; 30). Such guidelines which are specific to a single decision-making context and process, and which often have only to deal with a subset of technologies, are typically the more prescriptive. The less prescriptive professional

consensus statements have recently proposed the idea of an agreed and fixed method for calculating a 'reference' case that they recommend should always be reported to provide an estimate directly comparable between studies (27).

However there are a number of problems where health-related interventions are potentially cross-sectoral, and different approaches are used in different sectors. One example is the evaluation of policies relating to reducing the negative health effects of pollution in the UK. A recent study looked at methods to value the health effects of pollution, and recommended that the 'value of a statistical fatality' should be estimated based on a 'willingness to pay' approach, as is now common in the UK in terms of transport and environmental policy (31). This would give consistency with other transport policies but would appear to suggest an acceptable threshold for cost-per QALY gained that is much higher than that implicitly adopted for other health care spending. Thus of two policies of equal value, one relating to pollution might be accepted, but another in the main stream health sector, perhaps dealing with treatments for pollution caused diseases might be rejected. Such potential inconsistencies have important implications as countries begin to explore more fully cross-sectoral policies to improve health.

3.3 Are the results of such studies generalisable?

One serious problem is the extent to which past studies, particularly those in the published literature, can be used to inform current decisions in contexts other than that in which the study was originally undertaken. This issue of generalisability has a number of dimensions. The simplest is the standard problem that the underlying evidence and hence the cost-effectiveness analysis may become outdated, as technology, or experience moves on. The temporal change may relate to the comparator rather than the technology in question. A drug that once appeared cost-effective, may cease to be if a new comparator technology becomes available. But even at time of publication will the results be relevant in settings other than those for which they were calculated? Certainly it would be very dangerous to simply read across to other patient groups, countries, or health care delivery settings. A number of studies have begun to look at this issue. Bryan and Brown (32) looked at whether cost-effectiveness information from published studies could be extrapolated to local settings. They concluded that 'without local reanalysis there is a real danger that local policy changes in line with the recommendations of published studies will promote inefficiency.'

This view stemmed from an analysis of within country 'local' variations: the caution is likely to hold a fortiore in generalising studies between countries. Between countries, the relevant comparators, medical practice, relative costs, patient expectations may vary, as will the view as to what is an acceptable incremental cost-effectiveness ratio.

This issue arises in a rather different form in trying to analyse cost-effectiveness within the context of multi-national studies, which are now a common feature of Phase III and IV clinical trials of pharmaceuticals. For example, Willke et al (33) found that meaningful country-by-country differences in cost-effectiveness could be identified in such trials, and these might have important implications for reimbursement or utilisation decisions. The problems of generalisability, and the possible differences in cost-effectiveness, will tend to increase as we attempt to generalise studies from countries with similar health care systems to countries where health care provision is organised very differently or is provided at very different levels of expenditure.

3.4 Limitations of data sources and the need for modelling

Many of the economic evaluations are produced as part of a broader process of health technology assessment (as described in the Paper by Alicia Granados). Typically they draw on the results of individual clinical trials, or systematic reviews of trials, at least as the basis for the estimates of effectiveness. Randomised trials do provide a strong observed comparative basis (with 'internal validity') for estimating the effects of alternative interventions, but there is real concern as to the extent to which 'efficacy' data from the controlled contexts of trials is a reasonable proxy for the true 'effectiveness' that would be observed in a normal clinical context (external validity'). What is clear is that to answer questions relating to cost-effectiveness, it is necessary to undertake economic modelling of some sort to extrapolate (or generalise) the results (34). Typically trial results will be relatively short-term, and will measure proxy or intermediate clinical outcomes. The value of interventions as an investment will crucially depend upon longer-term outcomes, effects and costs. Taking the example of the choice between coronary artery bypass surgery and the less invasive percutaneous transluminal coronary angioplasty the true relative cost-effectiveness is only becoming clear with long-term (six-seven year) trial results (35; 36).

For many technologies, however, even short-term trial data is not available, and much softer evidence of effects has to be used (37). This is particularly true of many imaging and diagnostic technologies, many alternative forms of health service delivery and many issues relating to the more macro organisation of health care, although attention is beginning to be paid to these more difficult areas (38; 39; 40). Whilst the conceptual approaches of economic evaluation can be just as readily applied to these areas the evidence basis for the cost-effectiveness judgements are likely to be much weaker.

4. Objectives other than outcome 'health gain maximisation'

Economic evaluation in health care has been traditionally concerned with maximisation of health gain: the generation of the maximum number of units of health benefit (for example the maximum number of QALYs) within the context of a fixed budget. However, there are a number of senses in which this economic focus may only partially represent the true objectives of health care provision. The first is that within systems of social provision of health care, issues of equity are of considerable social and political importance. Economic evaluation has in the past failed to adequately address issues of equity. That is not to say that there are not implicit concepts of equity within QALY maximisation. The standard QALY calculus has the assumption that a year of life in full health is valued equally regardless of the other characteristics of its recipients. This has the advantage that it ignores for example, ability to pay, but it may fail to take account of social preferences, for example between different age groups. This issue is beginning now to be addressed. For example, it has been suggested that an underlying objective may be to try to ensure that all members of the population receive a 'fair innings', in terms of length and quality of life. It is thus suggested that social preferences would be to value more highly life-years (QALYs) gained by those who would otherwise have 'poor innings', whilst putting a lesser value on gains by those who had already have had a 'good innings' (41).

More fundamentally perhaps economic evaluation has for the most part, along with evidence-based medicine, accepted a totally outcome orientated approach. Whilst the health outcomes of health care interventions must clearly remain a matter of prime importance, it is clear that in the minds of the public (and hence in the eyes of the politicians) issues of the process by which

health care is provided is also very important. A number of economists are beginning to address this issue using techniques such as conjoint analysis (42).

Conjoint analysis is a stated preference technique designed to establish the impact of individual attributes of a good, or of a service, on respondents' relative valuation of it. It involves the presentation to individuals of hypothetical scenarios describing the good or service in terms of a set of attributes at specified levels. Respondents use ranking, rating or discrete choice exercises to represent their preferences for these scenarios. From these responses, the respondents' utility functions can be estimated (43). This method has been widely used and reported, for a number of years, in the fields of transport and environmental economics. It is now being increasingly applied in the field of health care, and studies are demonstrating that respondents consider process characteristics (such as geographical convenience, waiting times, etc) as important in their own right. More importantly, they are willing to 'trade' a reduction in health outcome for higher levels of utility from the process characteristics (44).

If economic evaluation is to assist social/political decision-makers who wish to reflect these public values, then it is important that the techniques used begin to address more complex objectives than simply the maximisation of health gain.

5. What sort of choices can economic evaluation inform?

Economic evaluation, as currently developed, represents a very powerful tool to address questions about the relative economic efficiency of alternative health care technologies, and it is being used increasingly within health care systems to provide decision-makers with this important information. However, most of the available evidence deals with discrete interventions aimed at well-defined patient groups, as exemplified in the various tables reproduced here.

However, economic evaluation of this kind is not well suited to informing broader judgements as to whether in a particular country at a particular point of time we would be better investing in primary or secondary care, or in local or regional hospital developments. It will not tell us directly whether more or less of a health care budget should be spent on pharmaceuticals, or doctors, or information technology. Nor does it tell us how much should be invested in health care. On the contrary it emphasises that the answers to these broad questions are dependent on the detailed allocation of resources within these broader sectors. The only broad generalisation is that all such generalisations are likely to be misleading. Cost-per QALY league tables show no clear picture as regards which sector or broad category of spending is most cost-effective. Simple primary prevention programmes to discourage smoking may appear to be cost-effective, whilst more complex programmes to reduce a range of cardiac risk factors may appear less so. Kidney transplantation looks very cost-effective, but kidney-dialysis, although widely accepted, has a very high cost per QALY gained. Hip replacement looks good: some cancer therapies look very unattractive in terms of cost-effectiveness. But in each case it certainly depends upon the precise technology used, and the particular patient group under consideration, and probably there will be additional artefacts resulting from the time, place and methods of the evaluation study.

6. Conclusions

There is potentially a major role for economic evaluation in resource allocation decisions within health care systems but some problems remain. The authors of the recent review of US evidence concluded:

'If CEA is to become a more influential tool in debates about broad-based resource allocation (either within disease categories or throughout the health sector of the economy), the analytical community needs to achieve more consensus about the methods and conventions employed in CEA. The Panel on Cost-Effectiveness in Health and Medicine of the US Public Health Service has recommended a uniform set of analytic practices that should govern Reference Case analyses in future CEAs. As this article has indicated, the analytical community has a ways to go yet to achieve the kind of uniformity in analytical practice that is necessary to inform decision makers interested in intersectoral reallocation of limited health resources' (15).

Such issues of consistency can fairly readily be overcome at least between studies undertaken to meet the needs of a specific decision context. The more difficult question is can a common approach be adopted for all studies regardless of their prime audience. In that economics is fundamentally about values, and values do differ between individuals, between groups, and certainly between countries it may be unrealistic to expect that total consistency is achievable or desirable. If published studies are to be used, some local reanalysis is likely to be necessary, to make the study relevant to the specific context, and to update if necessary. But the wheel certainly does not have to be reinvented each time.

Looking to the existing evidence from economic evaluation will emphasise that broad generalisations are often unfounded, and typically the evidence is more complex than policy-makers would like. To maximise the health gain from a given budget will require much more than simply investing in the right sector: it will involve ensuring that the right treatments are given to the groups at the right time, by the right professionals. This will need clinical involvement and support, and guidelines and incentives consistent with the desired approach.

Finally what must not be forgotten is that maximisation of health gain from a given budget is not the only objective of health care systems. There are both other broader maximands for health policy, for example those that recognise the utility attached to process, and there are objectives other than maximising such as those concerned with social equity. Finally as some of the figures shown here remind us, if we wish to save life and improve health the best place to start is not necessarily in the health sector. But that is another paper.

7. References

1. Wonderling, D., Langham, S., Buxton, M. *et al*.: What can be concluded from the Oxcheck and British family heart studies: commentary on cost-effectiveness analyses. *British Medical Journal* 1996; 312

2. Brooks, R.: EuroQol: the current state of play. *Health Policy* 1996; 37: 53-72

3. Dolan, P., Gudex, C., Kind, P., Williams, A.: The time trade-off method: results from a general population study. *Health Economics* 1996; 5: 141-154

4. Dolan, P.: Modelling valuations for EuroQol health states. *Medical Care* 1997; 35 (11): 1095-1108

5. Murray. C.J.., Lopez, A.D. (Eds.): *The Global Burden of Disease.* WHO/World Bank*;* Harvard University Press, 1996

6. Williams, A.: Calculating the global burden of disease: time for a strategic reappraisal? *Health Economics* 1999*;* 8:1-8

7. O'Brien, B.J., Gafni, A When do the "dollars" make sense? Towards a conceptual framework for contingent valuation studies in health care. *Medical Decision Making* 1996; 16 (3): 288-299

8. Diener, A., O'Brien, B., Gafni, A.: Health care contingent valuation studies: a review and classification of the literature. *Health Economics* 1998; 7 (4): 313-326

9. Bala, M.V., Wood, LL., Zarkin, G.A, Norton, E.C., Gafni, A, O'Brien, B.: Valuing outcomes in health care: a comparison of willingness to pay and quality-adjusted life-years. *Journal of Clinical Epidemiology* 1998; 51 (8): 667-676

10. Towse, A. (Ed.): *Guidelines for the Economic Evaluation of Pharmaceuticals.* London, Office of Health Economics, 1997

11. Department of Health /NHS Executive: *Faster access to modern treatment: how NICE appraisal will work.* Leeds, Department of Health, 1999.

12. Freemantle, N., Mason, J.: Not playing with a full DEC, *British Medical Journal* 1999; 318:1480-82

13. Crosbie, G.: *HEED: the Health Economic Evaluations Database*. London, OHE-IFPMA Database Limited, 1998

14. Pritchard, C.: *Trends in economic evaluation*. OHE Briefing, no 36, London, 1998

15. NHS Centre for Reviews and Dissemination, Information Service: *Databases. Introductory User Guide*. York, University of York, 1995

16. Graham, J.D., Corso, P.S., Morris, J.M., Segui-Gomez, M., Weinstein, M.C.: Evaluating the cost-effectiveness of clinical and public health measures. *Annu Rev Public Health* 1998; 19: 125-52

17. Briggs, A., Sculpher, M.J., Buxton, M.J.: Uncertainty in the economic evaluation of health care technologies: the role of sensitivity analysis. *Health Economics* 1994; 3: 95-104

18. Briggs, A., Wonderling, D., Mooney, C.Z.: Pulling cost-effectiveness analysis up by its bootstraps: a non-parametric approach to confidence interval estimation. *Health Economics* 1997; 6: 327-340

19. Briggs, A. & Gray, A.: The distribution of health care costs and their statistical analysis for economic evaluation. *Journal of Health Services Research & Policy* 1998; 3 (4): 233-245

20. Luce, B.R., Claxton, K. Redefining the analytical approach to pharmacoeconomics, *Health Economics* 1999*;* 8: 187-189

21. Heitjan, D.F., Moskowitz, A.J., Whang, W.: Bayesian estimation of cost-effectiveness ratios from clinical trials. *Health Economics;* 8: 191-201

22. Claxton, K.: Bayesian approaches to the value of information: implications for the regulation of new pharmaceuticals, *Health Economics* 1999; 8: 269-274

23. Drummond, M.F., Jefferson, T.O. (on behalf of the *BMJ* Economic Evaluation Working Party): Guidelines for authors and peer reviewers of economic submissions to the BMJ. *British Medical Journal 1996*; 313: 275-283

24. Russell, L.B., Gold, M.R., Siegel, J.E. *et al.*: The role of cost-effectiveness analysis in health and medicine. *JAMA* 1996; 276, no 14: 1172-1177

25. Weinstein, M.C., Siegel, J.E., Gold, M.R. *et al.:* Recommendations of the panel on cost-effectiveness in health and medicine. *JAMA* 1996; 276, no 15: 1253-1258

26. Siegel, J.E., Weinstein, M.C, Russell, L.B., Gold, M.R.: Recommendations for reporting cost-effectiveness analyses. *JAMA* 1996; 276, no 16: 1339-1341

27. Gold, M.R., Patrick, D.L., Torrance, G.W. *et al.:* Identifying and valuing outcomes, in: *Cost-Effectiveness in Health and Medicine.* Gold, M.R., Siege,l J.E., Russell, L.B., Weinstein, M.C. (Eds.). New York, Oxford University Press, 1996, pp 82-134

28. Drummond, M.F., O'Brien, B., Stoddart, G.L., Torrance, G.W. (Eds): *Methods for the Economic Evaluation of Health Care Programmes. Second Edition*. Oxford University Press, 1997

29. CCOHTA: *Guidelines for economic evaluation of pharmaceuticals: Canada.* 2nd Edition. Ottawa, Canadian Coordinating Office for Health Technology Assessment, 1997.

30. Commonwealth Department of Health, Housing and Community Services: *Guidelines for the pharmaceutical industry on preparation of submissions to the Pharmaceutical*

Benefits Advisory Committee. Canberra, Australian Government Publishing Service, 1992.

31. Department of Health: *Economic appraisal of the health effects of air pollution*. London, The Stationery Office, 1999

32. Bryan, S. & Brown, J.: Extrapolation of cost-effectiveness information to local settings. *Journal of Health Services Research and Policy* 1998; 3 (2): 108-112

33. Willke, R.J., Glick, H.A., Polsky, D., Schulman, K.: Estimating country-specific cost-effectiveness from multinational clinical trials. *Health Economics* 1998; 7: 481-493

34. Buxton, M.J., Drummond, M.F., van Hout, B.A. *et al.*: Modelling in economic evaluation: an unavoidable fact of life. *Health Economics*; 6 (3): 217-227

35. Sculpher, M.J., Seed, P., Henderson, R.A. *et al*: Health service costs of coronary angioplasty and coronary artery bypass surgery: the Randomised Intervention Treatment of Angina (RITA) trial. *Lancet* 1994; 344: 927-930

36. Henderson, R.A., Pocock, S.J., Sharp, S.J., Nanchahal, K., Sculpher, M.J., Buxton, M.J., Hampton, J.R.: Long-term results of RITA-1 trial: clinical and cost comparisons of coronary angioplasty and coronary-artery bypass grafting. *Lancet* 1998; 352: 1419-1425

37. Sculpher, M., Drummond, M., Buxton, M.: The iterative use of economic evaluation as part of the process of health technology assessment. *Journal of Health Services Research and Policy* 1997; 2 (1): 26-30

38. Bryan, S., Keen, J., Muris, N., Weatherburn, G., Buxton, M.: Issues in the valuation of picture archiving and communication system. *Health Policy* 1995; 33: 31-42

39. Keen, J., Bryan, S., Muris, N., Weatherburn, G., Buxton, M.: Evaluation of diffuse technologies: the case of digital imaging networks. *Health Policy* 1995; 34: 153-166

40. Bryan, S., Weatherburn, G., Buxton, M., Watkins, J., Keen, J., Muris, N.: Evaluation of a hospital picture archiving and communication systems. *Journal of Health Services Research and Policy* 1999; 4 (4): 204-209

41. Williams, A.: Intergenerational equity: an exploration of the 'fair innings' argument'. *Health Economics* 1997; 6: 117-132

42. Cave, M., Burningham, D., Buxton, M., Hanney, S., Pollitt, C., Scanlan, M., Shurmer, M.: *The valuation of changes in quality in the public services*. Report prepared for H M Treasury. London, HMSO, 1993

43. Ryan, M.: *Using Consumer Preferences in Health Care Decision Making: the Application of Conjoint Analysis.* London, Office of Health Economics, 1996

44. Ratcliffe, J. & Buxton, M.: Patients' preferences regarding the process and outcomes of life-saving technology: an application of conjoint analysis to liver transplantation. *International Journal of Technology Assessment in Health Care* 1999; 15 (2): 340-351

Session 3

METHODS FOR THE APPRAISAL OF INVESTMENTS IN HEALTH

Information Technology in Healthcare - Impact and Needs

by

Luis G. Kun, Ph.D., FAIMBE
Consultant & Research Professor of Health Informatics & Information Technology
CIMIC - Rutgers University, NJ, USA

CONTENT

Summary

The Information era we live in has created new challenges and opportunities. This age of information highways has an economic price, which has not been properly evaluated. Detailed studies are needed to prove the cost and medical effectiveness of these technologies as well as its effects in the quality of life. Our society's future may depend on it. People are living longer, discoveries in genetics and in information technology not only are helping produce newer drugs faster but providing the opportunity to exploit new areas such as disease prevention. These technologies provide a variety of opportunities to address public health challenges such as universal access for the uneducated, counter-bioterrorism, Telemedicine, distance education, and home care. These opportunities present new challenges such as: surveillance, privacy / confidentiality / security of personal information which will affect all of our lives. No strategy has been presented publicly yet addressing neither the benefits nor the pitfalls of such technologies. From an economic point of view it is an imperative necessity to understand the importance of the Information Technology Infrastructure (ITI) and what it is. The investments in creating and maintaining this ITI will not come from a single application area such as Healthcare, but rather from a combination of sources such as Electronic Commerce, Banking, Financial, Manufacturing, Entertainment, Travelling, Weather Forecasting, Pharmaceuticals, Education, Defense and many other "industries" or application areas.

The views presented here in the conference and in this session are all closely linked to this presentation, "Information Technology in Healthcare - Impact and Needs". There are already in the US several Information Infrastructures and related programs that are being expanded in order to fulfill the healthcare requirements of its population. The healthcare systems across the different nations represented here and the US in particular are dramatically different from an economic point of view and yet many of the socio-economic trends, such as growth of the elder population, increase in chronic diseases' expenditures, the use of telemedicine for homecare purposes, etc. are similar on both sides of the Atlantic. Regardless of the populations in question for example the medical, pharmaceutical and genetics fields share all the same findings yet the strategies that each country has chosen to use may be vastly different because of their chosen system of reimbursement.

Although in this session the two other presentations will focus on: *Cost- benefit and cost-effectiveness Analysis in health Investments* (economic evaluation of healthcare systems, facilities and procedures) and *Technology Assessment* (new medical, diagnostic and surgical procedures; new therapies and pharmaceuticals; impact on the demand for healthcare facilities and the design of healthcare establishments); these methodologies and/or technologies require certain, what I will define as: "technology enablers". These are "needs" required to do a successful cost and medical effectiveness study. In many cases these enablers have not been fully developed. In other cases through International Standards Organizations (ISO) there are a number of them being implemented. Finally there will be some discussion of the future roll of genetics and the genome map not only on drug discovery but more important in disease prevention and improvements in quality of life. Here too, the privacy of information could become the biggest hurdle ever encountered in this field and yet it presents a wonderful financial opportunity for those engaged in solving this paradigm.

Mayor driving Forces: The USA Picture

1. **Socio - Economic Realities**
    - Medical Expenditures
    - Elderly Population - Life Expectancy
    - Chronic Disease - Genome map and its implications
2. **Information Technology Impact**
    - Information Superhighways - High Performance Computers & Communications [HPCC]
    - Data Warehousing , Data Mining, Internet / NGI
    - Telehealth vs. Telemedicine -
    - Standards of Information vs. Standards of Care
    - Computer-Based Patient Records [CPR]
    - Clinical Decision Support Systems [CDSS]
3. **Needs - Issues**
    - Home Care
    - Distance Learning
    - Disease Prevention vs. Diagnosis / Treatment
    - Intelligent Agents / Genomics / Patient Identifiers vs. Privacy
    - Improving the Information Infrastructure
    - Universal Access - Illiteracy as a handicap
    - Privacy / Confidentiality /Authenticity / Security / Data Integrity

1. Socioeconomic realities

1.1 Medical expenditure and Aging population (1, 2)

Health care costs are the fastest growing segment of government expenditures (federal, state, and local). The United States was expected to spend more than $1 trillion on health care in 1995, or a full 14 percent of the U.S. gross domestic product (GDP). This percentage is expected to grow to 16 percent of the GDP by the year 2000 and to reach 18 percent by 2005.

As a nation, the U.S. leads the world in health care spending yet does not have the best outcomes overall. U.S. employers spend, on average, 8.2 percent of their payroll on health insurance while their counterparts in Germany and Japan spend approximately 6.4 percent and 4.2 percent respectively.

In order to balance care and cost, managed care companies are pursuing wellness and prevention programs, as well as disease management programs, to improve health outcomes. The growth in managed care has been explosive. In 1976, only 6 million people were enrolled in a health maintenance organization (HMO). By 1992, that figure had risen to an estimated 41 million. Data from 1993 indicate an increase to 45 million enrollees with projections for 1995 topping 50 million.

The elderly population is increasing. The average age will be older. Growth in the elderly population in the United States has outpaced the non-elderly since 1900, and is projected to continue through the middle of the next century. Most remarkable is the growth in the numbers of people age 85 years and older. By 2000, 13 percent of the population will be 65 or older and one in eight elderly will be over 84 years old. By 2040, 21 percent — one in every five Americans — will be 65 years or older, and there will be almost four times as many very old people, over 85, as there are today.

Life expectancy rates have increased due to changes in public health and medical technology. As the population ages, its need for health care increases. Not only are Americans living longer, but they are requiring more care that is not covered by insurance plans. The Health Care Financing Administration (HCFA) reports that nursing home care costs were $66.3 billion in 1992, up 11 percent over 1991. Medicare accounted for $2.7 billion while Medicaid's portion was $34.4 billion. Private, long-term care insurance contributed about $700 million. That means that the remainder, over $26 billion, was paid for by patients and their families.

1.2 Cost of Health Care and Chronic Conditions: The Major Cause of Illness, Disability, and Death (3)

The number of people who will be unable to go to school, to work, or to live independently due to a chronic condition is projected to reach 20 million by the year 2050. One in five disabled persons needs help with basic daily activities One in five of the nearly 50 million disabled persons in America needs help with basic daily activities (such as bathing, walking, taking medications, preparing meals). A large percentage (42 percent) of these people are under age 65. The number of Americans with chronic conditions is expected to rise in the span of 25 years, the number of people with chronic conditions will increase by approximately 35 million. However only 1 in 4 living in the community with a chronic condition is elderly. Some chronic conditions, such as arthritis, affect the elderly predominantly. Others, such as asthma, affect persons of all ages. Finally, nearly 40 million Americans have more than one chronic condition. The majority of people with more than one chronic condition are middle-aged or older.

Almost 100 million persons living in the community have one or more chronic conditions. The economic costs of chronic conditions are staggering. Chronic care costs make up the largest share of health care dollars spent in the United States. Direct medical costs for persons with chronic conditions represent nearly 70 percent of the $612 billion national expenditures on personal healthcare, in 1990, an estimated $425 billion, can be attributed to persons with chronic health conditions. Adding indirect costs brings the costs of chronic conditions to $659 billion. Almost 65 percent of the direct medical costs for persons with chronic conditions are for hospital care and physician services. Yet in spite of these expenditures, most hospital and physician care remains episodic. That is, services are concentrated on periods when the person with a chronic condition needs acute care, rather than in non-acute phases when care that is preventive or rehabilitative in nature is beneficial. Little investment is made in prevention (potential for genetics)— either efforts to prevent the condition from occurring initially, or to prevent disabilities caused by an existing condition. (Contrast this with the $73 billion spent on education and research in 1990.) The indirect costs for persons with chronic conditions -- in terms of lost productivity -- added $234 billion to the costs. $161 billion in indirect costs were due to premature death and another $73 billion can be attributed to lost productivity due to people being unable to work or to perform their usual activities. These indirect costs do not include the lost productivity of people who were unable to work because of their caregiving responsibilities.

Medical care costs are disproportionately high for persons with chronic conditions. In 1987, while 46 percent of persons with health problems reported one or more chronic conditions, they accounted for 76 percent of the direct medical care costs. Having one or more chronic conditions increases the costs of care. In 1987, annual medical costs per person were over twice as high for persons with one chronic condition compared to persons with acute conditions only ($1,829 vs. $817 in 1987 dollars). Having more than one chronic condition dramatically raises the total costs of care to $4,672 per year — nearly sixfold the per capita costs of persons with acute conditions only.

By 2030, unless new systems of care are created, chronic care alone is projected to cost the U.S. $798 billion (in 1990 dollars) in direct medical and nursing home costs. Also, demand for caregivers is increasing: The chances of becoming a caregiver to someone with a chronic condition are much higher today than ever before -- and the likelihood will increase over the coming decade. The demand for care-giving will increase as the elderly population increases, particularly among those 85 years and older, who are most likely to be disabled by chronic conditions. But the supply is decreasing (potential for homecare). Today, nursing homes care primarily for the frailest people, particularly those with significant mental impairments, strokes, or Alzheimer's disease.

1.3 Home Health Care Initiatives (1, 2). Telemedicine

The need for home health care is being driven by several factors, including: demographic trends; the shift in health care to more cost-effective approaches such as managed care and other risk-sharing systems; and the desire of patients, health care delivery organizations, practitioners, payers, and employers to dramatically curtail costs while still providing quality care. Not surprisingly, a survey of 59 home care chains showed that revenues increased 47 percent from 1992, to $5.1 billion in 1993, with the average chain growing from $83 million to $123 million a year. This is occurring in conjunction with major acquisitions as health care delivery organizations move into new lines of the home care business (Scott, L. 1994). Home care practitioners can make, on average, only four visits a day due to the time spent in transit. Telemedicine offers an effective means of increasing the efficiency of their services while maintaining high-quality personal care for patients, often at a reduced cost.

The increasing health care costs associated with the aging of the population are also creating market opportunities for telemedicine. In 1993, the nation spent $80 billion on long-term care for approximately 7.3 million people. Nursing home care accounted for approximately three-quarters of this spending, with home care making up the bulk of the remainder. Spending in this area is expected to continue its rapid pace as an estimated 10 million to 14 million people will require some form of long-term care by 2020, climbing to 14 to 24 million by 2060. With nursing home care averaging $35,000 per person per year, home care is becoming an attractive alternative, particularly as telemedicine permits the delivery of more sophisticated and less expensive care to the home (CRS 1995).

If we compare the different healthcare alternatives in terms of average cost per day (or per visit), the potential cost-savings that could be realized by delivering care to the home through telemedicine are of enormous proportions. Table 1

Table 1. Average cost of health care alternatives

Alternative	Cost	Reference
Hospital Inpatient	$820	Average expense of community hospital per inpatient day in 1992 (HIAA 1994)

Nursing Home	$100	Average expense of nursing home facility per day in 1993 (CRS 1995a)
Home Care Visit	$74	Skilled nursing visit (CRS 1995a)
Telemedicine to the Home	$30	Estimate for NANC (HealthTech Services Corporation)

2. Information Technology Impact

2.1 The Vision: Some remarks

Remarks by President William J. Clinton in State of the Union Address, February 4, 1997: "We must bring the power of the Information Age into all our schools. Last year, I challenged America to connect every classroom and library to the Internet by the year 2000, so that, for the first time in our history, children in the most isolated rural towns, the most comfortable suburbs, the poorest inner city schools, will have the same access to the same universe of knowledge. Our effort to connect every classroom is just the beginning. Now, we should connect every hospital to the Internet, so that doctors can instantly share data about their patients with the best specialists in the field."

"We must build the second generation of the Internet so that our leading universities and national laboratories can communicate in speeds 1,000 times faster than today, to develop new medical treatments, new sources of energy, new ways of working together. But we cannot stop there. As the Internet becomes our new town square, a computer in every home—a teacher of all subjects, a connection to all cultures—this will no longer be a dream, but a necessity. And over the next decade, that must be our goal" (4).

Remarks by President William J. Clinton in his Inaugural Address, January 20, 1997: "As this new era approaches we can already see its broad outlines. Ten years ago, the Internet was the mystical province of physicists; today, it is a commonplace encyclopedia for millions of schoolchildren. Scientists now are decoding the blueprint of human life. Cures for our most feared illnesses seem close at hand" (5).

Excerpt from the Department of Health and Human Services 1997 Strategic Plan: "The Department's success should be measured against the yardstick of steady, broad-based improvements in the health and economic well-being of individuals, families, and communities, and advances in medicine and public health that benefit the entire world. Achieving good health as individuals and communities is a shared responsibility. To realize its goals, Health and Human Services will develop the policies, tools, and resources that are appropriately national in scope. In an age of information, the National and Global Information Infrastructures will be utilized to efficiently achieve these goals. In order to realize the objectives for improving the nation's health, strengthening the social and economic fabric, and contributing to global health, Health and Human Services will form partnerships of many kinds: with state, local, and tribal governments, with academic institutions, with the business community, with nonprofit and volunteer organizations, and with its counterparts in other countries and international organizations" (6).

Remarks by Vice President Albert Gore: "Applications such as automated claims and payment transactions, telemedicine, computer-based patient records, and on-line access to the latest treatment and prevention information will help improve quality, expand access, and contain costs" (7).

The 1996 Telecommunications Act requires that the Federal Communications Commission (FCC) and the states revise the universal service system based on seven principles, including the principle that schools, libraries, and health care providers should have access to advanced telecommunications services. In addition to these broad principles, additional provisions were made that require the FCC to assure that health care providers serving rural areas have access to telecommunications services "necessary for the delivery of health care" at rates that are comparable to those for similar services in urban areas.

The FCC has authorized $400 million per year in discounts for rural telehealth access. Beginning January 1, 1998, institutions providing rural health care will be eligible for discounted telecommunications rates. This is the result of the FCC authorizing the establishment of a universal service fund to which telecommunications carriers will contribute for the purpose of making equal-cost access available in non-urban areas. The discounts will be available for obtaining toll-free Internet access, discounted rates for T-1 Internet connectivity, and other distance-related telecommunications charges (8).

Also in the balanced budget act of 1997, $200 million were allocated for reimbursement of telemedicine services of Medicare patients and $30 million for a demonstration and evaluation project of telehealth home care services for the elderly with diabetes mellitus living in underserved rural and urban areas (9).

2.2 Technologies for the 21st Century": Implementation actions, infrastructure

The Federal Computing, Information, and Communications (CIC) programs invest in long-term research and development to advance computing, information, and communications in the United States, formerly known as the High Performance Computing and Communications program. The results of these efforts help government departments such as Health and Human Services and its agencies fulfill their research missions by improving health care, teaching our children, providing lifelong training to our workforce, and providing the tools for fighting and preventing disease, drug development, modeling and simulation, and in general for providing an environment that allows for real-time tele-surgery as well as health services research in extremely large populations.

One of the nine committees of the National Science and Technology Council, the Committee on Computing, Information, and Communications oversees research and development (R&D) programs conducted by twelve Federal departments and agencies, and coordinates research in cooperation with U.S. academia and industry. These R&D programs are organized into five Program Component Areas. One of them, the Large Scale Networking working group has been chartered in creating the Next Generation Internet or NGI, an initiative of the Federal Government to foster a scientific and research-oriented, high-speed telecommunications network with more advanced capabilities than are currently available on the public Internet (10, 11).

2.3 Telemedicine -Telehealth Applications

Telehealth: Collectively, the public and private sectors have funded hundreds of telemedicine projects that could improve, and perhaps change significantly, how health care is provided in the future. However, the amount of the total investment is unknown. The General Accounting Office (GAO) (12) identified nine Federal departments and independent agencies that invested at least $646 million in telemedicine projects from fiscal years 1994 to 1996. The Department of Defense (DOD) is the largest Federal investor with $262 million and is considered a leader in developing this technology. State-supported telemedicine initiatives are growing. Estimates of

private sector involvement are impossible to quantify because most cost data is proprietary and difficult to separate from health care delivery costs.

In March 1995, the Vice President directed the Secretary of Health and Human Services to lead efforts to develop Federal policies that foster cost-effective health applications using communications technologies, including telemedicine. Health and Human Services was required to prepare a report on current telemedicine projects, the range of potential telemedicine applications, and public and private actions to promote telemedicine and remove existing barriers to its use. The Vice President also directed that this effort include representatives from several specific departments and agencies. As a result, Health and Human Services organized the Joint Working Group on Telemedicine (JWGT). The National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce in consultation with the U.S. Department of Health and Human Services published this year: "Telemedicine Report to the Congress". This publication contains, among other issues, a working inventory of all Federal projects (13).

As telehealth technology evolves it will become better and cheaper. Consequently, the questions facing telemedicine today involve not so much whether it can be done but rather where investments should be made and who should make them. The solution lies in the public and private sectors' ability to jointly devise a means to share information and overcome barriers. The goal is to ensure that an affordable telecommunications infrastructure, with interoperable software and hardware, is in place and that the true merits and cost benefits of telemedicine are attained in the most appropriate manner.

Telecommunications costs are often a major component of a telemedicine project's overall costs. These costs can be very high. Different telehealth applications require different technologies. As a result, assessing the costs for different combinations of technologies and infrastructures can be a difficult exercise. Another factor affecting the telecommunications cost and ultimately the cost of the total telemedicine system is the uneven distribution of modern telecommunications infrastructure across the country. In those areas where the information infrastructure is underdeveloped, unreliable, or non-existent, the cost of upgrading the infrastructure can be prohibitive. Yet these same areas would most likely benefit the most from telemedicine services. Rural areas in particular have the least access to high quality and high capacity modern telecommunications infrastructure.

The Koop Institute estimates that the U.S. telemedicine market totals $20 billion for telecommunications infrastructure, computer hardware and software, and biomedical equipment. A breakdown of this funding is unavailable. Also, the Koop Foundation, a sister organization to the Institute, is expected to compile an inventory by the year 2000 of private-sector telemedicine projects.

Very few comprehensive studies have been completed to prove that telemedicine delivers cost-effective, quality care and quantified the benefits through a comprehensive cost-benefit analysis.

Within the Department of Health and Human Services, four agencies—the Agency for Health Care Policy and Research (AHCPR), the Health Care Financing Administration (HCFA), the Health Resources and Services Administration (HRSA) and the National Library of Medicine (NLM)—are conducting research in the area of telehealth. The subjects evaluated relate to many topics including cost/effectiveness, reimbursement, rural areas, and transmission of images.

Through information technologies, research agencies such as AHCPR (14) can benefit the providers of health care services, the consumers, and the researchers across the world with

timely and important evidence based studies. Telecommunications through the National and Global Information Infrastructures is the highway of the information; the vehicles of this highway are multiple. Telehealth applications can vary from diagnostics such as teleradiology, to treatment through telesurgery, or telementoring where a specialist surgeon can guide a beginner. Decision support systems, on the other hand, may be accessed from Internet Web sites, and inform and lead the provider with better decision-making tools. Computer-based patient records (CPRs) have an enormous importance since they are the enablers of large population studies, which will lead to better outcomes research, and therefore better cost and medical effectiveness of the health care delivery system. Yet, in order to attain these goals, international collaboration is fundamental. It is needed primarily to establish standards development such as vocabulary or universal language. The growing use of information technology in the health care sector demands that issues of patient privacy and data security again be analyzed to ensure that policies, practices, and procedures for handling health information take into account the vulnerabilities these systems entail **(15).**

3. The USA Information Technology Infrastructure (16)

A highlight of the President's FY 2000 R&D budget is the proposed Information Technology for the Twenty-first Century (IT2) initiative. This research initiative proposes $366 million in increased investments to help advance the knowledge base in fundamental information science and to train the next generation of researchers who will sustain the Information Revolution well into the 21st Century. Building on the Government's previous accomplishments and existing investments in High Performance Computing and Communications (HPCC), including the Next Generation Internet (NGI), and the Department of Energy's (DOE's) Accelerated Strategic Computing Initiative (ASCI), the initiative will extend some existing research and provide opportunities to address new, complementary research topics in three key areas:

- Long term information technology research that will lead to fundamental advances in computing and communications.

- Advanced computing infrastructure as a tool to facilitate scientific and engineering discoveries of national interest .

- Research on the economic and social implications of the Information Revolution, and efforts to help train additional IT workers at our universities .

The IT2 research agenda responds directly to the findings and recommendations of the President's Information Technology Advisory Committee (PITAC), which concluded in a report released in February 1999 that the Federal Government is underinvesting in long term IT research relative to its importance to the Nation. The initiative is garnering widespread support from industry and academia. If approved by Congress, the coordination and implementation of the IT2 initiative will be integrated with the HPCC R&D programs.

3.1 The HPCC R&D programs:

The Federal government coordinates multiagency research in computing and communications through the HPCC R&D programs (formerly known as the Computing, Information, and Communications [CIC] R&D programs). HPCC-coordinated activities are organized into five Program Component Areas (PCAs):

a) High End Computing and Computation (HECC)

b) Large Scale Networking, including the Next Generation Internet (LSN)
c) High Confidence Systems (HCS)
d) Human Centered Systems (HuCS)
e) Education, Training, and Human Resources (ETHR)

a) High End Computing and Computation: HECC

HECC R&D provides the foundation for U.S. leadership in high end computing, promoting its use in government, academia, and industry. HECC researchers are developing computation-intensive algorithms and software for modeling and simulating complex physical, chemical, and biological systems; information-intensive science and engineering applications; and advanced concepts in quantum, biological, and optical computing.

The HECC Working Group (HECCWG) coordinates Federal R&D dedicated to maintaining and expanding U.S. leadership in high performance computing and computation, which includes algorithms, architecture, components, software, and high end mission applications. The HECCWG also promotes cooperation in high end computing and computation R&D among Government laboratories, academia, and industry.

b) Large Scale Networking: LSN

LSN R&D provides the leadership in networking technologies, services, and performance to meet Federal agency mission needs and to develop technologies that enable the future growth of the Internet. Key LSN R&D areas include technologies for highly capable very high speed networks and applications that require such technologies. LSN activities are coordinated by a Working Group and four Teams, each of which includes non-Federal participants:

The *Joint Engineering Team (JET*) coordinates connectivity among the Federal agency networks (FedNets) -- DOE's Energy Sciences network (ESnet), the National Aeronautics and Space Administration's (NASA's) Research and Education Network (NREN), the National Science Foundation's (NSF's) very high performance Backbone Network Services (vBNS), and the Department of Defense's (DoD's) Defense Research and Engineering Network (DREN) -- with the Abilene network (a university/industry partnership), with international networks at the Chicago-based Science, Technology, and Research Transit Access Point (STAR TAP), and with geographically disadvantaged states such as Alaska and Hawaii.

The *Networking Research Team (NRT)* coordinates agency networking research programs, shares networking research information among Federal agencies, and supports NGI networking R&D activities. It provides outreach to end users to promote dissemination of networking research information and to promote coordination among end users and applications developers.

The *High Performance Networking Applications Team (HPNAT)* coordinates Federal R&D in high performance networking applications in science and engineering, weather and the environment, biomedicine, and healthcare.

The *Internet Security Team (IST)* facilitates testing and experimentation with emerging advanced security technologies and serves as a focal point and clearinghouse for application and engineering requirements for security systems.

c) Next Generation Internet: NGI

The 1991 High Performance Computing Act was amended with bipartisan support in FY 1998 by the Next Generation Internet Research Act, which authorizes the NGI Initiative. The NGI Initiative -- coordinated under the LSN Working Group -- is:

Conducting R&D and experimentation in networking technologies in order to add functionality and improve performance. This includes hybrid networks (including satellites and terrestrial components), Internet security, Internet protocol (IP) over wave division multiplexing (WDM), mobile networks, multicast, network management and modeling (for reliability and robustness), optical add-drop multiplexers, quality of service (QoS), and test and evaluation.

Developing two testbeds for system-scale testing and for developing and demonstrating advanced applications. The 100x testbed includes the FedNets and connects about 130 universities and Federal facilities with end-to-end performance that will be 100 times faster than the Internet of 1997; 25 more connections are expected in FY2000. The Defense Advanced Research Projects Agency's (DARPA's) SuperNet, the 1,000x testbed, connects about 20 sites nationwide at speeds that will be 1,000 times faster than 1997's Internet.

Developing and demonstrating revolutionary applications -- in basic science, crisis management, education, the environment, Federal information systems, healthcare, and manufacturing -- and their enabling technologies -- **collaboration technologies, digital libraries, distributed computing, privacy and security, and remote operation and simulation (17).**

d) High Confidence Systems: HCS

HCS R&D is developing technologies for achieving predictably high levels of computing and communications system availability, reliability, safety, security, and survivability. Such systems must withstand internal and external threats and natural disasters. These technologies are needed as we increasingly rely on our information infrastructure to support our financial, **healthcare**, manufacturing, power (electricity, natural gas, nuclear power), and transportation infrastructures.

HCS activities include National Security Agency (NSA) work in active network defense, secure network management, network security engineering, cryptography, and secure communications; DARPA work in information survivability; NSF's computing-communications research; the National Institute of Standards and Technology (NIST) -NSA National Information Assurance Partnership (NIAP); and National Institutes of Health (NIH**) research in protecting patient records and in collaborative technologies for telemedicine.**

The HCS Working Group is preparing an agenda for new research in theoretical foundations, tools and techniques, engineering and experimentation, and pilots and demonstrations, which has contributed to the IT2 initiative.

e) Human Centered Systems: HuCS

HuCS R&D focuses on improving the interactions among humans, computing systems, and information resources. Federal investments in HuCS R&D benefit scientists, physicians, engineers, educators, students, the workforce, and the general public in dozens of disciplines, including **biomedicine**, defense, manufacturing, **education**, library sciences, law enforcement, weather forecasting, and **crisis response**. Areas of HuCS research are:

Knowledge repositories and information agents, including the multiagency Digital Libraries Initiative Phase Two; the National Library of Medicine's (NLM's) **Visible Human and Unified**

Medical Language System (UMLS) projects; and DARPA's Text, Radio, Video, and Speech program supporting information extraction for battlefield awareness

Multimodal human-computer interfaces, including NSF's Speech, Text, Image, and MULtimedia Advanced Technology Effort (STIMULATE) and other **speech recognition technologies** developed by NIST, DARPA, and NSA

Multilingual technologies, including Spanish language interfaces developed by NSF, DARPA, and other U.S. and international organizations

Universal access, including the Web Accessibility Initiative to assure Internet accessibility to all people, sponsored by NSF, the Department of Education (ED), several U.S. corporations, and the Rehabilitation Research

Visualization, virtual reality, and robotic tools, including "Virtual Los Angeles," NSF's realtime visualization system for large scale urban environments, **NSF's robotic surgery, NASA's "software scalpel" and computerized breast cancer diagnostic tools,** and NOAA's Virtual Worlds

f) Education, Training, and Human Resources: ETHR

ETHR R&D supports education and training in computing, communications, and information technologies from K-12 through postgraduate training and lifelong learning. ETHR facilitates the development of software learning tools, modeling of education and learning, research on cognitive processes, and demonstrations of innovative technologies and applications. Activities include NSF's studies of learning and intelligence in systems, DOE's Computational Science Graduate Fellowships, NIH/NLM's **biomedical informatics** training grants, and NASA's Learning Technologies Project for using its vast data collections.

3.2 Computer-Based Patient Records (CPRs) & Clinical Decision Support Systems [CDSS] (18)

The computer-based patient record (CPR) is a powerful tool for organizing patient care data to improve patient care and strengthen communication of patient care data among health care providers. The CPR is a necessary tool for supporting clinical decission making that is enhanced when it retrieves applicable medical knowledge. Evidence exists that the use of CPR systems can change both physician behavior and patient outcomes of care. The CPR can also be an instrument for building a clinical data repository that is useful for collecting information about which medical treatments are effective in the practice of medicine in the community and for improving health care generally. Additional applications of CPR data beyond direct patient care can improve population-based care, bringing personal and public benefits and issues that must be addressed.

A CPR is a collection of data about a patient's health care in electronic form. The CPR is part of a system that encompasses data entry and presentation, storage, and access to the clinical decision maker--usually a physician or nurse. The data may be entered by keyboard, dictation and transcription, voice recognition and interpretation, light pen, touch screen, hand-held computerized notepad (perhaps wireless) with gesture and character recognition and grouping capabilities, and other means. Entry also may be by direct instrumentation from electronic patient monitors and bedside terminals, nursing stations, analysis by other computer systems

such as an EKG system, a laboratory autoanalyzer or any clinical imaging digital systems, or another provider's CPRS.

Patient care data collected by a CPRS may be stored in one facility (centrally), in many places (distributed) or even on an optical card, to be retrieved at the request of an authorized user through a data base management system. The CPR may present data to the physician as text, tables, graphs, sound, images, full-motion video, and signals. The CPR may also point to the location of additional patient data that cannot be easily incorporated into the CPR. The primary function of the CPR is to support the delivery of medical care to a particular patient. Serving this purpose, ideally the CPR brings past and current information about a particular patient to the physician, promotes communication among health care givers about that patient's care, and documents the process of care and the reasoning behind the choices that are made. Thus, the data in a CPR should be acquired as part of the normal process of health care delivery, by the providers of care and their institutions.

3.3 Clinical Decision Support Systems .

Another function of the CPR is to enable a clinical decision support system (CDSS)--computer software designed to aid clinical decission making--to provide the physician with medical knowledge that is pertinent to the care of the patient. Diagnostic suggestions, testing prompts, therapeutic protocols, practice guidelines, alerts of potential drug-drug and drug-food reactions, treatment suggestions, and other decision support services can be obtained through the interaction of the CPR with a CDSS. Existing knowledge about potential diagnoses and treatments, practice guidelines, and complicating factors pertinent to the patient's diagnosis and care are needed at the time treatment decisions are made. The go-between that makes this link is a "knowledge server," which acquires the necessary information for the decision maker from the knowledge server's information sources. The CPR can provide the knowledge server proper context, i.e., specific data and information about the patient's identification and condition(s).

Knowledge sources include a range of options, from internal development and approval by a hospital's staff, for example, to sources outside the hospital, such as the evidence-based practice reports sponsored by the Agency for Health Care Policy and Research, the Physicians Data Query program at the National Cancer Institute, other consensus panel guidelines sponsored by the National Institutes of Health, and guidelines developed by physician medical and specialty societies. Additional sources of medical knowledge include the medical literature, which can be searched for excellent review articles and for particular subjects using the "Grateful Med" program to explore the Medline literature data base available through the National Library of Medicine.

Medical Logic Modules and Nomenclature.

If medical knowledge needs are anticipated, acquired beforehand, and put into a medical logic module (MLM), software can provide rule-based alerts, reminders and suggestions for the care provider at the point (time and place) of health service delivery. Because MLMs are independent, the presence or absence of one MLM does not affect the operation of other MLMs in the system. If done carefully and well, MLMs can be incorporated in the CPRSs of different hospitals. However, this requires much more than using accepted medical content and logical structure. If the medical concept terminology (the nomenclature used by physicians and by the CPR) differs among hospitals, the knowledge server may misinterpret what is in the CPR, apply logic to the wrong concept, or select the wrong MLM, or the MLM may be misinterpreted by the physician receiving its message. For widespread use of CDSSs, a uniform medical

nomenclature, consistent with the scientific literature is necessary. Medical knowledge is information that has been evaluated by experts and converted into useful medical concepts and options. For CDSSs to search through a patient's CPR, identify the medical concepts, and retrieve appropriate patient data and information, the CDSS has to recognize the name used by the CPR for the concept. Providing direction for coupling terms and codes found in patient records to medical knowledge is the goal of the Unified Medical Language System (UMLS) project of the National Library of Medicine.

Research Data Bases.

CPRs can have great value for developing research data bases, medical knowledge, and quality assurance information that would otherwise require an inordinant amount of manual resources to obtain in their absence. Evidence-based studies and other forms of outcomes research can provide important cost and medical effectiveness information to both care givers and consumers as well as administrators or insurers involved in payment policies.

System security becomes important as more and more data for patient treatment and other uses is exchanged through national networks. Not only does this issue relate to purposeful violations of privacy, but also to the accuracy of medical knowledge for patient benefit. If the system fails to transmit accurately what was sent to a physician--for example, an MRI, a practice guideline, or a clinical research finding--and if a physician's judgment and recommendation is based on a flawed image or other misreported medical knowledge, who bears the legal responsibility for a resulting bad, avoidable patient outcome?

Privacy will play a major role when including genetic information in the CPR. While this information has the potential of helping prevent disease or delay it's offset, if privacy is not protected patients could loose their insurance, they could not get insurance (or get very expensive insurance) because of "prior conditions", they could loose their jobs if their employers find out information and perceive them as potential "expenses", etc.

The development of a National Information Infrastructure (NII) to bring widespread benefits to the users of CPRSs must address many of these issues. Early in 1993, the Federal government articulated the vision of an NII [Clinton and Gore, 1993], followed by the creation of a White House Information Infrastructure Task Force (IITF) to identify the obstacles to an NII and propose Federal policies to overcome them. The NII involves high-speed computers, broad national data networks, community networks, supporting software, and human interaction, linked together for the good of the nation.

In late 1993, the IITF identified four areas in which it expected NII benefits: telemedicine, unified electronic claims, personal health information systems, and computer-based patient records. In 1994, the IITF expanded its vision of NII applications in health care and raised issues that must be addressed to bring about this vision.

A part of the NII, the Federal High Performance Computing and Communications (HPCC) Program was established in 1991 to expedite the development of high-performance computers and networks. In 1994, the HPCC expanded its scope to accelerate the development and deployment of NII technologies. An HPCC national challenge in health care aims to improve health care system quality and efficiency. This national challenge envisions linking health facilities to share medical data and imagery, visualization technology, virtual reality applications, patient treatment in remote areas, medical knowledge access, and database technology for storing and obtaining patient care data while safeguarding personal privacy.

The successful delivery of health services to citizens has always depended on adequate flows of information and knowledge. The emergence of new global epidemics and rapid increases in medical progress have rendered health issues more and more complex. Telecommunication and Informatics (i.e. Telematics) technologies offer the possibility of mastering these complexities and are thus becoming all the more relevant to the health sector, since they allow rapid access to appropriate information and knowledge.

4. Global Healthcare Applications (19): A global Project

There is a strong tradition of international co-operation in the health field including for instance, intergovernmental co-operation on public health activities with WHO. Such international co-operation is also exemplified by the spread and strengthening of world-wide co-operation between health professionals and non-governmental organizations in fields such as cancer or cardiovascular diseases. Pooling of information and knowledge at a global level has allowed an increase in the efficiency of both epidemiological or clinical studies and in diagnosis and treatment of these major scourges.

4.1 Expected impact and Objectives

Effective partnerships between governments and hospitals, healthcare research and teaching organisations, non-governmental organizations and international organizations (notably WHO), as well as service providers will be built on and strengthened.

The objective of the project is to improve existing international co-operation through the deployment of modern cost effective and user-friendly multimedia telematics applications, and to demonstrate that they can contribute to better health for citizens. Interoperable solutions that protect the confidentiality of patient information will be prerequisite.

4.2 Scope of sub-projects

Six sub-projects have been retained at this stage. These sub-projects will help to improve the prevention and treatment of major scourges such as cancer and cardiovascular diseases, thus limiting related morbidity and mortality and enhancing the well-being of citizens. They will also facilitate the sharing of relevant experience and knowledge amongst health professionals. Success will open the way to similar collaborations to fight other diseases and improve health across the world. Taken together, the six sub -projects will serve to illustrate the potential of a global information society for health, and its benefit to citizens across the world.

The six subprojects are:

1. *Towards a global public health network*. The sub-project will make it possible for health professionals and institutions to access publicly available information relevant to the control of public health hazards and of infectious diseases. Standard personal computers will use routine data transmission (less than 64 kbit/sec) to connect to networks. Canada, the United States, and the European Commission have indicated a particular interest in co-ordination of this sub-project. WHO will also be closely involved.

2. *Improving prevention, early detection, diagnosis and treatment of cancer* through global networks.

3. *Improving prevention, diagnosis and treatment of cardiovascular disease* through global networks. The sub-projects will link existing distributed databases to allow health professionals and institutions to share knowledge on best practice for prevention, screening, quality control and treatment of these diseases. Leading cancer and cardiovascular centers across the world will also be linked to validate the use of broad band networks for global co-operation in these fields. From a technological perspective, standard personal computers, multimedia workstations and broad-band transmission (2 mbit/sec minimum) will be required. The networks will allow discussion on strategy and treatment protocols as well as consultation for a particularly difficult patient. This could be gradually extended to a large number of hospitals. These sub-projects should use the same intercontinental broad band connections as those to be established for the G7 "Global interoperability for broad band networks " Project. Canada, France and the European Commission have indicated an interest in co-ordination of sub-project 2, and Italy in co-ordination of sub-project 3.

4. *A 24 hour multilingual telemedicine surveillance and emergency service*. The sub-project will explore the feasibility of interconnecting major public and private telemedicine centers around the world with a view to offering 24 hour multilingual telemedicine services. Multimedia equipment linked via satellite will be important in this sub-project. France and Italy have indicated their interest in co-ordination.

5. *Enabling mechanisms for global health networks.* Pre-requisites for effective international healthcare networks include harmonization of approaches with respect to health nomenclature, standards, privacy and security of data and the development of user friendly access tools and on-line translation services. This sub-project is designed to strengthen existing approaches and is relevant to all technologies commonly used in healthcare. Germany, the United Kingdom and the European Commission have indicated interest in co-ordination of this sub-project. WHO will also be closely involved.

6. *International harmonization of data cards in healthcare.* Data cards are being used ever more widely for healthcare applications. The sub-project will extend the existing European co-ordination activities to other G7 countries, involving those that play a key role in the emergence of interoperable solutions. Germany, France and Italy are particularly interested in co-ordination of this sub-project.

Implementation. During 1995, co-ordinators for sub-projects will develop a consensus on the content of the projects as well as a framework for their operational implementation. In the case of sub project 5, "Enabling mechanisms for global health networks" further meetings at the expert level will be needed to determine whether an initiative in this area will advance the goals of standardization and interoperability.

5. Conclusions

Recently we have argued that this perhaps will be one of the greatest events for global health ; the creation of information systems which are 100 to 1,000 times more reliable and cost-efficient than those which currently exist. Improved health and reduction of health care costs on the electronic superhighway can best be achieved through prevention. Much has been written concerning the interface between and telecommunication systems and health care. The two dimensions which have most been discussed have been that of the use of these networking systems for image transmission (i.e. NMR, CT scans) (20). The second area has been to discuss

the potential health care cost savings with regard to the use of these telecommunication systems. It has been estimated, for example, that in the United States alone, the application of these systems could reduce health care expenditures by as much as 36 million dollars (21). The cost savings are brought about through a reduction of physician visits by providing information services through the electronic superhighway, improved efficiency of physician's and other medical care personnel's time and eliminating the inefficient paper based medical record system efficient through the use of electronic storage. What has been neglected in these discussions has been the critical role of prevention in reducing health care costs and how the rapid, accurate transmission of information can lead to better and more cost-effective systems. Prevention can yield markedly improved health with potentially and even greater savings of costs than the 36 billion dollars.

6. References

1. Council on Competitiveness, *Highway to Health: Transforming the US Health Care in the Information Age*, http://www.compete.org/bookstore/book_index.html , March 1996.

2. Fitzmaurice, Michael: *Puting the Information Infrastructure to Work Health Care and the NII*, Department of Health and Human Services http://nii.nist.gov/pubs/sp857/health.html 1994.

3. The Institute for Health & Aging, University California, San Francisco for The Robert Wood Johnson Foundation: *Chronic Care in America: A 21st Century Challenge*; Princeton, New Jersey , November 1996

4. William J. Clinton, *1997 State of the Union Address, Remarks by the President in State of the Union Address*, United States Capitol, http://www.pub.whitehouse.gov/white-house-publications/1997/02/1997-02-04-state-of-the-union-address.text , February 4, 1997.

5. Inaugural Address of President William J. Clinton, The White House, Office of the Press Secretary, http://www.pub.whitehouse.gov/white-house-publications/1997/01/1997-01-20- presidents-inaugural-address.text , January 20, 1997.

6. The Department of Health and Human Services (HHS) can be found at: http://www.hhs.gov/

7. AMIA Policy Statement by its Board of Directors. A Proposal to Improve Quality, Increase Efficiency, and Expand access in the US Health Care System. *JAMIA*; 4: 340-341, Sep./Oct 1997.

8. An FCC document, "*Frequently-Asked-Questions on Universal Service*," may be found at the following URL: http://www.fcc.gov/Bureaus/Common_Carrier/Public_Notices/1997/da971932.html Also a selection on a broader "Health Care and the FCC" home page at http://www.fcc.gov/healthnet/

9. Balanced Budget Act of 1997. Conference Report to accompany HR 2015, Sec. 4206. Medicare reimbursement for telehealth service and Sec. 4207. Informatics, telemedicine, and education demonstration project. It can be found at: ftp://ftp.loc.gov/pub/thomas/c105/h2015.enr.txt

10. The National Coordination Office for Computing, Information, and Communications has a Web site containing information about the Next Generation Internet, located at: http://www.ccic.gov/ngi/ . For other types of information, go to: http://www.ccic.gov

11. Smith, J. and Weingarten, F. (editors): *Research Challenges for the Next Generation Internet, Computing Research Association (CRA)*; it can be found at the following Web site: http://www.cra.org , May 12-14, 1997.

12. United States General Accounting Office (GAO): *Telemedicine: Federal Strategy Is Needed to Guide Investments*, may be found at the following Web address: http://www.gao.gov/AIndexFY97/abstracts/n397067.htm , February 1997.

13. National Telecommunications and Information Administration (NTIA) / Department Of Commerce (DOC): *Telemedicine Report to the Congress* may be found at the following URL: http://www.ntia.doc.gov/reports/telemed/index.htm , January 31, 1997.

14. The Agency for Health Care Policy and Research (AHCPR) can be found at: http://www.ahcpr.gov/

15. "*For the Record—Protecting Electronic Health Information*," Committee on Maintaining Privacy and Security in Health Care Applications of the National Information Infrastructure, Computer Science and Telecommunications Board, National Research Council, National Academy Press, March 1997.

16. High Performance Computing and Communications: "*Information Technology Frontiers for a New Millenium*." A Report by the Subcommittee on Computing, Information, and Communications R&D, Committee on Technology National Science and Technology Council, April 1999.

17. Kun, L : *The Global Health Network in the 21st Century: "Telehealth, homecare, genetics, counter-bioterrorism, security and privacy of information, do we need it and are we ready for it?*" HPCN Conference, ISIS - ITAB'99, Amsterdam, Netherlands, April 1999 .

18. Fitzmaurice, Michael: *Computer Based Patient Records, Department of Health and Human Services, The Biomedical Engineering Handbook*, Ed. J. Bronzino, Chapter 177: pp 2623-2634, CRC Press 1995.

19. LaPorte, Ronald E: *Towards a Global Health Network*, University of Pittsburgh Pittsburgh, PA, http://www.pitt.edu/HOME/GHNet/GHNet.html , August, 1994.

20. LaPorte RE, Akazawa S, Hellmonds P, Boostrom E, Gamboa C, Gooch T,Hussain F, Libman I,Marler E, Roko K, Sauer F, Tajima N.: Global public health and the information superhighway. *British Medical Journal* 1994; 308:1651-1652.

21. Schiller AE. *Telecommunications: Can it help solve America's Health Care Problems?* Report prepared by the Arthur D.Little Company, Cambridge, Massachusetts. 1992.

22. Lasker, Roz D.,.B. L. Humphreys,W. R. Braithwaite.; *Making a Powerful Connection: the Health of the Public and the National Information Infrastructure* Report of the U.S. PHS Public Health Data Policy Coordinating Committee 7/6/95

Session 4

Design and Operation of Health Care Facilities

Hospital Facilities As Work Environments:

Evaluation Studies in Seven Finnish General Hospitals

by

Martti Teikari, D.Tech., Lic.Med.
National Research and Development Centre for Welfare and Health
STAKES
Helsinki, Finland

Content

Summary

The research project Quality of the Physical Working Environment of Hospital Personnel, conducted at the Helsinki University of Technology, comprises a staff-focused comparative post-occupancy evaluation of the physical working environment in the operating, radiology, and emergency departments in seven Finnish general hospitals. The emphasis is on the actual use of the facilities, how they conform to the requirements and expectations of the present users, and what subjective emotional responses the characteristics of the environment evoke. A rich collection of qualitative descriptions and quantitative appraisals of the facilities was obtained with the use of a questionnaire directed to all workers in the departments. In total, 838 respondents from 18 departments participated in the survey. The data was completed with interviews of the users, direct observation of the functions, and instrumental measurements of the physical characteristics of the environment.

On the level of individual spaces, the unsatisfactory features of the environment fell into three main categories: utility, comfort, and control of privacy. The most common cause of negative feedback in every department was clearly the lack of space in individual rooms.

On the departmental level, the spatial structure was identified as the most invariant predictor of user satisfaction. Three basic layout features were repeated in the most positively evaluated departments: quadratic form, grid-like structure of the corridor system, and functional zoning. These features also seem to diminish experiences of stress caused by long distances.

The conclusion of the study was that staff dissatisfaction with the working environment was essentially determined by the amount of repetitive encounters with features that require alteration of the preferred action plans. Some rare totally unsuccessful details may dominate the appraisal of the environment.

The results demonstrated that user participation in the planning and improvement of the environment does have a positive effect on environmental satisfaction. Dissatisfaction with the job itself or with the management often coincided with negative appraisals of the environment, but the direction of causality may not be inferred.

Key words: hospital design, evaluation, work environment

1. INTRODUCTION

Hospitals are institutions that people usually hope to visit as seldom as possible. Negative associations of illness, pain, and end of life are easily attributed also to the physical buildings themselves. To benefit the health and well-being of the patients is the only justification for the existence of hospitals, and the best for the patients should be of primary concern also in the planning of hospital buildings.

But a hospital is also a working place for a large number of people. It is a complex conglomerate of interdependent and yet rather independent functional units, each with its own special functions, organization, hierarchy, and intricate social relationships.

A hospital can never be made to be like the patient's normal environment. Hence, it is more essential in hospital design to consider first the needs of the hospital staff to ensure that their physical and mental resources are preserved for direct human interaction with the patients. Regardless of the rapid developments in medical technology, this interaction is still an essential element in the quality of hospital care. On the average, an individual is hospitalized only a few times during his or her life and treatment periods are becoming ever shorter. The effects of possibly negative experiences encountered in the hospital environment are consequently only temporary for the patient, but unsatisfactory conditions in the physical working environment can become a source of constant strain to the staff. It must be emphasized here that the above-mentioned applies exclusively to general acute care hospitals. Institutions for long-term care are homes for the patients and should be designed accordingly.

In Finland, a number of new general hospitals, to cover the needs in the various parts of the entire country, have been built during the last forty years. They range from smaller regional hospitals to university hospital complexes. Also remarkable enlargements and renovations of old hospital buildings have been realized. As this most active period has come to an end, it has become evident in different connections that the designed facilities do not in every case conform to the expectations of the users.

The research project "Quality of the Physical Working Environment of Hospital Personnel", financed by The Academy of Finland, was carried out in the Research Institute for Health Care Facilities SOTERA at the Helsinki University of Technology, Faculty of Architecture, in 1991-94.

The principal aim of this study was to reach an understanding of the worker–environment relationships in hospital settings through identification of invariances and differences in the perceptions of the physical working conditions and the non-physical work-related factors in different hospital departments.

Whenever the hospital environment is discussed, the most often cited phrase is the statement of Florence Nightingale: "*...the very first requirement in a hospital [is] that it should do the sick no harm.*"[25] But, a hospital shouldn't do harm to the staff either.

2. PERSON–ENVIRONMENT RELATIONSHIP

The physical environment affects the workers, directly and indirectly. In the opposite direction, the built environment housing any larger organization provides usually only few possibilities for the individual worker to directly influence the relationship with the surrounding environment when compared to people's other action milieus, like residential or recreational settings. A hospital building is necessarily quite rigid for rearrangements and other changes. Thus, the physical working environment is rather deterministic and choice less for the behaviour of the hospital workers, as it is for the patients also.

In hospitals, very few workers are performing their tasks continuously in one work place. Work is characterized by moving around in a space or group of spaces, which usually have multiple changing users. Occupation of any space by a certain individual or group is usually temporary, e.g., the occupation of an operating theatre by the team during the operation. Permanent reservation of a space to be used only by one person, enabling individualization of the

[25] F. Nightingale: Notes on Hospitals 1859, cited, for example, in Pevsner (1).

environment and the use of status signs is only possible in administrative and clerical work spaces.

The key element in the analysis of the human–environment interface is *purposive action*, i.e., instrumental activity in pursuit of some predetermined goal. According to the action theory (2; 3), goal-oriented behaviour is directed and controlled by specific cognitive *plans*, at least on a general level. Information perceived from the environment guides further actions, functioning as a source of feedback checking the relevance of the perceptions and allowing the adjustment of the plans (4; 2; 5). In other words, individuals are constantly trying to learn about the surrounding environment, to be able to behave appropriately in it and if possible to control it, and the more one learns about the environment in the course of time, the more efficient is one's interaction with the environment (6; 7).

2.1 Direct and mediated effects of the physical environment

The features of the physical environment may *directly* influence the worker's behaviour and well-being (8; 9), without the individual's assessment or interpretation of these features. The direct effects manifest themselves principally by physiological changes, fatigue or injuries.

The environment may necessitate certain action patterns and prevent others, thus delimiting the assortment of choices. Tight spaces, narrow passages or inappropriate fittings may force the worker into awkward postures or strenuous movements. Long distances between spaces or lacking connections between them require long walking journeys, cause delays and also regulate social interaction and communication. Ambient conditions like extreme temperatures, polluted air, loud noise or bad lighting, which are clearly outside of reasonable physiological limits, may directly prevent working or make it unbearable, at least for longer periods. Certain hazardous features of the physical environment may become apparent only by acute accidents, like falling on a slippery floor. Hazards like toxic chemicals, ionizing radiation or microbiological risks include acute or long-term effects that may even be impossible to be perceived. Otherwise, the perceived features lead concomitantly with the direct effects to indirect or mediated psychological effects.

The *indirect* or *mediated* effects of the physical environment depend on the individual perceptions and subsequent cognitive evaluations and interpretations of the objective environment.

Perception of the environment is the elementary phenomenon that is dependent on the objective environmental conditions that exist independently of the individual, and differences in individuals' personal characteristics and previous experiences. Cognitive appraisal of the perceptions may prove the environment to be within an optimal range of stimulation. If this is not the case, the individual's adaptational resources are taxed and possibly exceeded, leading to the employment of coping strategies. If the attempted coping strategies are successful, adaptation or adjustment occurs. This may be followed by negative after-effects, such as lowered frustration tolerance, fatigue, or reduced ability to cope with the subsequent stressors, but alternatively also by improved means to cope with the next occurrence of the same stressor through learning. If coping is not successful, arousal and stress will continue, leading eventually to the more serious after-effects.

2.2 The requirements for a good working environment

The principal requirement for any environment is that it should suit its users. In discussions about the built environment, many concepts with the same basic content have been used to describe the ideal relationship between an individual and the environment: person–environment fit (PE–Fit); compatibility; congruence; habitability, etc.

The basic prerequisite for pleasant working conditions, i.e., a good person-environment compatibility, is surely a certain level of physical safety and comfort, determined by the physiological need for shelter from the forces of nature. Yet, hospitals may function with considerable success in the most primitive conditions, like tents in catastrophic areas, provided that the conditions are within somewhat reasonable physiological limits, and appropriate instruments, supplies and pharmaceuticals are available.

According to the instrumental approach, the other most important condition is that the environment *facilitates*, or at least does not hinder, *the attainment of goals* important for the worker and produces as much satisfaction and as little stress as possible (9;11; 12; 13; 14). In Sommer's words, "*hot only must form follow function, but it must assist it in every way*" (15). Becker (9) distinguishes, besides this direct activity-support system function, the second-order effects of the physical working environment: the environment acts as a catalyst. This implies that the physical setting sets in motion a series of events, behavioural reactions, and individual adaptation strategies, and not only the intended or expected behaviours.

It must be noted that this approach is not solely limited to the physical barriers for goal attainment. Even the appearance, symbolic contents, social regulation, and other features not directly physically hindering task performance may indirectly, through discomfort, dislike, or distraction, affect the worker and, e.g., disturb involvement and concentration necessary for the accomplishment of work tasks. Yet, it would be indefensible professional negligence if a designer would overlook for aesthetic reasons the requirements for functionality and direct activity-support in the planning of a physical working environment.

Controversy of requirements

In the user-focused approach to environmental planning, the primary requirements are set by the users, their values, actions and goals in the environment. Nevertheless, the user requirements for hospitals are not so easily defined. The workers are only one user group, together with patients and visitors, and all the individual users have their personal preferences.

The requirements a hospital is expected to fulfill have strong ties to the political and cultural conditions in a country, including, e.g., the state-of-the-art of applied medical science and the economic resources available. The construction of a curative health care system based on general hospitals is essentially a socio-political decision in a country, but there are unfortunate examples of high technology hospitals built merely as monuments for the political government in countries where the infrastructure of primary health care is largely undeveloped.

As is clear, there are, in addition to the primary users, also several other interest groups and actors connected to the design, construction and running of hospitals. These groups have their requirements and values, even if some of them may never use or even visit the facilities (16). Governmental regulation influences hospital building through resource allocation and building codes; architects have their own predilections in composing spatial relationships and aesthetic features of the building; structural performance, and construction techniques and the technology

controlling the ambient conditions depend on the planning engineers. The main interests of the hospital administration are effectiveness, low running costs, and flexibility. The acquisition of medical technology is strongly influenced by the medical profession, international trends and the manufacturers' marketing efforts.

In several matters, the demands of the different user groups may be in opposition to each other, requiring compromises. Such issues may be, for example, ease of patient supervision versus privacy; the uncomplicated and efficient accomplishment of work tasks versus design solutions required by the rigid rules of hospital hygiene; or the ease in cleaning of surface materials versus "hospital-like" appearance and high reverberation.

2.3 Quality requirements for hospitals as working environments

The quality requirements for hospital working environments, which were formulated as one starting point of this study, are presented in Table 1. The requirements are categorized into three principal groups: *functional*, *technical*, and behavioural or *psychosocial* factors. This categorization follows the Vitruvian tradition, as applied by Preiser (17); many other classification systems have also been presented (18; 19; 20). Such vital factors as the location of the hospital building in relation to the surrounding community and the landscape, the cost of running and maintenance, or the general requirement for flexibility are left without consideration, but the proposed three classes include all the factors in the environmental quality that have direct reference to the individual workers inside the hospital. The significance of the different factors will vary enormously depending on the purpose and use of any single space, from unit to unit, and for different occupations.

The functional requirements refer to the practicality and ergonomic appropriateness of the physical environment. The technical requirements relate to the physical, chemical, and microbiological effects of the structures and technical service systems on the safety, health and comfort of the occupants. Psychosocial requirements, referring to the behavioural, visual and symbolic aspects of the environment, are essentially resultant of the two former categories.

The different factors may be considered separately, but in reality they all act together and only a balanced entirety will fulfill the three basic conditions for a good physical working environment: *practicality*, *safety*, and *comfort*.

Table 1. Quality requirements for hospital facilities as working environments.

FUNCTIONAL REQUIREMENTS
Spatial dimensions
• Appropriateness of the amount, size, and configuration of the rooms and other spaces for the planned functions, considering the workers and their tasks, the equipment, supplies and appliances in use, and the movements performed in the room.
• Appropriate relation between the total areas of different functional space groups (e.g., the storage, maintenance, and hygiene spaces in relation to the main activities).
• Sufficient width of the traffic passages and openings, considering both the persons and the different equipment used in transport and as moving aids, like patient beds and trolleys, wheel chairs, walking frames, carts for goods transport, movable instrument and operation tables, etc., including their mobility and turning radius. Traffic areas are not to be used for storage.

Location of functions

- Location of the central and connected functions conveniently near each other, and the mutually disturbing functions far from each other or sufficiently isolated. Through passage rooms should be avoided.
- Clear and appropriate conduct of traffic flows by grouping of spaces, location of traffic routes, and orientation of traffic openings.

Furniture, fittings and equipment

- Appropriate, sufficient, and properly located and dimensioned furniture, fittings, and in each case necessary special equipment. Flexibility must be considered.

TECHNICAL REQUIREMENTS

Building parts and structures

- Firmness and tightness of the building structures.
- Sufficient isolating properties, durability, technical appropriateness, ease of use, and reliability of the mechanisms of doors, windows, hatches, etc.

Materials

- Appropriate and pleasant surface materials, considering the mechanical (durability, cleanability; anti-slipperiness and low rolling resistance of floors), visual (colour, glare, roughness, texture), and acoustic (low reverberation) properties.

Indoor climate

- Comfortable and steady temperature in respect of the activity in the room space and the varying heat loads from equipment; room-specific control or cooling when necessary.
- Free from draught.
- Sufficient ventilation in respect of the amount of persons using the room and the chemicals, particles, and odours discharged in the air.
- Comfortable and appropriate air humidity (prevention of irritation symptoms and static electricity); room-specific control or additional humidification when necessary.

Acoustics

- Lowest possible noise level; isolation of noise producing equipment.
- Sufficient structural sound isolation between spaces.
- Prevention of inconvenient audibility by location and separation of functions.
- Minimized reverberation.

Lighting

- Lighting intensity, colour temperature and colour rendition corresponding to the activities.

- Avoidance of reflections, glare, and strong contrasts.
- Appropriate locations and easy adjustment of spot lights.
- The highest possible amount of spaces with natural lighting.

Technical installations

- Amount, locations, and technical properties of the installations (plumbing and sewage; electrical, alarm, computer, and telecommunication; medical gases and vacuum; and technical fittings for special medical equipment) corresponding to their use; ease of adjustment.

PSYCHOSOCIAL REQUIREMENTS

Environmental image

- Aesthetic attractiveness of architectural composition, material choices, and colours.
- The symbolic contents of the environment compatible with the use and users of the premises.
- Ease of orientation, visual elements promoting environmental control; visual connection to the outside.

Cooperation and interaction

- Promotion of team work and patient focus by the dimensioning and location of spaces and through communication arrangements.

Privacy

- Opportunity, when needed, for undisturbed individual working and confidential conversations.
- Sufficient amount of storage space for personal use.
- Opportunity to add personal features to the environment.

Restoration

- Opportunity for rest, withdrawal from work tasks, bodily relief and hygiene in appropriate premises.

---

3. MATERIAL AND METHODS

The study is a staff-focused evaluation of selected hospital departments and includes the typical features of a *diagnostic post-occupancy evaluation* (POE) study as defined by Preiser (17). It was carried out as a multiple case comparison of the facilities and is limited to the operating and anaesthesia departments, radiological departments, and emergency departments of the target hospitals. The chosen departments are all essential functional units of any general hospital. Patients stay in these units at the most only a few hours during their hospital visit. For this reason, the design requirements for the facilities are primarily set by the diagnostic and treatment procedures performed by the staff. The methodological and technological developments may change the contents of these processes and thereby the requirements set on the premises.

Regardless, these units will most probably continue to be central elements in general hospitals in the future. The inpatient wards are deliberately excluded from the scope of this study because of the abundance of ward studies and also because the use of wards is rapidly changing, making part of the traditional wards in general hospitals redundant. The study concerns only the inside features of the selected hospital departments and the functions in them.

The target departments for the study were chosen among those Finnish general hospitals for which whole new units have been constructed and taken into use during the last ten years (Table 2). Six examples of each department type were selected from a total of seven hospitals.

Table 2. Target hospitals of the study.

Hospital, no. of beds, year of completion, architect	Included departments		
	Operating	Radiology	Emergency
KUOPIO UNIVERSITY HOSPITAL, Kuopio (776 beds) Enlargements 1983, 1985. Arch. office Kari Virta.	●	●	●
TAMPERE UNIVERSITY HOSPITAL, Tampere (1.162 beds) Enlargement 1989. Arch. office Veijo Martikainen.	●	—	●
NORTH CARELIA CENTRAL HOSPITAL, Joensuu (618 beds) Enlargement 1989. Arch. office Veijo Martikainen.	●	●	●
CENTRAL H. OF CENTRAL FINLAND, Jyväskylä (732 beds) Enlargements 1985, 1990. Arch. office Railo&Leinus.	●	●	—
LAPLAND CENTRAL HOSPITAL, Rovaniemi (371 beds) 1988. Rovaniemi General Arch. Office/ Reino Koivula & Co	●	●	●
MIKKELI CENTRAL HOSPITAL, Mikkeli (350 beds) Enlargement 1985. Arch. office Marja and Erkki Wirta.	●	●	●
PEIJAS HOSPITAL, Vantaa (113 beds) 1990. Vantaa Architecture Ltd/ Pekka Terävä	—	●	●

The research methods of the study included questionnaires and interviews, direct documentation through observation and measurements, research of archival data and activity statistics, and literature review. The main aim has been to gather both quantitative and qualitative feed back data concerning the quality of the physical working environment in daily use. This data has then been compared with the objective and subjective data collected by the researcher and to the general knowledge of hospital planning and person–environment relationships.

The principal method for collecting information from the staff was a standardized questionnaire, developed specifically for this study. It was directed to all persons and staff categories working in the researched departments, without sampling, and the form was identical for all the respondents in any single department. The questionnaire consists of both structured and open sections, the latter encouraging the respondents to express in free verbal form their perceptions

of the working facilities. The questionnaire is divided into two independent parts, the first covering the background data of the respondent and the work-related issues, and the second part concentrates on the evaluation of the physical environment.

Altogether 838 questionnaires were returned from the researched departments. The average return percentage of accepted questionnaires was 82 per cent, ranging from 57 to 100 per cent from individual hospitals.

The respondents were divided into three larger groups, i.e., physicians (10 %), nursing staff (64 %), and ancillary staff (26 %), according to the type of occupation and the characteristics of their work tasks. The mean age of the respondents was 37 years, and 84 per cent of them were female.

4. RESULTS

4.1 General results of the evaluation

The most extensive section of the inquiry consisted of the detailed room-by-room evaluations of the working environment. The written comments were classified under different topics according to their contents. The total amount of all classified comments was 28,123. It must be noted, that the comments refer to single spaces, and do not always reflect the more general design solutions of the departments. Regardless, the received comments conform well with the information acquired by direct observation and informal discussions held with the users. Therefore the researcher believes that these room-by-room comments cover quite well the essential features and problems of the departments. Broader qualitative descriptions of the departments were included in the open ended question concerning the layout and traffic in the department, but the contents of this data were not quantified.

Depending on the department 23 to 34 per cent of all the negative comments concern the lack of space in individual rooms. Other frequently commented topics involve the amount of storage furniture, indoor climate, locations and connections of the different spaces, and the amount of working table tops.

The features of the physical working environment that commonly disturb the workers are more or less shared by all the researched departments. Yet, it is evident that there are some characteristics in each department that cause workers to evaluate their working environments quite differently. The qualitative responses include descriptions of an enormous amount of singly detailed features in the physical environment that clearly bother at least some of the workers or worker groups, either quite often or only occasionally. The main emphasis of the whole study is on finding the possible general denominators, or truly essential features in the planning of the departments and in the organizational and work content factors that may account for the differences in the evaluations.

The basic notion from the quantitative responses concerning general satisfaction with the physical working environment and the general quality of planning, collected with these different question constructions, is that the same departments are uniformly placed at the opposite ends along the response scale. This may also be interpreted as a sign of good reliability of the survey instrument. The absolute values of the variables do not naturally have any meaning as such, but the constancy in the ranking of the departments justifies the assumption that there are true and significant perceivable differences in the physical environments of the departments posited at the

far ends of the range. Yet, it may be inferred from the comparison of the qualitative responses that usually rather few unsuccessful design features that recurrently bother large user groups determine this general appreciation of the premises. It must be stressed, that by any standards, all the researched departments conform to essential quality requirements that may be set for modern hospital facilities. The departments are quite suitable and appropriate for their purpose, even if they are not all equally appreciated by their users.

4.2 Predictors of environmental satisfaction

The study reveals certain environmental problems in the hospital facilities that are of regular concern to the workers, and which are also to be regarded as predictors of environmental satisfaction if solved successfully. In all hospital environments, these are very basic and commonly recognized controversial features that lower the quality of the person–environment relationships and also the relationships between the different actors in the environment (10; 19; 21; 22).

On the level of individual spaces or rooms, these qualities fall into three main categories: *utility*, *comfort*, and *control of privacy*. On the system level, the spatial *structure* was identified as the most invariant predictor of user satisfaction. Shortcomings in these qualities are typically reflected in the necessity or urge to modify the preferred action plans, as is discussed later.

Utility

Utility means simply to have the physical prerequisites that allow one to do what one wants and needs to do in the environment. The researched departments contain innumerable details in relation to the amount, locations, and properties of fixtures, furnishings, and equipment that may affect the performance of planned work tasks in the individual rooms, but the most important primary prerequisite for utility is the space itself, its absolute and relative amount.

The simple fact that the activities taking place inside a building are always limited by the surrounding walls creates the basic constraint on the functions. There may be several reasons why people may feel that they do not have enough space around them. In environmental psychology, one essential research subject has been the occupation of a limited space by a number of people and their distance-regulating behaviors that depend on the nature of the interaction and the personal and cultural variations (15; 23), with reference to the original animal experiments. As differentiated by, e.g., Stokols (4), density is defined as a physical variable, i.e., the number of people per unit area, and the term crowding is used for the subjective state or feeling of being in a situation where there are too many people.

The absolute amount of room space in the researched hospital environments is most crucial in relation to the dimensions required for procedures and movements around a recumbent patient.

Relative lack of space is usually a consequence of the chain reaction when too many persons or too much equipment or supplies are located in a space that is planned for less. This phenomenon is most usual in all entrance and waiting areas, patient observation areas, offices, storages, staff lounges, and corridors.

The decisions made in the planning phase on the space standard of the hospital facilities are of essential importance for the whole utility of the spaces throughout their lifetime. The allocation of the limited space resources often reflects the professional preferences and power struggles in the planning team, and are partly made by decision-makers who may not have anything to do

with the actual use of the facilities. A low space standard may also be attributed to the client's attempts to include too many basic functional units in a limited building volume, thus forcing the planners to use inappropriately small room sizes. One crucial question in space allocation is how much the peak loads of the spaces are taken into account in the dimensioning if on the average the space is quite sufficient during a normal or low load.

The users' expressed complaints about lack of space are often under valuated by, e.g., planners, financiers, and administrators of hospitals, partly because of the psychological aspects involved. The study demonstrates that the users are by experience quite able to define the limits for the desired sizes of the principal activity spaces, and these are in logical relation to the activities taking place in these spaces. To ensure the flexible use and potential changes of the activity patterns, the space standard should be set according to such known optimal limits, and not, as is often the case, according to the minimum standard that is still acceptable. The optimum dimensions for the core activity rooms and principal traffic areas should be determined and fixed in an early planning phase and then left entirely unaltered to ensure that the seemingly little pinches here and there during the planning do not endanger the functionality of the most important rooms.

It is most shortsighted to cut the sizes of the principal functional spaces in order to save building costs, because the cramped rooms inevitably become a continuous constraint to the activities for which they were intended. These constraints often pose ergonomic risks and provide substandard facilities for patient care. The dissatisfaction and discomfort of the staff and the patients have a long term effect not immediately quantifiable in economic terms. The ultimate price is morbidity, increased absenteeism, and staff turn-over, all of which are not taken into account by the financial management during the building phase.

As a tool for efficient facility management, internal leasing has been introduced in many hospitals in the 1990s. This means that the departments have to include in their budgets the calculatory lease for the spaces they occupy. This is expected to change the space requirements of the departments, as all space that may be considered redundant for the essential functions is left for other units in order reduce the lease. This development is most welcomed if it leads to more efficient use of space and, for example, to the departure of symbolic underused private offices. The problem in hospital facilities is that many of the core activity rooms are for single purpose only, and the adopted un-flexible patterns in the provision of hospital services may cause the highly expensive spaces and equipment remain unused a major part of the day. The economic efficiency of the facilities should be increased by the active employment of the underused capacity, not by reductions of the single room sizes to the limit of unusability. If some core activity rooms are after all deliberately planned small, the arrangement should allow their future enlargement, for example, by easy combination of neighboring spaces.

The optimal ratio of the auxiliary space groups to the core activities is much more difficult to determine than the individual room sizes. One most regularly recognized problem in the researched departments is the inappropriate amount and type of storage space. This is naturally in essential connection with the organization of logistics. No simple index to predict the user satisfaction with the provided amount of storage space was found in the study. Nevertheless, all reserve corners and surfaces in the rooms and corridors are usually converted into storage space, which is not anticipated in the original dimensioning of the spaces. The neglect of storage function may partly be due to its passive role, without the same strong devoted professionals to defend it in the planning phase as the core activities have. The same applies to such auxiliary spaces as, for example, maintenance rooms and traffic areas. The division of storages to under dimensioned boxes scattered around the department with no logical relation to the centers of activities is considered as the most unsuccessful alternative. For larger equipment, storing in

simple recesses of the corridors may be the most appropriate storage form, but the space needed for corridor storing must be taken into account when the widths of the corridors are determined. With the development of logistics services and technologies, the need for intermediate storing of supplies in the departments should be reduced.

The relative tightness of the traffic areas where patients are transported is a very common problem throughout all the researched departments. This reflects the efforts to reduce the total traffic area and to refine the efficiency index, i.e., gross area per net area, in the planning phase, as this has been one of the main concerns of the inspecting governmental authorities in an attempt to save money in the building construction.

The basic dimensioning requirements for the core activity rooms will not be changed in the future since the patient dimensions will remain the same. Patients will always, at least to some extent, have to be examined, treated, and transported in a recumbent position, since their physical contact with the operating surgeon, radiological examination equipment, the care team in an emergency situation, etc., cannot be altogether eliminated. The rapid development of diagnostic technology and telecommunications should make certain procedures less dependent on the specially dedicated departments, thus reducing the need to transport the patient inside the hospital and between different care institutions.

Comfort

For ambient comfort, the most problematic seems to be the control of temperatures and ventilation in the different parts of a complex hospital building at different times of the day and year and for varying numbers of people in the rooms. The most urgent need is to provide rapid short-term additional ventilation in all rooms where patient excreta or chemicals causing pungent odors have to be handled. When this is not possible mechanically, the possibility to open a window becomes crucial. The psychological importance of windows for contact to the outer world is also emphasized in rooms where people work for long periods, but the lighting intensities as such are generally the least bothering of the ambient conditions in the researched departments (24).

Control of privacy

Control of privacy and regulation of personal space have according to Westin (25; 26) four principal functions: personal autonomy, independence, and self-identity; emotional release and protected relaxation from social roles, rules, and customs; self-evaluation, i.e., integration of experiences, thinking, and planning; and limited and protected communication to share confidential information with others. Privacy in a hospital environment is essentially affected by such physical features as the chosen space standard, the relations of the neighbouring spaces, and the provision of visual and sound isolation, as well as to a great extent also by the staff's attitudes and manners of behaviour in personal interactions. The team-oriented nature of hospital work may be expected to diminish the significance of privacy and territoriality for the staff, but expressions of annoyance because of encroachment on both staff and patient privacy were nevertheless regular in the responses. Uneasy feelings, which may also be called "empathic embarrassment", were most often described in relation to spaces, where the patients were known to get into embarrassing situations when, for example, the body and its functions are discussed and examined in merely symbolic isolation; when the patient is lying incapacitated in bed, maybe partly unclothed, in an open area; or is transported in such a condition through public areas. The design of the facilities should protect the patient in such situations and provide structural solutions that add possibilities to greater privacy, even if the difficulties to arrange visual and acoustic isolation in open areas are almost impossible to resolve. Other situations that

were regularly brought up as awkward, concerning both patients and the staff, are related to personal hygiene and toilet visits. The awareness that somebody hears the natural sounds made during such visits seems to be very embarrassing, but such feelings are reduced if the toilets may be entered unnoticed and there is no public traffic right outside.

The disturbance of tasks that require concentration is common in the often overcrowded offices. But the staff requires also some privacy in relation to the patients. To be continuously "on stage" may be rather exhausting, and it would be too idealistic to deny the staff the need for temporary selfish withdrawal from contact with the patients. A common problem is that the staff lounges do not allow any quiet private rest; such possibilities are provided only for on-call personnel, principally physicians, in some emergency departments.

Structure

On the system-level, the department structure refers to the basic features of the spatial arrangement: the locations, connections, and communication between spaces. As Kaplan and Kaplan propose in their preference framework, actually based on the considerations of natural environments, the concern to *make sense* of the environment is of major importance in environmental preference and reflects a crucial human need (27). In their terms, the basic essence of making sense is *coherence* of the environment, i.e., being able to organize what one sees into a relatively few identifiable units. Furthermore, the concept of *legibility* refers to the ease with which new information is acquired from the environment during further exploration. After the development of cognitive maps (5; 27; 28), which code such environmental dimensions as proximity, distance, order, and sequence, the need to explore the environment for collection of new information is radically diminished. In the researched departments, which are familiar to their users, the structure becomes essential not for exploring the possibilities provided by the environment, but for the rapid and easy assessment of the most convenient routes between the different functions in any part of the department in an effort to avoid unnecessary delay and strain. The importance of the developed cognitive maps was demonstrated, for example, in the annoyance reported when in some departments the locations of certain supplies had been changed several times from one storage to another, thus adding to the walking distances that are wasted in searching before a new map had been developed.

The results of the study favour the use of formalistic and simple spatial structure for hospital departments. According to Gärling and Golledge (5), the general properties of environments that are likely to affect spatial orientation and navigation comprise the direct or indirect visual access to destination, the degree of visual differentiation of the environment, and the complexity of the path system. According to these authors, differentiation and good visual access may not further enhance the orientation if the path system is simple.

In the analysis of the layout in the most positively evaluated departments, three basic features as predictors of satisfaction are identified: *concentric form*, *grid-structure*, and *functional zoning* (Figure 1). Concentric form refers to quadratic layouts that are centered around a hub. Such forms predict satisfaction and success at least for process-oriented departments such as operating and radiology; in contrast, oblong department forms generally predict difficulties and dissatisfaction. The grid-structure refers to the principal corridor system that enables one both to go around and traverse the whole department without passing through and disturbing the ongoing activities in the rooms. Rational functional zoning refers to the logical grouping of related activities to avoid the scattering of the core functions and to ensure unobstructed flow of the principal traffic elements typical for each department. Especially in operating departments, the functionality and convenience may have been remarkably constrained because of artificial zoning based on some vaguely substantiated assumptions both of the different cleanliness grades

of the various traffic forms and the air movements between the spaces. The general position of the author is that too complicated or rigid structural arrangements to control traffic and behaviour will inevitably lead to negligence on the part of the staff.

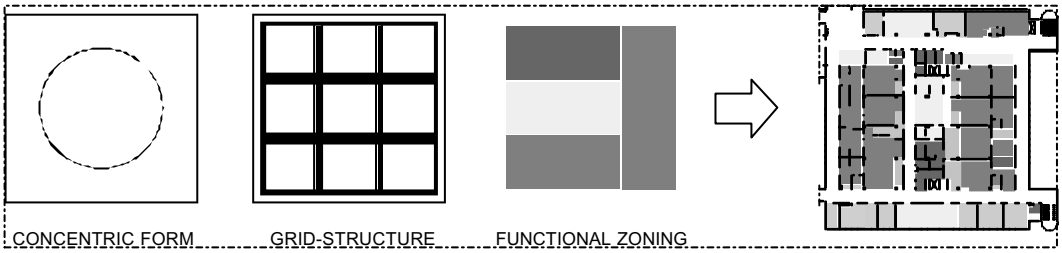


Figure 1. Preferred elements of spatial structure

It was demonstrated that the departmental structure affects the experiences of stress caused by long distances between the different functional spaces. In departments with the successful features listed above, the distances were usually experienced to cause considerably less dissatisfaction than what might be expected from comparisons of the actually measured walking distances and the corridor lengths.

In large departments, it goes without saying that the distances between functions located peripherally in relation to the core activities are long. The most crucial spatial solutions concerning the principal arrangement of the functions and the general composition of the building form are established during the planning phase. These solutions essentially determine the required travel distances for the lifetime of the hospital. Because the efforts to place all the connected activities in the department core lead to quite impossible equations, one key question in the planning is, whose steps are considered as the most important or costly; not all occupational groups have to regularly walk to, for example, remotely located storages, maintenance rooms, or other seemingly secondary spaces.

Visual appearance

The visual appearance of the researched departments was not demonstrated to be an independent predictive factor of environmental satisfaction, since it seems to be appraised inseparably together with other, principally functional, features of the environment. The general satisfaction with the environment definitely correlates with the experience of its attractiveness, but the emanation of such experience may not be predicted from the chosen architectural style or the perceivable visual elements in the setting. The researched departments include examples from absolutely neutral or dull to highly personal or unique visual environments, but the appraisals of their appearance do not follow any such classifications or typologies. This might be interpreted in two quite opposite ways: either as a permission to remove from the environment all "unnecessary" elements supposed to add aesthetic attractiveness; or, as it should, that designers may follow their own honest creative intuition in creating pleasant environments for users. However, attempts to enhance the attractiveness by adding striking, unconventional features or overwhelming visual cues will probably fail. Moderate complexity, i.e., visual richness and diversity of the environment is known to add environmental preference, but not if it is achieved at the expense of coherence (27; 29).

A hospital designer has his or her personal professional views about how people could be kept interested in their environment and how the traditional image of hospital facilities might be changed to offer some excitement, variety and novelty through, for example, material and colour choices and spatial arrangements. Regardless, such endeavours will most probably be negatively judged in the long run if they are done in an ignorant pursuit of highly individualistic artistic creation, chained to one taste or transient architectural fashion, far from the anticipated opinions of the users. Especially so, if these attempts are in contradiction with the designer's principal responsibility to ensure that the original functions are performable in an environment which is created primarily for action and interaction.

Comparison of the work content and background factors

The inquiry included a set of questions that concern the respondents' attitudes towards the work itself, the psychosocial factors in the working community, and the respondents' background data. In the comparison of the departments, the only variables that differ more regularly from the average in the same direction as the attitudes towards the physical environment are those reflecting general job satisfaction or satisfaction with the management either of one's own working unit or the whole hospital.

The results show that those who have extremely negative attitudes towards their job in general and towards the management, also have highly negative attitudes towards the physical working environment. Statistical analyses do not allow any inferences of the direction of the causality between the variables. Yet, considering the contents of the qualitative data, it would be incorrect to assume that the users' harsh judgment of the physical environment in certain departments would only be a side-effect or channelling of the criticism and dissatisfaction with the work related psychosocial factors, with no true reference in the physical environment. The shortcomings in the environment of these departments are apparent, and the criticism expressed in the open evaluations is congruent with the perceivable features of the physical environment.

It was noted that physicians have significantly more positive general attitudes towards the physical environment, and they feel less stress about inappropriate facilities or equipment as well as less physical strain in the work than the other occupational groups on the average. The nursing staff is, in general, the most critical group concerning the physical environment and also concerning the management of the hospital and of their own working unit. Experiences of stress caused by the mental demands of the work are also most common among the nursing staff. On the other hand, they derive significantly more satisfaction from the contents and the general meaningfulness of their work compared to the other occupational groups. In this respect, the service and clerical staff groups are quite the opposite. Mental demands in the work cause stress least to the service staff, but they feel the most stress caused by physical strain in the work tasks. Appreciation in the working community is most often experienced by the physicians and least often by the clerical staff. These results reflect the differences in the characteristics of the various work tasks, the professional hierarchy prevailing in the departments, and the relationship with the physical environment, i.e. how much the environment may be considered to directly affect each occupational group's work performance.

Experienced influence on the physical environment

Of all the respondents who had been working in the researched departments ever since their inauguration, about one fifth reported that they had had at least some influence on the design of the physical environment during the planning and building phases. This is also reflected significantly in the general satisfaction with the environment: those who have had at least some influence were significantly more satisfied compared with those who have not had any influence.

Those respondents who reported themselves having a lot or quite a lot of influence on effecting corrections to the defects occurring in the physical working environment were significantly more satisfied with the physical environment than those who feel they have less of such influence. This verifies the positive effect of participation in the decision making concerning the physical environment to general satisfaction with the environment.

5. Conclusions

5.1 The role of the physical environment in hospital work

The physical working environment is usually considered to play a minor part among the things that occupy people's minds or determine their general attitudes in relation to their work (8; 11; 30; 31). As, for example, Locke suggests, in an established situation the physical working conditions, unless they are extremely good or bad, are usually taken for granted by most employees and become salient only in relation to some new explicit standard of comparison. The results of this study support the view that the physical working environment is generally perceived as the granted natural envelope of the work activities and its role as an essential resource or condition in work performance is not especially emphasized.

A conclusion of this study is that the overall contribution of the physical environment is revealed in user-based evaluation research mainly by the amount and effect of the *negative features* in the environment that are experienced to *impede the attainment of goals* felt important in the work context. This is in concordance with the theory of positive-negative asymmetry (PNA), as reviewed by Peeters and Czapinski (32). According to this approach, the normal adaptive human functioning entails a cognitive-affective bias so that evaluatively negative information is weighted more heavily than evaluatively positive information in the formation of overall evaluations. Negative stimuli are considered to have greater informational value than positive ones, and positive evaluations are regarded to reflect subjective preferences, which vary according to the subjects' tastes while negative evaluations are more controlled by objective cues.

Acting in an environment involves a continuous series of innumerable conscious or subconscious appraisals of the environmental encounters within the framework of the highly individual and ever evolving perceptual cycles (33). Any single appraisal element may result in negatively or positively laden emotions or may be passed with indifference, depending on how it fits in the personal expectations, goals, and preferences in the situation, modified by the individually determined relative importance of the appraised environmental element. Only the important elements are supposed to evoke strong feelings (11).

Purposive, goal-oriented action is thought to be organized by hierarchically arranged cognitive plans, i.e., intended sequences of acts leading to goals (2; 3; 12; 34). As Russell and Snodgrass propose, the single most important environmental variable affecting mood and affective appraisal may be the environment's interference with the fulfilment of a person's plans (34). Interruption of an ongoing action or cognitive activity produces a state of arousal and may develop into negative emotional expressions (33). In a work setting, environmental features are expected to be appraised primarily in relation to their cognitive information value for action plans.

A conclusion from the results of this study is that staff dissatisfaction with the working environment in the researched hospital departments is essentially determined by the amount of repetitive encounters with features that require alteration of the preferred action plans. The result of any such encounter is either interruption or necessary modification of the plan, or just a felt desire for such modification. These are accompanied with sensations of physiological discomfort and feelings of annoyance, irritation, or embarrassment. If the desired modification, for example, withdrawal from an embarrassing situation or from a room with uncomfortable ambient conditions is not possible, the negative sensations and feelings continue, causing prolonged arousal and ultimately stress. The negatively appraised encounters reported in the responses have mostly a momentary nuisance value. Their cumulative stress provoking effect is, nevertheless, rapidly increasing if they are regularly repeated, or if they affect the performance of some very essential work tasks. In such cases, some rare totally unsuccessful details may dominate the appraisal of the environment.

When any single feature is appraised as an enabler or facilitator of action, this feature does not interfere with the preferred ways of proceeding, and after a short acquaintance period it does not necessarily require active attention in subsequent encounters. Such features inevitably loose much of their information and novelty value with time, as do all the non-action related features of the physical environment. Appraisals of aesthetic features, for example, evoke subjective feelings, but these appraisals do not take place on the enabler-constraint axis. Even if such a feature would first be experienced very negatively, the effect will fade quite rapidly with repeated encounters, because the action plans do not have to be modified.

Dissatisfaction with the physical environment, the psychosocial milieu of the work place, and the work content factors often coexist, and the negative feelings towards these may accentuate each other, but these are not each other's cause. Correspondingly, exceptionally good personal relations and satisfaction with the working community and its management may mildew the general evaluations of the physical environment. The experiences of influence on the design or improvement of the physical environment have a similar positive effect on the general satisfaction with the environment.

6. REFERENCES

1 Pevsner, N.: *A History of Building Types*. London, Thames and Hudson, 1976.

2 Frese, M., Sabini, J. (Eds.): *Goal Directed Behavior: The Concept of Action in Psychology*. Hillsdale, New Jersey, Lawrence Erlbaum, 1985.

3 Miller, G.A., Galanter, E., Pribram, K.H.: *Plans and the Structure of Behavior*. Holt, Rinehart and Winston, 1960.

4 Levy-Leboyer, C.: *Psychology and Environment* (translated by David Canter and Ian Griffiths). Beverly Hills, California, SAGE Publications, 1982

5 Gärling, T., Golledge, R.G.: Environmental Perception and Cognition. In: *Advances in Environment, Behavior and Design*. Vol. 2. Zube, E.H., Moore, G.T. (Eds.). New York, Plenum Press, 1989, 203–36.

6 Landy, F.J., Trumbo, D.A.: *Psychology of Work Behavior*. Revised Edition. Homewood, Illinois, Dorsey Press, 1980.

7 Moos, R.H.: Work as a Human Context. In: *Psychology and Work – Productivity, Change and Employmen*t. Pallak, M.S., Perloff, R. Master Lecturers: American Psychological Association 1986. Fourth Printing, 1992, 9–52.

8 Sundstrom, E.: *Work Places. The Psychology of the Physical Environment in Offices and Factories*. New York. Cambridge University Press, 1986.

9 Becker, F.D.: *Workspace – Creating Environments in Organizations*. New York, Praeger Publishers, 1981.

10 Sagehomme, D., Laigle, F.: Architecture and Working Conditions: Stress at Work. In: *Building for People in Hospitals – Workers and Consumers*. Moran R., Anderson R., Paoli P. (Eds.). The European foundation for the improvement of living and working conditions. Luxembourg, Office for official publications of European Communities, 1990, 93–102.

11 Locke, E.A.: The Nature and Causes of Job Satisfaction. In: *Handbook of Industrial and Organizational Psychology*. Dunnette, M.D. (Ed.). Chicago, Rand McNally College Publishing Company, 1976, 1297–1349.

12 Kaplan, S.: A Model of Person–Environment Compatibility. *Environment and Behavior* 1983; 15 (3): 311–32.

13 Moran, R.: Health Environments and Healthy Environments. In: *Building for People in Hospitals – Workers and Consumers*. Moran R., Anderson R., Paoli P. (Eds.). The European foundation for the improvement of living and working conditions. Luxembourg, Office for official publications of European Communities, 1990, 5–24.

14 Friedmann, A., Zimring, C., Zube, E.: *Environmental Design Evaluation*. New York, Plenum Press, 1978.

15 Sommer, R.: *Personal space – The Behavioral Basis of Design*. New Jersey, Prentice-Hall, 1969.

16 Field, H.H., Hanson, J.A., Karalis, C.J., Kennedy, D.A., Lippert, S., Ronco, P.G.: *Evaluation of Hospital Design – A Holistic Approach*. Boston, Tufts–New England Medical Center, 1971.

17 Preiser, W.F.E., Rabinowitz, H.Z., White, E.T.: *Post-Occupancy Evaluation*. New York, Van Nostrand Reinhold, 1988.

18 Loftness, V., Hartkopf, V., Mill, P.: Critical Frameworks for Building Evaluation: Total Building Performance, Systems Integration, and Levels of Measurement and Assessment. In: *Building evaluation*. Preiser, W. (Ed.). New York, Plenum Press, 1989, 149-66.

19 Souder, J.J., Clark, W.E., Elkind, J.I., Brown, M.B.: A Conceptual Framework for Hospital Planning. In: *Environmental Psychology: Man and his Physical Setting.* Proshansky, H.M., Ittelson, W.H., Rivlin, L.G (Eds.). New York, Holt, Rinehart and Winston, 1970, 579–87.

20 Wilmes, R.: *Designing for users. Hospital Management International '90*. London, Sterling Publications Ltd, 1990.

21 Winkel, G.H., Holahan, C.J.: The Environmental Psychology of the Hospital: Is the Cure Worse than the Illness. In: *Beyond the Individual – Environmental Approaches and Prevention*. Prevention in Human Services, Vol. 4. Wandersman A., Hess R. (Eds.). New York, The Haworth Press, 1985, 11–33.
22 Papassotiriou-Mazis, S.: Considerations in Building Design for Working in Hospitals. In: *Building for People in Hospitals – Workers and Consumers*. Moran, R., Anderson, R., Paoli, P. (Eds.). The European foundation for the improvement of living and working conditions. Luxembourg, Office for official publications of European Communities, 1990, 31–41.
23 Hall, E.T.: *The Hidden Dimension. Man's Use of Space in Public and Private.* (1st printing 1966) London: The Bodley Head Ltd, 1969.
24 Pütsep, E.: Modern Hospital – International Planning Practices. London, Lloyd-Luke, 1981.
25 Ornstein, S.: Linking Environmental and Industrial/Organizational Psychology. In: *International Review of Industrial and Organizational Psychology*, Vol. 5. Cooper, C.L., Robertson, I.T. (Eds.). Chichester, John Wiley & Sons, 1990.
26 Altman, I.: Privacy – A Conceptual Analysis. *Environment and Behavior* 1976; 8 (1): 7–29.
27 Kaplan, S., Kaplan, R.: *Cognition and Environment – Functioning in an Uncertain World*. New York, Praeger Publishers, 1982.
28 Russell, J.A., Ward, L.M.: Environmental Psychology. *Annual Review of Psychology* 1982, 33: 651–88.
29 Nasar, J.L.: Urban Design Aesthetics. The Evaluative Qualities of Building Exteriors. *Environment and Behavior* 1994; 26 (3): 377–401.
30 Gutman, R., Westergaard, B.: Building Evaluation, User Satisfaction, and Design. In: *Designing for Human Behavior: Architecture and the Behavioral Sciences.* Lang, J., Burnette, C., Moleski, W., Vachon, D. (Eds.). Stroudsburg, Pennsylvania, Dowden, Hutchinson & Ross, 1974, 320–9.
31 Sundstrom, E.: Work Environments: Offices and Factories. In: *Handbook of Environmental Psychology*. Stokols, D., Altman, I. (Eds.). New York, John Wiley & Sons, 1987, 733–71.
32 Peeters, G., Czapinski, J.: Positive-Negative Asymmetry in Evaluations: The Distinction Between Affective and Informational Negativity Effects. In: *European Review of Social Psychology*. Vol. 1. Stroebe, W., Hewstone, M. (Eds.). Chichester, John Wiley & Sons, 1990, 33–60.
33 Neisser, U.: *Cognition and Reality.* New York, W.H. Freeman and Company, 1976.
34 Russell, J.A., Snodgrass, J.: Emotion and the Environment. In: *Handbook of Environmental Psychology* . Stokols, D., Altman ,I. (Eds.). New York, John Wiley & Sons, 1987, 245–80.
35 Mandler, G.: *Mind and Body – Psychology of Emotion and Stress*. New York, W.W. Norton, 1984.

This presentation is a summary of the publication

Teikari, M.
Hospital Facilities as Work Environments — Evaluation Studies in the Operating, Radiology, and Emergency Departments in Seven Finnish General Hospitals.
Espoo, Finland, Research Publications by Helsinki University of Technology, Faculty of Architecture, 1995.

The publication can be obtained from:

Helsinki University of Technology
Faculty of Architecture
Research Institute for Health Care Facilities SOTERA
PO Box 6500, FIN-02015 HUT, Finland
E-mail: sotera@hut.fi

Session 4

Patterns and Strategies of Design of Health Care: The Hospital of the Future

by

R.J.W. Beijers
Executive Director Bosch Medicentrum

Content

The search for the Holy Grail? .

The way in which Hospitals are build is a reflection of the period in time in which their building plans and organisational schemes were conceived and in which they function.

In other words: what you ask for is, usually what you will get.

It is safe to say that taking into account the developments in the society at large and in the field of healthcare more specifically, the hospital in its present form, a from the society isolated ? black box' providing specialised medical care and cure in a to the general public almost enigmatic form is obsolete.

When trying to predict the shape of the hospital of the future it is impossible to do this without first (trying to) learn the lessons from the past.

The contemporary hospitals are usually build the way they are because of two major developments from the last two centuries.

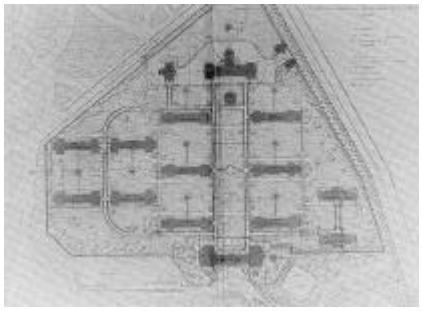
1: A changing focus within medicine, shifting from care towards diagnosis and treatment.

2: An upgrading of the hospital from a usually religiously inspired institute providing mainly care for the poor and homeless (the rich were cared for at home) to an important factor in the provision of medical specialist cure and care.

Until the mid nineteenth century nothing changed much in the way hospitals were build in the Netherlands. But by then, much later by the way then in Great Britain and France, a tendency developed to build pavilion type hospitals rather then corridor type hospitals.

Originally meant to surround the clinical units with clean air the pavilion system was used more and more to accommodate different specialities. However, the initial succes of this development also became its end.

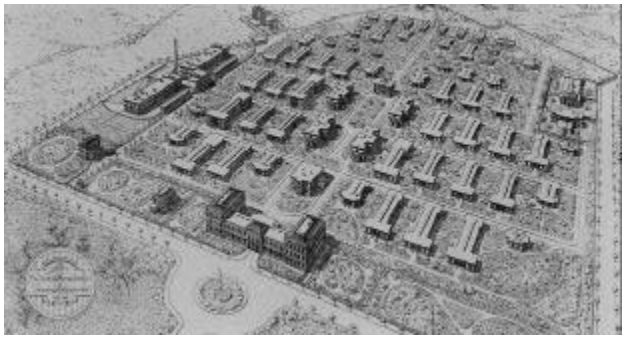
Ever increasing different specialties caused constant addition of new pavilions, including specialty-specific laboratories and diagnosis and treatment accommodations. The facilities became larger and larger with ever increasing walking distances. In other words, what we asked for (implicitly and maybe explicitly) is shown in picture 1



Picture 1[26]

[26] M.Gropius, H. Schmieden, Stadtisches Krankenhaus im Friedrichshain, Berlin, 1868-1874

And what we got in the end can be seen as an example in picture 2.



Picture 2[27]

The ratio of space provided for nursing compared to space for treatment in this type of hospital was about ten to one (1).

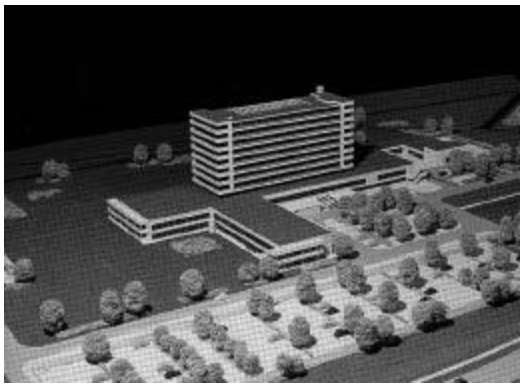
Around world war II under the influence of medical, organisational, technical and economical developments a different type of hospital: the concentrated hospital emerged. At first as low rise building, later more in the form of a high-rise construction (example picture 3).

Picture 3[28]

The treatment area, surrounded by vastly increasing out patient areas (caused by the movement of medical specialists from rooms outside the hospital to rooms within the hospitals) and, at first, also increasing bed capacity became the central planning focus.

This all gave rise to for instance a very well known type of hospital in the western world called the "breitfuss" type of hospital (picture 4).

[27] H. Curschmann, Allgemeines Krankenhaus, Hamburg-Eppendorf, 1884-1888
[28] Coolidge, Shepley, Bulfinch and Abbott, Cornel Medical center, New York, 1933



Picture 4[29]

As always due to several factors, things ran their course but finally there was a price to be paid.

Further development of hospital systems along these lines became unaffordable. In the mid nineteen sixties there was about 5.1 hospital bed per 1.000 inhabitants. More over there was an authoritarianism developing within the ?medical bastion? that was worrying to the general public and policy makers alike.

This led to the unravelling of the monolithic type of hospital into a combination of smaller units while at the same time these units were put together again based mainly on logistical and organisational aspects into flexible structures. (Picture 5.)

Picture 5[30]

However, in spite of all these developments hospitals remained self centred, self-satisfied organisations, a world apart from the general society.

Trying to conceive the shape of the hospital of the future, we will first have to identify the main trends and developments in society and more specifically in medicine. Next we will have to ask the right questions and if we do so, we can hope to get what we ask for: the right thing.

[29] Willem Alexander Ziekenhuis ‘s Hertogenbosch, Wiegerinck Architecten.
[30] Canisius Wilhelmina ziekenhuis Nijmegen, Wiegerinck Architecten.

Hospital of the Future

Research indicates that health care trends that originated in the 1990s will continue and flourish in the 21st century. In particular, literature indicates that the four trends listed below will define the course of health care in the 21st century:

- Decline of inpatient care
- Development of innovative services
- Emergence of integrated delivery systems (IDSs)
- Redesign of health care facilities

Decline of inpatient care

As hospitals around the world have struggled to reduce costs, inpatient services have emerged as major targets in the effort to reduce utilisation and hospital length of stay (LOS). As a result, health care services increasingly revolve around the delivery of care in a non-hospital or outpatient setting. The types of services listed below are indicative of future trends in health care delivery.

- *Ambulatory care services* (including outpatient surgery and fast-track emergency rooms) will replace a broad array of services, such as surgical and diagnostic procedures, previously provided in the inpatient setting.
- *Hospice and home health programmes* will gain popularity as cost-effective alternatives to extensive hospital stays.
- *Hospital midwifery services* will replace more expensive obstetrical care delivered by physicians.
- *Nurse triage hotlines*, designed to prevent unnecessary hospital visits by directing patients to the most suitable setting, will become necessary functions of a hospital.
- *Sub acute care*, an intermediate point between long-term care and acute care, will provide less expensive care for patients who do not fully qualify for treatment in a long-term care facility.

The transition to outpatient service delivery is evident since the early 1990s, as outpatient surgeries for example started to rapidly replace inpatient surgeries. This trend, especially evident already in the United States, is also emerging in Europe and expected to continue well into the 21st century, The developments in the US are highlighted in the chart below.

Hospital Based-Surgeries: Inpatient versus outpatient (Millions of procedures)
Source: AHA Annual Survey of Hospitals

In addition, the next table depicts the steady decline in volume of hospital inpatient surgeries contrasted with a constant increase in volume of hospital outpatient surgeries.

GROWTH IN HOSPITAL OUTPATIENT SURGERY				
	Hospital inpatient surgeries (thousands)	**Annual percentage change**	**Hospital outpatient surgeries (thousands)**	**Annual percentage change**
1981	15,675	-	3,560	-
1984	14,379	-5.0 %	5,538	17.1 %
1987	11,783	-5.1 %	9,073	12.0 %
1990	10,903	-1.2 %	11,020	5.8 %
1992	10,766	-0.3 %	12,129	3.8 %
1993	10,609	-1.5 %	12,282	1.3 %
1994[1]	10,326	-2.7 %	12,691	3.3 %
1995[2]	10,154	-1.7 %	13,059	2.9 %
1996[2]	9,968	-1.8 %	13,434	2.9 %
1997[2]	9,786	-1.8 %	13,801	2.7 %
1998[2]	9,543	-2.5 %	14,241	3.2 %
1999[2]	9,367	-1.8 %	14,649	2.9 %
2000[2]	9,267	-1.1 %	14,982	2.3 %
2001[2]	9,185	-0.9 %	15,378	2.6 %

Source: SMG Marketing Group Incorporated, 1995.
1 Estimate
2 Projections

Development of innovative services

The pressures of health care costs are twofold: attempting to decrease costs and striving to increase revenues. The latter by the way not so distinctly present in Europe (yet). The decline of inpatient services is expected by industry experts to contribute to decreasing costs. If European Hospitals in the future will have to operate in increasingly competitive markets they, in order to increase revenues, will increasingly have to vie for patients. One method of attracting patients is to improve the services offered within the hospital. The chart below highlights some of the services expected to prevail and develop in the 21st century.

HOSPITAL SERVICES IN THE FUTURE	
Type of service	**Future developments**
Ambulatory care	➢ Fast-track emergency rooms ➢ Indigent care clinics ➢ Urgent care centres
Behavioural health	➢ Crisis stabilisation ➢ Emergency services ➢ Home care ➢ Intensive outpatient care ➢ Outpatient and aftercare therapy ➢ Partial hospitalisation ➢ Residential treatment
Home health	➢ Acquired Immunodeficiency Syndrome (AIDS) patient care ➢ Alzheimer's care ➢ Cancer care ➢ Diabetes care ➢ Organ transplant care ➢ Post traumatic head injury care ➢ Well-baby services
Oncology	➢ Chemotherapy ➢ Pain management techniques ➢ Radiation therapy ➢ Surgery ➢ Therapeutic strategies
Paediatrics	➢ After-hours telephone triage services ➢ Day hospital programmes ➢ Paediatric ambulatory care services ➢ Paediatric home health programmes ➢ Paediatric outpatient surgery
Rehabilitation	➢ Acute and speciality hospital services ➢ Acute rehabilitation ➢ Clinician services ➢ Long-term care ➢ Outpatient care ➢ Post acute care services ➢ Subacute care, including skilled nursing facilities
Women's health	➢ Breast health programmes ➢ Midwifery services ➢ Single-room maternity care

In addition, research indicates that alternative medicine represents an important trend in future health care delivery. The increasingly popular alternative medicine includes the common complementary medicine therapies listed below (2).

- Acupuncture
- Biofeedback
- Chiropracty
- Feldenkrais
- Herbal medicine
- Homeopathy
- Nutrition and diet therapy
- Therapeutic touch
- Trager

Furthermore, a number of innovative products and services, listed in the chart below, will distinguish exemplary hospitals from competitors in the future (3).

INNOVATIVE HEALTH CARE PRODUCTS AND SERVICES	
Category	**Products and Services**
Retail outpatient care clinics	➢ Alternative medicine centre ➢ Breast cancer diagnosis centre ➢ Cancer treatment clinic ➢ Digestive disorders clinic ➢ HIV/AIDS clinic ➢ Mid-life women's centre ➢ Mobile care centre ➢ Musculoskeletal centre ➢ Senior centre
Hospital "condominium" products	➢ Cardiac crisis centre ➢ Diabetes centre ➢ Frail elderly unit ➢ Hand centre ➢ Paediatric emergency centre ➢ Simple surgery hospital ➢ Stroke centre
Medical management products	➢ Bone marrow transplant franchise ➢ Catastrophic care planning ➢ Complex care management ➢ Neonatology franchise ➢ Remote chronic monitoring

Emergence of integrated delivery systems (IDSs)

In the attempt to improve quality of care and to deal with the increasing volume of patients, with relatively decreasing budgets, many hospitals and health systems will develop integrated delivery systems (IDSs) in order to offer patients a full continuum of care. IDSs seem likely to survive well into the 21st century.

A full continuum of care includes the areas listed in the chart below:

COMPONENTS OF THE CONTINUUM OF CARE	
Category	**Services**
Primary and tertiary care	▪ Inpatient care: medical, surgical, trauma and critical care services in all specialities of health care ▪ Outpatient care ▪ Outpatient surgery ▪ Prenatal care ▪ Primary care centres/clinics ▪ Primary care visits
Prevention and wellness	▪ Community health centres ▪ Health education ▪ Health screenings (mammography, blood pressure, cholesterol) ▪ Research/education centres ▪ Wellness visits
Home health care	▪ Home health visits ▪ Home infusion therapy services ▪ Home medical equipment services
Long-term care	▪ Hospice care ▪ Nursing home ▪ Retirement housing
Counselling and rehabilitation	▪ Inpatient/outpatient chemical dependency programmes for adolescents and adults ▪ Mental health services ▪ Physical therapy ▪ Rehabilitation ▪ Subacute care
Demand management	▪ Disease management ▪ Physician referral lines ▪ Telephone triage lines

Providing a continuum of care may create the following benefits:

- Allows more efficient use of assets
- Attracts patients through increased convenience of system access
- Lowers malpractice premiums
- Lowers number of inpatient hospital days
- Prevents inappropriate and unnecessary care
- Prevents service duplication and reduces need for multiple pieces of same equipment
- Provides lower premiums to the public

However, developing a continuum of care may also cause several problems,

- In a system of separated budgets available for the different types of care delivered, a struggle will develop about the allocation of those budgets. In order to be able to offer a true continuum of care for each individual patient these "budget walls" will have to disappear.
- Vertical integration holds the risk of the development bureaucratic organisations unable to function as effective units.

Whether IDSs provide efficient and effective care remains the subject of vigorous debate; nonetheless, IDSs created in the 1990s will continue to play a role in shaping health care delivery in the 21st century.

Redesign of health care facilities

Changing venues and services will as mentioned earlier render current health care facilities obsolete. In order to remain current with developments in health care delivery, facility design and construction is expected to undergo a number of changes, including those listed below (4):

- Designing medical office buildings for group practices, health systems and physician management companies
- Development of low-technology centres
- Expanded investment in long-term care facilities
- Hiring of outside programme managers to plan, organise and manage all aspects of a building programme
- Involvement of consumers in the design of future services
- Justification of projects through strategic planning
- Redesign of critical care units to accommodate new technology and growing patient volumes
- Relocation of ambulatory and long-term facilities off-campus, to strategic locations within the community
- Transforming institutional spaces into atrium settings (e.g., through plants, natural light, etc.)

The new facility space created by the aforementioned trends in facility design and construction may be used in the following manners (5):

- AIDS centres
- Alternative medicine programmes
- Cancer centres

- Disease management programmes
- Fertility clinics
- Occupational health programmes
- Post acute recovery services
- Senior centres
- Stroke centres
- Women's centres
- Etc.

Health Care Staff of the Future

In order to provide a wide range of services hospitals will require more and or different types of personnel to provide patient care. It is not likely at all that training and hiring greater numbers of clinicians will prove to be an adequate answer. While clinicians typically provide adequate care, their salaries are too high to permit an immense increase in hiring. As a result, innovative utilisation of existing staff will become necessary to provide competitive care without incurring exorbitant costs. The following staff members will maintain broader functions in the future:

- Clinical technicians
- Registered nurses (RNs)

In addition, hospitals that require clinically experienced staff yet cannot afford to increase their numbers of clinicians may consider the staffing options listed below.

- Physician extenders (PEs)
- Hospitalists

Clinical technicians

Many hospitals have employed clinical technicians in order to allow nurses to concentrate on more specialised tasks. Utilisation of clinical technicians includes the following details (6):

> *Hospitals have found it useful to implement cross-trained clinical technician positions that combine clinical and support roles and relieve nurses of lower-level tasks, thereby maximizing nursing staff efficiency. Typical clinical technician tasks include performing patient assessment, drawing blood, preparing patients for surgery and transporting patients.*

Using clinical technicians to perform less skill-intensive tasks enables hospital managers to better utilise the higher-paid and more skilled nurses.

Registered nurses

In addition to relieving nurses of lower-level tasks, employing clinical technicians enables nurses to develop higher-level skills. The trend of cross-training nurses diverges from previous training efforts, as noted in the quotation below (7).

> *In contrast to the 1980s trend of cross-training registered nurses (RNs) "down" to assume the duties of lower-skilled personnel, hospitals currently favor cross-training RNs "up" to handle ancillary services such as IV therapy and respiratory therapy. This allows RNs to further develop their clinical expertise.*

Permitting RNs to acquire more specialised skills supplies them with a broader range of functional abilities, thereby offering a more efficient use of hospital personnel.

Physician extenders

Similar to the role of clinical technicians in relieving RNs of lower-level tasks, physician extenders (PEs) provide many of the same services as clinicians at a lower cost. PEs, also called "mid-level providers," include physician assistants (PAs), nurse practitioners (NPs), and may provide between 60 and 80 percent of the services rendered by clinicians. In addition, PEs have gained considerable popularity; research indicates that between six and eight job opportunities exist for every new PA and NP graduate (8).

The increasing use of PEs suggests that clinicians in the future will not necessarily need to be present for patient care. While a number of procedures will continue to require the specialised skills and training of clinicians, PEs may provide many of the services traditionally rendered by clinicians. In fact, research indicates that patients may prefer PEs to clinicians, as PEs provide the following patient-friendly services (9):

- Discuss treatment options and complicating factors more thoroughly than clinicians
- Listen to patients' health concerns more attentively than clinicians
- Proactively educate patients regarding healthy lifestyles
- Spend more time with patients

PEs' cost-effectiveness typically allows them to allocate more time per patient than general practitioners (GPs), which leads to greater patient satisfaction (9).

Hospitalists

Hospitals are increasingly employing Hospitalists, or dedicated inpatient physicians who track a patient from hospital admission to discharge (10). Hospitalists provide the following benefits for clinicians and patients (10):

- Assuming "roster" night call duty
- Leveraging medical specialist time
- Rounding multiple times daily
- Serving as admitting staff member from emergency department (ED)
- 24-hour availability and communication

In addition, Hospitalists provide the following benefits for hospitals (10):

- Expediting care of unassigned patients
- Providing immediate response for overnight patient needs
- Improving lower-tier procedural outcomes
- Leading clinical standardisation and reform
- Reducing length of stay and variable costs

Research indicates that the combination of increased utilisation of Hospitalists and favourable early experiences at hospitals raise the prospect of "hospitalise services becoming standard practise in the foreseeable future (10).

TOOLS OF THE FUTURE

Medical and technological advancements regularly change the face of health care throughout the world. Undoubtedly, revolutions in medicine and technology will continue to affect health care in the 21st century.

Technological advancements

New technological advances in five areas of health care, as depicted in the chart on the following page, will chance the shape of health care in the 21st century (11).

NEW TECHNOLOGIES	
Health care area	**Technologies**
General surgery	♦ Lasers ♦ Robotics ♦ Virtual reality
Oncology	♦ Brachytherapy ♦ Prostatron ♦ Sentinel node biopsy ♦ Stereotactic breast biopsy
Radiology	♦ Genesys Vertex Dual Head Gamma Camera (SPECT camera) ♦ Ultrafast Computed Tomography (CT) scanner technology
Rehabilitation	♦ Virtual reality technology
Orthopaedics	♦ MRI and imaging equipment ♦ Prosthetic equipment ♦ Surgical micro-instrumentation ♦ Updated camera and video equipment ♦ Updated laser equipment

In addition, minimally invasive surgery has emerged as one of the most promising technological advances for the future. Benefits and trends of minimally invasive surgery include those listed below (12).

- Decreased bleeding during surgery
- Decreased hospital length of stay
- Decreased recuperative time
- Reduced incidence of post-surgical wound infection
- Reduced pain
- Reduced scar tissue

Dissenting opinions surround the subject of the cost effectiveness of minimally invasive surgery. However, literature indicates that the higher costs incurred by longer operating times may be offset by significantly decreased length of stay following minimally invasive procedures (12).

In addition to medical technology, information technology is changing the operational efficiency of hospitals. In particular, telemedicine has gained substantial popularity among health care providers. Research indicates that health care providers expect telemedicine to provide the following benefits (13):

- Increased coverage of remote, under-served areas
- Opportunity to expand markets internationally

- Quality continuing education for medical staff
- Reduced travel time for clinicians
- Shorten hospital stay
- Reduce cost
- Improve treatment compliance

The use of HANC (Home-assisted Nursing Care) Units has, according to JAMA, in the United States increased from 1.715 consultations in 1993 to 90.000 in 1998 (14).

Medical breakthroughs

The following seven new discoveries and techniques may influence 21st century medicine (15).

- *Bone regeneration*
- *Breast cancer detection*
- *Lyme disease vaccine*
- *Migraine treatment*
- *Ovarian cancer vaccine*
- *Umbilical cord blood transplants*
- *Uterine balloon*

In addition, research indicates that replacement body parts could be available to order from medical laboratories of the 21st century. Human skin, cartilage, bone and liver have already been grown outside the body; scientists are currently attempting to grow the heart muscle (15).

Advances in cell generation could initiate a new era in transplant surgery, as laboratory-grown body parts preclude the need for human donors, eliciting the two following advances in organ transplants (15):

- *Division of liver*: Dividing donor liver into two parts, for one adult and one adolescent recipient
- *Xenografts*: Genetic modification of organs of living animals, in preparation for human recipients

In addition, advances in gene therapy, which involves treating cancers and inherited genetic defects by injecting replacement functional genes, may eliminate or reduce the occurrence of many debilitating or fatal diseases (15;16).

Finally, the following promising medical developments will influence health care in the 21st century (17):

Cardiology
- Intracoronary radiation
- Minimally invasive direct coronary artery bypass (MIDCAB) surgery

Gastrointestinal
- Medical laser spectroscopy

General surgery
- Growth of laparoscopic surgery

Oncology
- Biological therapies for tumours
- Brachytherapy
- Early detection

- Education
- Killer genes
- Molecular drugs
- Sentinel node biopsy
- Tumour-strangling agents
- Vaccines

Patients of the Future

As hospitals, staff, medicine and technology change in the 21st century, so too will the patient population. Three main trends will concern patients in the 21st century:

- The changing face of patient care
- The impact of diseases
- The power of the consumer

The changing face of patient care

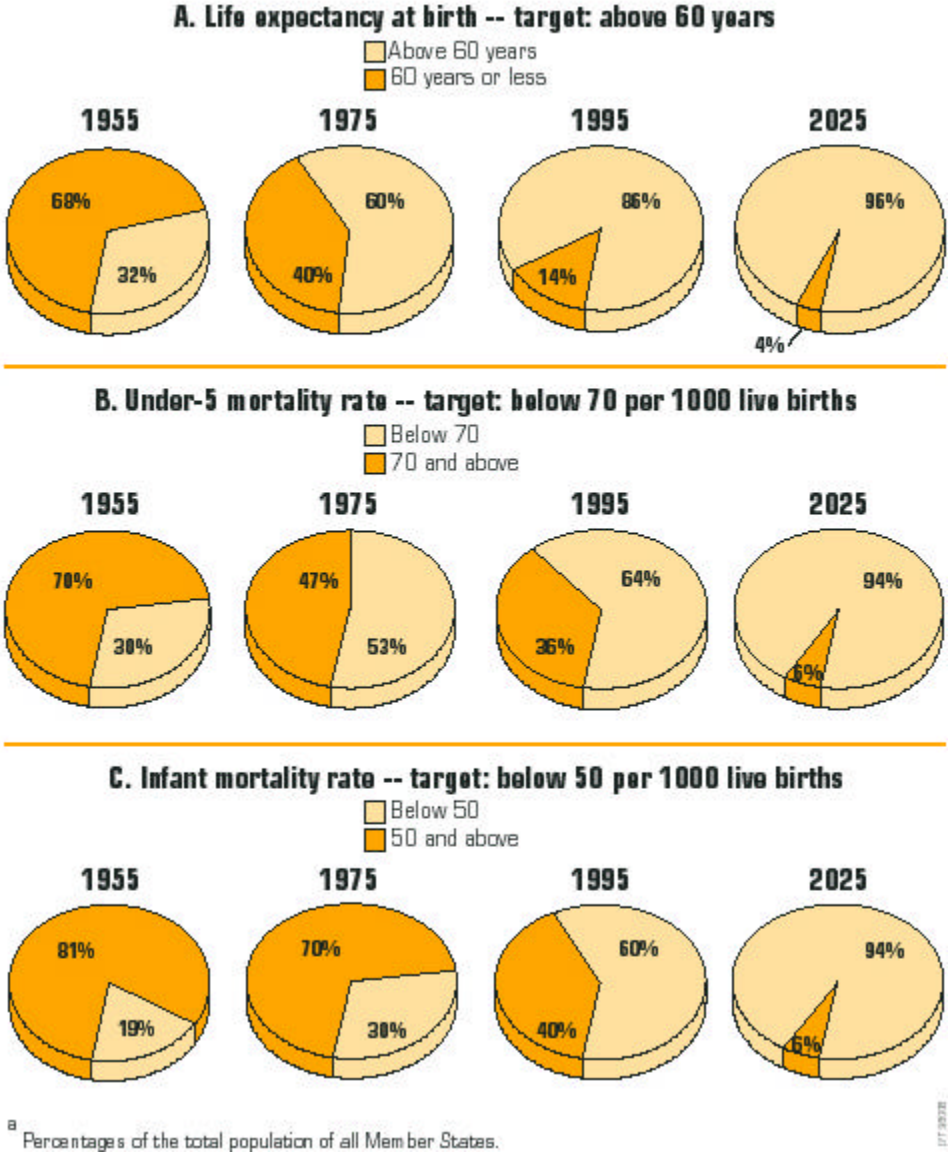
The 21st century will usher in an ageing global population, coupled with a steadily improving standard of living. As life expectancies increase, quality of life will improve concurrently (18):

> *The most important pattern of progress now emerging is an unmistakable trend towards healthier, longer life. Supported by solid scientific evidence of declines in disability among older people in some populations, this has considerable implications for individuals and societies.*

Increased life expectancies combined with globally decreasing average fertility rates will result in steadily ageing populations. This trend will magnify the need for geriatric care, as the elderly population constitutes greater proportions of the world population. By 2025 "the number of people aged over 65 will have risen from 390 million in 1997 to 800 million—from 6.6 percent of the total population to 10 percent (18)." In addition, "the proportion of young people under 20 years will have fallen from 40 percent in 1997 to 32 percent of the total population (18)." The figure below demonstrates these changing demographics.

In addition to improvements in quality of life due to enhanced medical capabilities, the global trend toward an increasing adult population may be attributed to improvements in survival rates of infants and young children. The charts on the following page depict global progress in increasing average life expectancy and decreasing mortality rates for infants and children under five years of age.

Fig. 1. Progress in achieving global targets for health for all by the year 2000[a]



[a] Percentages of the total population of all Member States.

Source: *World Health Report 1998 Executive Summary*, World Health Organisation.

The impact of diseases

A number of global disease trends will affect the global population in the future (18). The main targets of health care efforts in the coming years will be as follows (18):

> *The war against ill health in the 21st century will have to be fought simultaneously on two main fronts: infectious diseases and chronic, non-communicable diseases.*

In addition, "lifestyle" conditions, including the following diseases, will become more prevalent, especially in developing countries (18):

- Cancer
- Diabetes
- Heart disease

Of the communicable diseases, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) will surface as the "deadliest menace" in the 21st century, with a rising annual death toll. HIV/AIDS will also increasingly threaten the health of children throughout the world (18):

> *One of the biggest hazards to children in the 21st century will be the continuing spread of HIV/AIDS. In 1997, 590,000 children aged fewer than 15 became infected with HIV. The disease could reverse some of the major gains achieved in child health over the past 50 years.*

Control of infectious diseases, such as HIV/AIDS, will continue to depend on research efforts across the globe. Progress in health care resulting from technological advances spread by global telecommunications will change in the future (18):

> *The successes achieved in the past 50 years against microbial and parasitic diseases stem from the creation of a healthier environment, with improvements in hygiene and sanitation; treatment with effective and affordable antibiotic and antiparasitic drugs; and the availability of vaccines. Unfortunately, these types of drugs cannot be relied on to the same extent in the future—because of the spread of strains of pneumonia, tuberculosis and malaria that are resistant to the most powerful medicines.*

For this reason, "the future of infectious disease control is likely to lie with vaccines rather than drugs (18)."

In addition, the following risk factors may contribute to increased rates of non-communicable diseases:

- High-fat diet
- Lack of exercise
- Smoking

Of these non-communicable diseases, cancer will remain one of the leading global causes of death, as noted below (18).

> *Despite much progress in research, prevention and treatment, only one-third of all cancers can be cured by earlier detection combined with effective treatment. However, a range of measures, including avoiding tobacco use and adopting a healthier diet could prevent many of the remaining cancers.*

A summary of predictions for changes in rates of non-communicable diseases between 1998 and 2025 is presented in the table below (18).

TRENDS FOR DISEASE RATES BETWEEN 1998 AND 2025			
Disease	**Population**	**Trend**	**Cause of change**
Cancer	Developing countries	Increase	Not available
	Industrialised countries	Stagnate or decrease	
Lung and colorectal cancer	World	Increase	Smoking and unhealthy diet
Stomach cancer	World	Decrease	Improved food conservation, dietary changes, declining related infection
Cervical cancer	Industrialised countries	Decrease	Screening; possible advent of a vaccine
Liver cancer	World	Decrease	Immunisation against hepatitis B; screening for hepatitis C
Adult diabetes	World	Increase twofold	Dietary and other lifestyle factors

Source: *World Health Report 1998 Executive Summary*, World Health Organisation; Council of International Hospitals analysis.

The power of the consumer

With the advent of the information age, consumers are typically better-informed about their options now than at any other time in History, as noted in the following quotation (19):

> *The consumer does not choose in a vacuum…The information is available over the Internet and at kiosks located in the workplace, public libraries and other public spaces*.

In addition, research reveals that the trend toward increasing consumer influence by naming retail marketing to consumers is one of the top 10 trends for the 1998 (20). Patients face an ever-increasing amount of choices in health care delivery, and they have displayed burgeoning interest in participating actively in their course of care. Research indicates that, in addition to quality of care, a number of factors influence patient satisfaction, which in turn affects patients' willingness to recommend or return to a health care facility. Hospitals vying for patients ought to consider evaluating their performance in the main determinants of patient satisfaction. A summary of the common drivers of patient satisfaction, is presented in the next chart

DRIVERS OF PATIENT SATISFACTION	
Categories of Concern	*Manifestations*
Administration	❖ Discharge procedures ❖ Patients' ability to secure appointments ❖ Registration and admitting
Comfort	❖ Cleanliness of facilities ❖ Meals and diet ❖ Pain management ❖ Physical comfort
Communication	❖ Educational services ❖ Patients' access to information ❖ Patients' involvement in decision-making ❖ Patients' understanding of status of condition and nature of treatment ❖ Preparing patients for discharge ❖ Staff attention and response to patients' concerns
Competence of caregivers	❖ Ability of physicians, nurses and hospital staff ❖ Transition, co-ordination, and continuity of care
Emotional support	❖ Involvement of family and friends ❖ Privacy and dignity ❖ Staff ability to alleviate fear and anxiety ❖ Staff ability to provide emotional support
Professionalism of staff	❖ Courtesy ❖ Kindness ❖ Promptness ❖ Respect
Timeliness	❖ Lapse between varying stages of diagnosis and treatment ❖ Time patient must wait before seeing a physician

While current literature does not address the probability that these factors will continue to determine patient satisfaction in the 21st century, the trend toward the power of the consumer suggests that hospital administrators should continue to monitor drivers of patient satisfaction.

International Risk Factors

The evolution of health care in the 21st century will affect all countries. As indicated below, health care is becoming an increasingly global, rather than national, concern (21).

In addition, the following factors contribute to the international transfer of health risks (21):

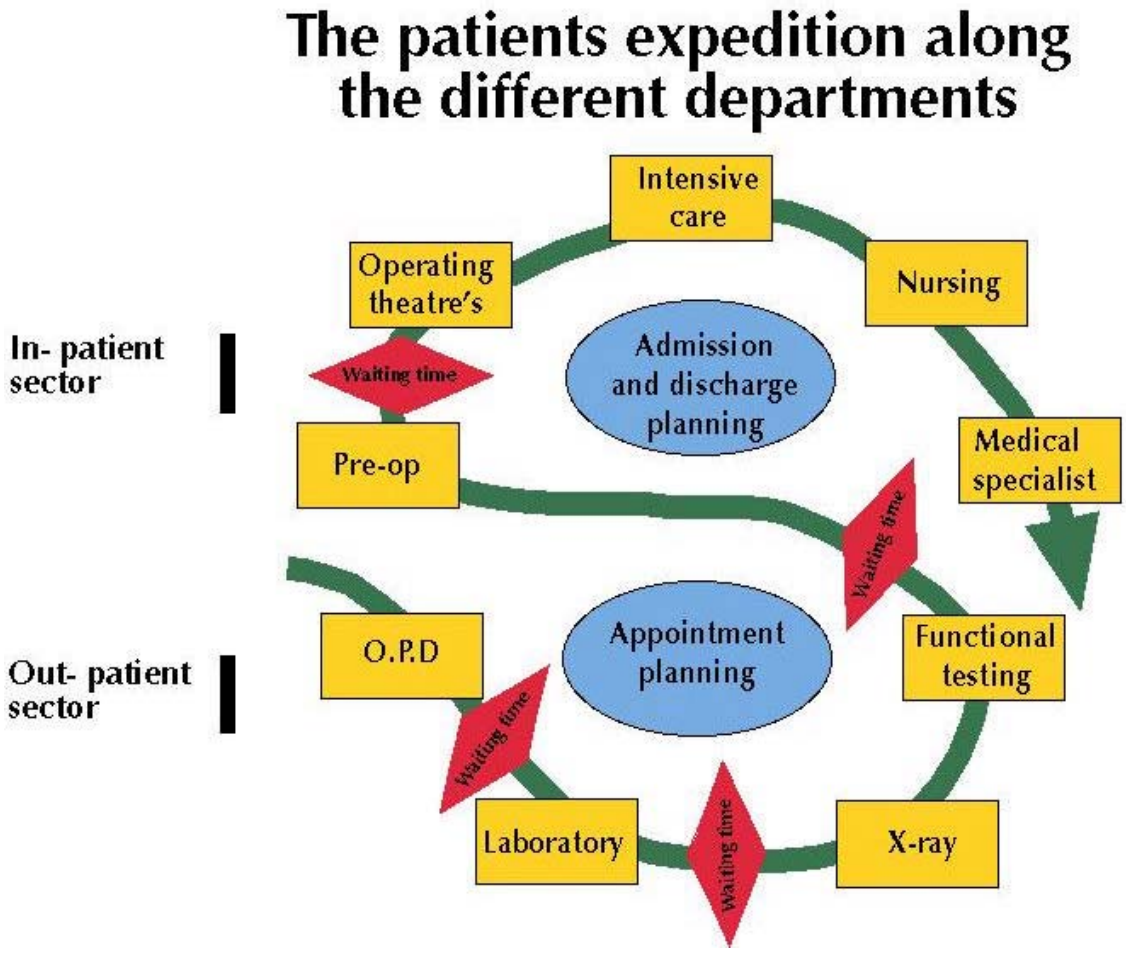
> *The health situation in nations is increasingly influenced by global determinants such as environmental threats, the expanded movement of people and goods that facilitates the spread of pathogens across national borders, and the trade in legal and illegal hazardous substances.*

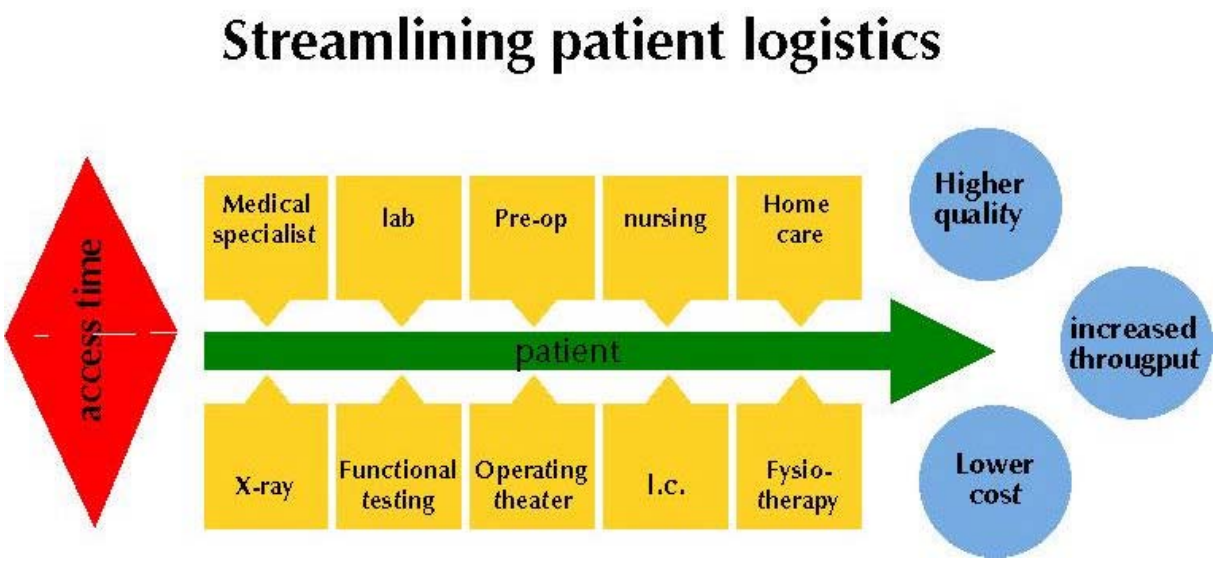
- ***Global environmental threats:*** Environmental changes primarily caused by certain countries may have disproportionate health ramifications in other countries, such as increased risk of skin cancer due to ozone depletion.
- ***Cross border movement of people:*** Population movements due to war, environmental crisis, economic collapse and travel will contribute to the global spread of infections and disease.
- ***Traffic of illicit drugs:*** Global trafficking of illegal narcotics, such as heroin and cocaine, will cause increased health risks.

The Hospital of the Future

Having identified the trends and developments, it becomes increasingly clear that the hospital in its present form will soon be obsolete. The hospital of the future will be a knowledge centre for healthcare rather than a medical specialist institution. No longer will the hospital focus on the professionals working there, approaching the patient from a perspective most beneficial and efficient to themselves. Rather, the patients and the provision of products needed for their health maintenance and if needed and possible complete cure, will become the central focussing point.

No more islands primarily focussing on the optimisation of their own processes leading, for the patient, to an expedition like journey along a myriad of different departments each with their own specific demands and waiting times as shown in the next figure, but much rather focussing on the patient and the organisation of care and cure around him as shown below.





Rather than being self centred institutions Hospitals will have to become one of the, important, partners in the healthcare industry at large providing services to the patient if and when needed on his journey through the healthcare system.

What does this mean for the Hospital in's Hertogenosh?

Presently there are two hospital organisations ('Bosch Medicentrum' and ' Carolus Liduina Ziekenhuis') providing the full spectrum of medical specialist cure and care for a population of about 330.000 people from three hospital locations.

A: "Groot Zieken-Gasthuis"

One of the two locations of Bosch Medicentrum consists of 543 beds covering an area of 3.25 hectares is situated right in the centre of town. The "Groot Zieken-Gasthuis' has been sold (with a profit compared to book value) to a project development consortium and is leased back for a limited period (until 2010 at the latest).

B: 'Willem Alexander Ziekenhuis'

consisting of 238 beds is situated at the periphery of the town with ample space (11 hectares) to accommodate the building of new healthcare facilities.

C: 'Carolus Liduina Ziekenhuis'

an independent 363 bed Hospital covering an area of nearly 9 hectares is situated on the eastern border of the centre of town.

Both Hospital organisations have decided to face the future in a co-operative rather then a competitive way. At executive level, it has therefore been decided to work towards a merger first at executive level followed later, within a few years, by a full merger of the two organisations.

The executive Board developed a health care vision of the future[31] for ‘s Hertogenbosch and its environment.

The joined mission of the two hospital organisations can be summarised as:

> *The provision of Cure and Care tasks by one organisation from one main hospital location.*

Apart from the trends and developments described earlier two main convictions are fundamental to our vision of the future:

- The provision of true patient-centred care
- The functioning of a hospital from within a true continuum of care provided by an integrated delivery system in which the hospital plays an important, yet to be precisely defined, role.

Most important for the organisation of healthcare will be the demand voiced by the patient. The patient will be increasingly grey, suffering from multiple pathology. Multi-disciplinary care and cure will become the rule rather then the exception.

The hospital of the future will be a centre for specialised diagnosis and treatment. Hospital care will be focussing on the cure function, acute as well as non-acute. The hospital has to provide the full spectrum of treatment in order to provide >98% of the medical specialist care for the regional adherent population. The other <2% will have to be referred to an academic medical centre for very specific and/or experimental treatment.

The hospital will be organised as an integrated medical specialist ?industry?. It will not be a hierarchical organisation but an organisation in which each unit will have its own specific tasks and responsibilities. Medical specialists will play an important role in the managing of these units and will have their own responsibility for quality co-ordination, planning and cost control.

The central focus on the patient will not only be apparent from the fact that the new hospital will be a patient friendly organisation but also from the increasing transparency obtained through the use of systematic and measurable quality systems. The length of stay of patients within the hospital will decrease further. Organisation wise there will be a distinction between acute, high tech cure and care with minimal length of stay and non acute cure and care that can be planned and will be provided, as much as possible, in a day-care or out patient setting. Planning and co-ordination with the environment (general practitioner, home care organisations and nursing homes) will be essential. The hospital bed will no longer be a planning instrument but become what it should be, just a simple occasional necessity in the treatment of a patient. As soon as the cure requirements for the patients are over the patient will be transported to a care environment within or outside the hospital, depending on the necessity for (medical) specialist support. The hospital will focus itself on its core business because its functioning in an integrated delivery system being a network of co-operating cure and care facilities.

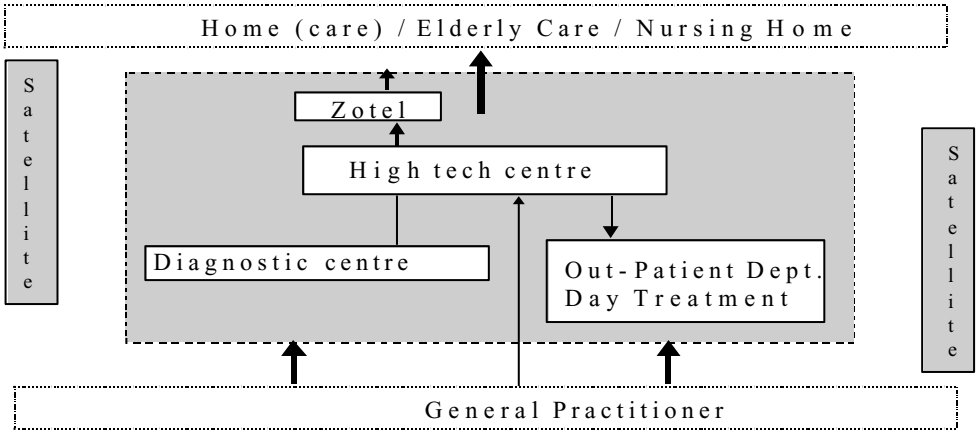
[31] ‘visie op ziekenhuiszorg na 2000’ Stichting Ziekenhuiszorg ‘s Hertogenbosch.

The medical specialists will further integrate in the management of the hospital organisation. The division between financing of hospitals on the one hand and medical specialists on the other that presently exists in The Netherlands will fade away. Medical specialists will get an important steering role within the organisation of the care and cure and will, of course, keep their role in the provision of it.

The need for coherence between the different providers of care and cure will continue to fuel the further development of integrated delivery systems. The future hospital will participate in a healthcare network. Part of this network are the general practitioners, the organisations for home care, nursing and elderly homes and institutions for mental healthcare. Possibly, even building society type of institutions will become part of this network. The transition from one form of care or cure to the other within this integrated delivery system will be seamless. To prevent unnecessary admission to the hospital there will be an intensive co oporation between the medical specialist and the general practitioner. A diagnostic centre will provide assistance for the medical specialist as well as for the general practitioner. After the completion of the cure function of the hospital there will be different pathways available for the patient depending on the specific need for (after) care.

- Going home, possibly with assistance of the home care organisation and the general practitioner.
- Going to a 'sickbay' for short-term medium to low care related to a medical specialty.
- Going to a nursing home for special type of nursing, paramedical or psychosocial support for long-term care that can not be provided in the home situation.

The position of the hospital in this integrated delivery system is shown in the next figure.



Infrastructure

What does this mean for the infrastructure of the new hospital in 's-Hertogenbosch?

The importance of the hospital bed as a measure for hospital capacity will further decrease. The increased use of alternatives for hospital admissions will decrease length of stay. The total capacity of the hospital facilities at this moment is 1144 beds, 781 in Bosch Medicentrum and 363 in Carolus Liduina Hospital. Looking at the future and taking into account developments that were described earlier in this paper we anticipate that it will be possible to realise all the

hospital functions within the capacity of about 600-700 beds (i.e. 2 beds per 1.000 inhabitants). This is excluding typical care beds like beds in care hotels and other facilities alike.

All in all the way in which healthcare and healthcure products will be offered to the public at large will change dramatically.

No longer will a Hospital focus on the professionals working there, approaching the patient from a perspective most beneficial and efficient to themselves. The patient and the provision of products needed in the provision of health maintenance and if needed cure, will become the central focusing point. Rather than being self-centred institutions Hospitals will have to become one of the important partners in the healthcare industry providing services to the patient when and if needed on his (or her) journey through the healthcare system.

Taking all these developments into account, we in 's-Hertogenbosch are looking at two main and by the way in our view contagious models.

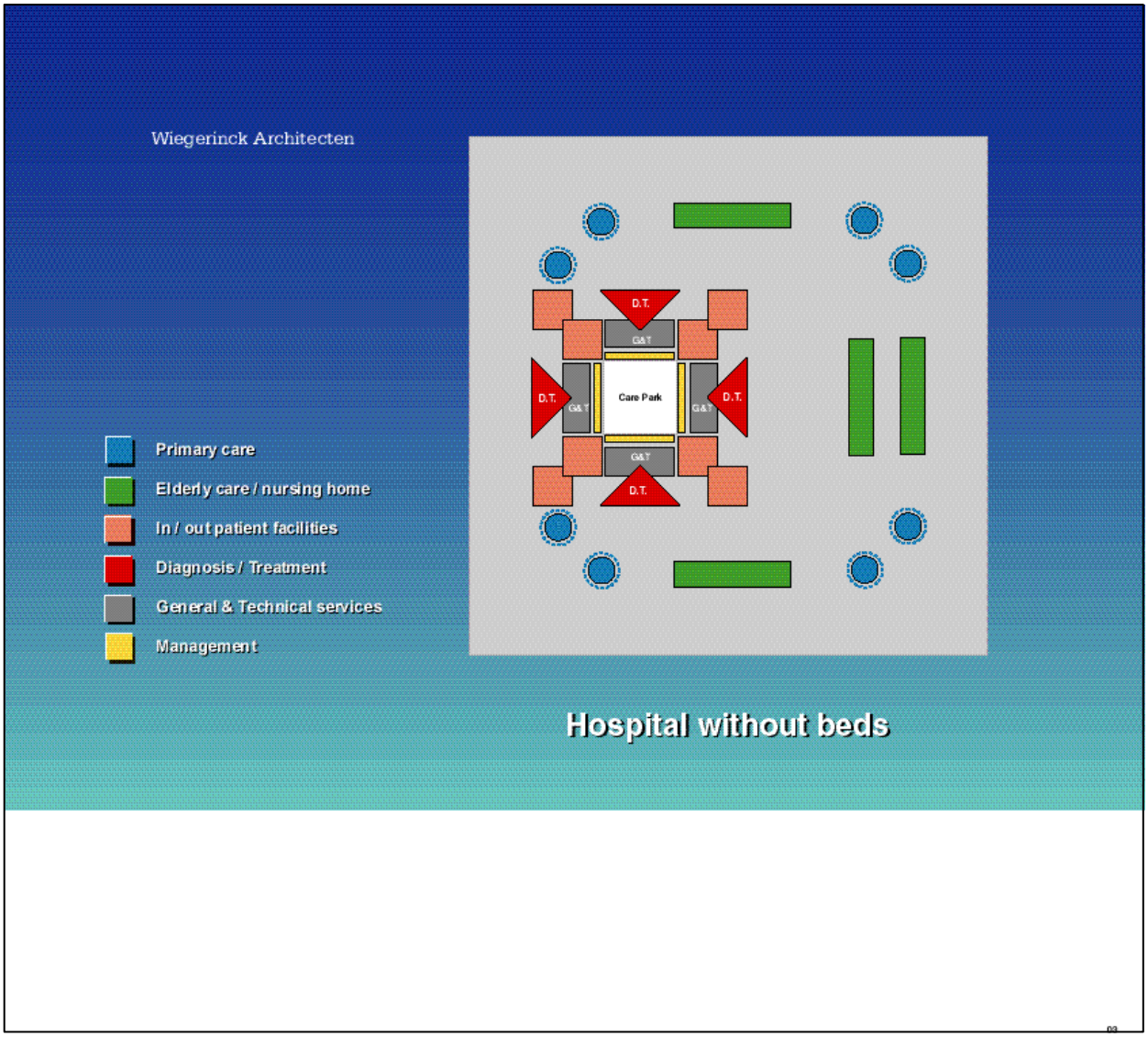
- **Care park, the 'Hospital without beds'**

In this model the Hospital as a building for the provision of medical specialist care and cure will remain necessary. The out patient function however will become central. The clinical part of the Hospital will no longer be dominant at all. This type of Hospital will provide accommodation for a clustered organisation according to patient and/or diagnostic groups in which out patient diagnostic and treatment units are linked to a limited clinical bed capacity. Next to a variety of OR and IC facilities and an emergency department this Hospital also possesses treatment units focusing on chronic care like for instance radiation, cytostatic treatments, dialyses and pain treatment.

The OR-facilities for day treatment are more important than the clinical OR-department. This Hospital will extend to a maximum of two to three floors. Laboratory, pharmacy and the departments for functional testing and radiology are, albeit to some extend probably decentralised towards the clustered units, still accommodated within the Hospital building. Ample waiting room facilities for the daily flow of visitors and patients, together with adequate amounts of meeting rooms to accommodate the increasing intensity for multidisciplinary discussions between professionals and care providers will be available.

This Hospital without beds is localised at the parameter of the city in a green, park like, environment. The buildings will breathe an atmosphere of rest in which high tech on the one hand and nature and landscape architecture on the other will harmonise. Looking at the cluster structure of the organisation a pavilion model of the 21st century becomes natural. Every cluster in this model will have its own pavilion but contrary to the old pavilion model these clusters will now be patient or diagnosis group focussed rather then centred around the professionals providing the treatment. To provide the pavilions with a necessary interconnections, certainly in the Northern part of Europe, a system of interconnecting passages will be considered as by the way can be seen in the St. Pau Hospital (dating already from the beginning of this century) in Barcelona.

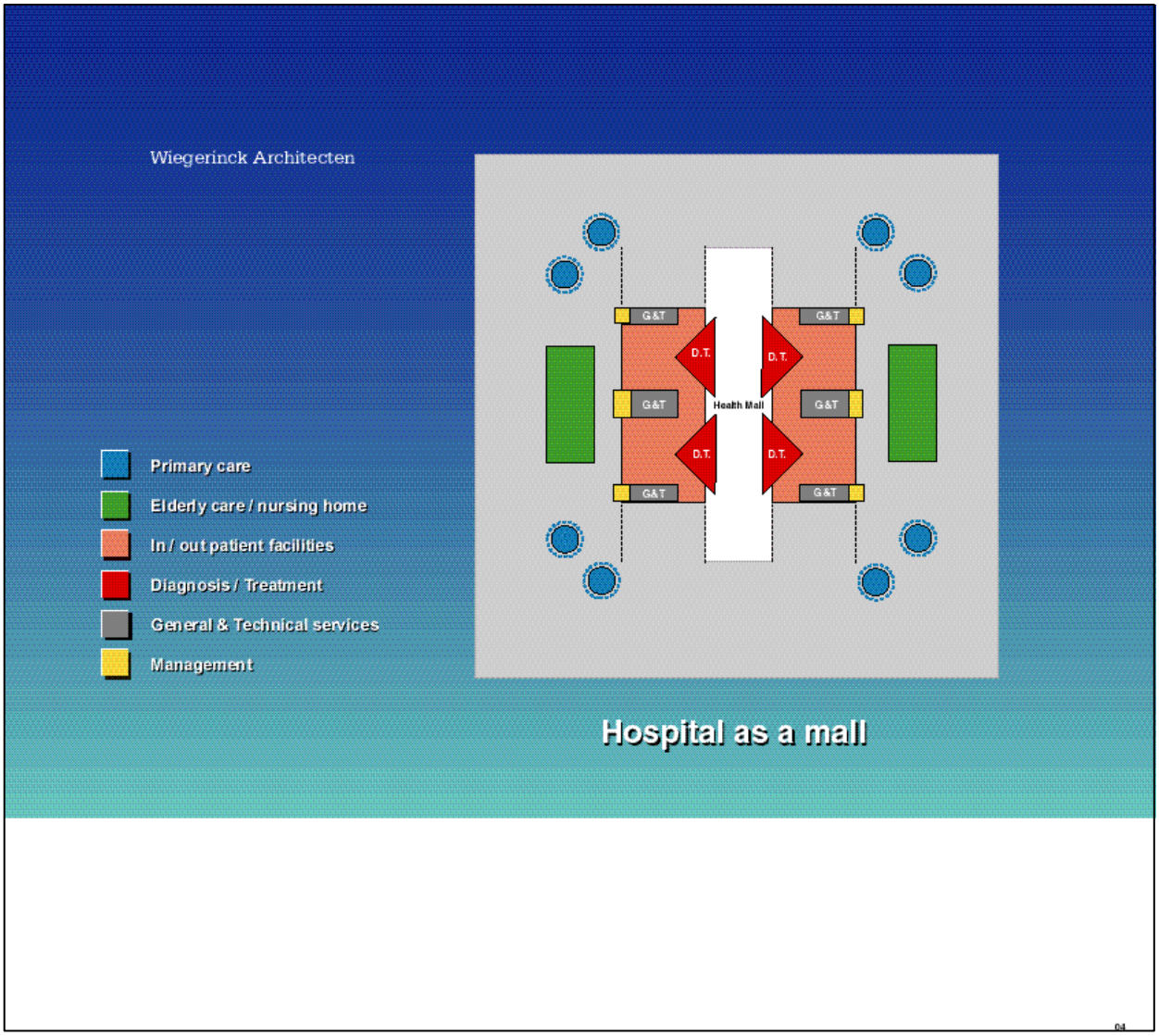
A scheme of this Hospital without beds can be seen in the next figure.



- **"The Hospital as a Healthmall"**

The second, as said contagious model, is the Hospital as important part of a health mall. In this model the functions presently housed in the Hospital building will be, contrary to the previously described model, housed in one main building. This scenario foresees a hospital that, as a building, is an important part of a (big) city. Rather than disposing functions outside its walls, this Hospital will be inclined to accommodate new functions within its walls. The Hospital will be an integral part of the city infrastructure. The healthmall will be characterised by a big central hall around which several floors of Hospital activities (diagnoses and treatment units) will be combined with independent shops of shopkeepers that are affiliated with the theme ? health? . In addition a variety of alternative and more regular therapists, insurance companies and fitness centres will be available. This healthmall will be easily accessible by car as well as by public transport.

A scheme of this model is characterised in the below.

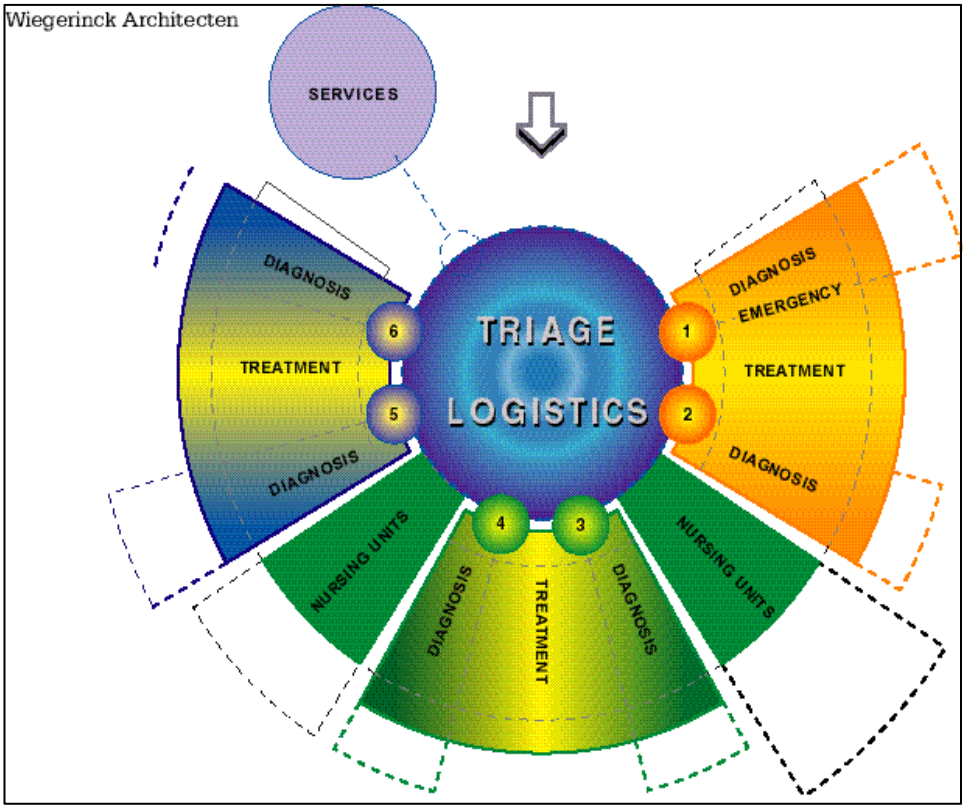


In order to enable us to realise either one (or a mix) of these models, it is imperative that policymakers handle the present rules and regulations in a flexible way. Only this way meaningful renewal of the provision of health maintenance in the broadest sense to the public can be assured. It is absolutely imperative in this respect that the provision of funding for organisations trying to institute meaningful renewal of patient care and cure to the public at large is based much more on the vision of the products to be offered than on rules and regulations trying to control expenditure. Money spent on healthcare and health maintenance, much rather then being a cost to society should be seen as an investment in the future.

The successful development of either type of hospital as well as the further successful development of an IDS will be heavily dependent on the further development of another important factor in the provision of the healthcare of the future i.e. Information Technology. This however is beyond the scope of this paper.

It is as impossible at this stage to provide a detailed building scheme of the hospital of the future as it is to predict to future itself.

Whatever shape this hospital will take however, it will be based on the principle of patient focussed care



In addition, with certainty, it will be part of a regional organised Integrated Delivery System.

References

1. Noor mens: De metamorfose van het Ziekenhuis. *Medisch Contact* 1998; 18 december.

2. Advisory Board Company: *Alternative Medicine Trends* (12/97)

3. Advisory Board Company: *Product Innovation: 1998 Guide to Promising Health System Products and Services*. Washington, DC, 1998.

4. Coile, R.: Health Care Architecture and Design 2000. *Health Trends* 1996; March.

5. Advisory Board Company: *Innovative New Products* (9/97)

6. Advisory Board Company: *Implementing Cross-Trained Clinical Technician Positions* (5/95)

7. Advisory Board Company : *Nursing Staff Cross-Training Models* (6/94)

8. Advisory Board Company: *Quality and Financial Implications of Physician Extenders* (4/96)

9. Advisory Board Company: *Role of Physician Extenders in the Outpatient Setting* (2/98)

10. Advisory Board Company: *Hospitalist Programs: Toward a New Practice of Inpatient Care*. Washington, DC, 1998.

11. Advisory Board Company: *Future of Medicine: New Technologies and Staffing Arrangements* (10/96)

12. Advisory Board Company: *An Overview of Minimally Invasive Surgery and Dedicated Centers* (4/96)

13. Advisory Board Company: Emerging Health Care Technologies (1/98)

14. International Herald Tribune Thursday , April 8 ,1999

15. Advisory Board Company: *Medical Breakthroughs into the 21st Century* (1/98)

16. Stefansson, K.: *Healthcare 2020 the promise of innovation*. INSEAD, April '99

17. Advisory Board Company: *Medical Breakthroughs into the 21st Century* (1/98)

18. World Health Organization: *Executive Summary: The World Health Report 1998: Life in the 21st Century—A Vision for All*. www.who.int/whr/1998.exsum98e.htm

19. Advisory Board Company: *American Healthcare: 1997 State of the Union*. Washington, DC, 1998.

20. Coile, R.: Top 10 Health Care Trends for 1998. *Health Trends* 1998*;* January.

21. Frenk, J. et al.: The Future of World Health: The New World Order and International Health. *British Medical Journal 1998; 10 may.*

Session 4

Management of health care facilities and establishment.

Factors influencing the role of hospitals and healthcare quality

by

Antonio Bonaldi
Medical Director Ospedali Riuniti of Bergamo
Bergamo, Italy

Content

1. Introduction

In the last decades we have witnessed an exponential growth of hospital spending, which nowadays absorbs the largest quota of the health national fund (In Italy more than 60% of the entire budget). There is also an increasing consciousness that health maintenance goes beyond the hospital care and there is convincing evidence that investment in other services, especially in primary care, could get better results for people's health (1).

The main factors that influence the delivery of healthcare are the following:

- disease and treatment evolution;
- health policies and payment system;
- advancement in health technology;
- improving quality programmes.

Unfortunately, all these four elements undergo rapid changes; certainly faster than those necessary for modifying the prevalent culture, the existing facilities and the level of management and organization. For this reason, we often observe a gap between what medicine could offer for the best care of the patients and the current context in which healthcare interventions must be delivered.

2. Disease and treatment evolution

2.1 Care delivery system in the nineteenth and the beginning of the twentieth centuries

Many big hospitals, still in activity, at least in Italy, were built in the beginning of the century and reflect the cultural, scientific, social and economic situation at that time, when medical specialisations began. Then specialists thought they could be self-sufficient for curing the specific diseases relative to their specialisation by themselves and that they could completely control the necessary resources and knowledge. They did not need to work with other healthcare providers because the cure for disease was not seen like a continuum of care. On these bases the building of hospitals with separate pavilions was encouraged; each had its own independent ward, operating theatre, ambulatory and offices directed to treat a selected group of diseases. Patients and doctors were distributed in divisions and health care delivery, strictly separated into different levels (first, second, third).

Figura 1 Ospedali Riuniti of Bergamo in a picture of 1939.

2.2 Today's care delivery system

In most cases the current care delivery system is still based on the scientific and organisational model widespread in the beginning of the century and based on Operative Units, divided into different medical disciplines. Generally, this kind of structure rigid, physically separated and its organisation is based on its own independent procedures and regulations, often not co-ordinated with the rest of the organisation and not centred on the real needs of the people and the health outcomes.

Nevertheless the type of diseases and their treatments have now changed. Most of the patients suffer from chronic diseases such as diabetes, nephropathies, cancer, coronary disease or depression. These diseases often need a multidisciplinary treatment with medical technology which does not cure, but favourably alter their course (insulin, dialysis, chemotherapy, cardiac surgery). Moreover, medical specialities, technical skills and scientific knowledge are so specific and sophisticated that it is quite impossible for a single physician to make a diagnosis and to prescribe the correct treatment without the help of other persons.

2.3 Is it enough to do one's best?

For the above-mentioned reasons there is a growing concern for developing a new holistic approach towards health and the treatment of illness, based on co-ordinated interventions between different components of the health system and between various medical disciplines and professional categories. The healthcare outcomes, in fact, do not depend only on what single health workers can do in certain specific circumstances (points of excellence), but they are largely the result of the overall quality and coherence of the entire organisation towards expected results. In other words, the healthcare outcomes depend on the interaction of multiple factors and on the quality level achieved by many different people.

Imagine a process with essential components, each of which functions properly 99% of the time. If the process has 10 of such components, it will function correctly 9 times out of 10. With 100 components, it will function correctly about 4 times out of 10. With 1,000 components, it will function correctly only 4 times out of 100.000 (2).

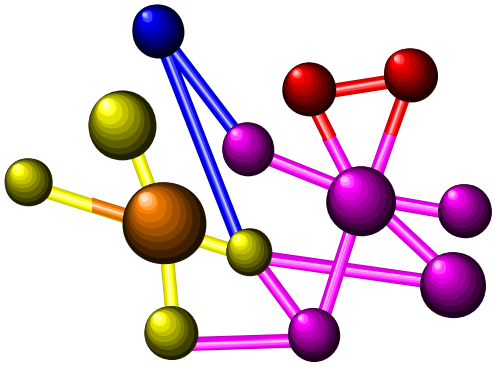
Table1 - Components of one process and chances of good result.

N. of essential components of process	Rate of proper operation of each components	Chances of good result
10	99%	9/10
100	99%	4/10
1000	99%	4/100.000

2.4 Systemic view

Everyone must acquire a systemic view and recognise the complexity and interrelation of factors influencing disease and treatment success. Without a systemic vision of the problems you could actually improve your performance to the prejudice of other people.

Care providers must be forced to work together focusing on groups of patients afflicted by a particular disease, rather than on single episodes of care. In practice, the more differentiated professional specialisation becomes, the greater is the need for co-ordination between the sectors involved in the final outcome. This new approach places the attention: on interdependency, comprehensiveness and continuity of care; on the use of evidence based guidelines and the evaluation of outcomes; and on health and social service integration (3; 6).



3. Restructuring hospitals

This deep evolution of disease management can't find easy solutions in the traditional architectural components of hospitals laid out in separate pavilions, reflecting an organisation based on rigid disciplines and hierarchies. Therefore, this kind of hospitals have largely become structurally obsolete for managing diseases that need strict co-ordination between interdisciplinary teams. Whatever adaptations are envisaged, these structures can't help to create a positive environment, where modern medicine can be well carried out. These cultural, scientific and technological changes in diseases management require redesigning the functional space of most hospitals, restructuring internal and external organization and redefining the information system.

3.1 Health policies and payment system

It is increasingly recognised that health system financing is related to the dimensions and type of investment in health facilities. Hospital's reimbursement system for case treated (DRG) and tariff based payment for out-patients as incentives for more efficiency can produce a high admission rate, duplication of specialist services and indiscriminate supply of new expensive technology, not directly related to health gain, because producer's interests rather than evidence of their effectiveness take priority.

For example, the rate of cholecystectomy and x ray examinations in different countries (table.2), confirm the hypothesis that payment system concurs to determine the variability of the prescriptions.

Table.2 Rate of cholecystectomy and x ray examinations in different countries.

Country	Type of payment	N. of cholecistectomy per 100.000 female	N. of x ray per 1.000 inhabitants
Denmark	National Health Service	19	
UK	National Health Service	91	440
Ireland	National Health Service	124	460
Sweden	National Health Service	178	500
Netherlands	Fee for service	192	500
Switzerland	Fee for service	208	
USA	Fee for service	267	1200
Canada	Fee for service	314	

OECD Health data base, 1995

Now there is a general agreement to reduce hospital beds in favour of more cost-effective alternatives, provided through development of primary health care and community health services such as home care, nursing home and hospice.

3.2 Advancement in health technology

In the last years, in most countries there has been a stable admission rate and a reduction in average length of stay, due mainly to cost-pressure influences, improvement of clinical management of patients and introduction of innovative technologies such as diagnostic imaging, coronary and carotid angioplasty and stenting, intravascular ultrasound, minimally invasive surgery, stereotactic surgery, lithotripters (7). Data of Lombardy region represented in table 3 confirm these trends.

Table .3 Trends in hospital admissions in Lombardy region.

	1994	1995	1996	1997	variations % 1997 vs 1994
N. of ordinary beds	51.920	47.846	46.968	46.944	- 10,6
N. of day-hospital beds	1450	1.546	2.634	3.287	+ 55,9
N. of ordinary beds per 1.000 residents	5.9	5.4	5.3	5.3	- 10,2
N. of ordinary admissions	1.662.441	1.670.267	1.669.768	1.665.735	+ 0,2
Rate of ordinary admissions x 1.000 residents	174,9	175,8	175,7	175,3	+ 0,2
N. of admissions in day-hospital	356.623	445.993	638.603	897.641	+ 151,7
Average length	11.1	10.0	9.4	8,1	- 27,0

Moreover, for the sake of cost-containment policies and efficiency improvement there is a clear trend toward concentrating care for acute patients in high-technology hospitals, offering a vast range of sub-specialisation services in short time spans. In this sense, the systematic reviews carried out at the University of York, in order to assess the evidence of a link between volume of clinical activity in hospitals and patients' outcomes, suggest that for at least some procedures or specialities there may be some quality gains increasing the number of cases treated in the same hospital. This is true, for example, for services carrying out more than 200 procedures/year of coronary artery bypass graft surgery or treating more than 300 cases of paediatric heart surgery. However, in some cases, like breast cancer, the thresholds are very low (29 cases) and could be

reached through specialisation of task among hospital physicians, rather than through increase in the size of the providers (8). Nevertheless, it is still not totally clear which factors can influence the different results and, certainly, gathering several health centres with poor outcomes do not necessarily improve them.

3.3 Improving quality programmes

Which problems to face?

It is common opinion that healthcare system is not performing efficiently and needs great improvement in management skills. Particularly we often find: poor co-ordination between different services, inappropriate use of resources, such as manpower and supplies, scarce maintenance of existing building and equipment, lack of information on costs and outcome, poor attention to board and lodging aspects.

Clinical practice has also serious problems considering that:

- at least 20% of procedures used in routine clinical practice is not evidence based (9; 10);
- 25 – 38% of hospital admissions (11)
- 32% of carotid endarterectomies (12)
- 21% of coronary angiography (13)
- 16% of bypass surgery (13)
- 58% of patients with clinical depression was either poorly evaluated or inadequately treated (14);

} are inappropriate

- 10% of patients acquires a nosocomial infection (15).

With regard to health quality Chassin says: "i*f the performance of certain high-reliability industries, whose standards of excellence we take for granted, suddenly deteriorated to the level of most health care services, some astounding result would occur. At a defect rate of 20%, which occurs in the use of antibiotics for colds, USA banks would deposit 36 million checks in the wrong accounts every day"* (16).

Good outcomes require attention on two main directions, with a distinct but, at the same time, synergic role: management and professional quality.

What can we do?

Improvement of healthcare quality involves close attention to the management of change and organisational development. In this context the hospital can be considered as an enterprise providing services which must be organised, managed and evaluated with industrial criteria. However, the management's point of view doesn't become an obstacle for improving clinical quality of healthcare. In this sense it's useful to specify the different responsibilities of managers and clinicians.

In the hospital two different but strictly interrelated decisional networks live together. The first is present where management functions are prevalent, like financing, staff recruitment, preparing health unit schedules and duty rosters, developing information technology system, controlling and maintaining instruments, ordering equipment, devices and drugs, monitoring lodging aspects. The second one regards the decision system related to clinical activities. Naturally the two systems are not easily divided: efficiency of the organisation and health outcomes depend on the coherence of the healthcare delivery as a whole and on the capability of people, working in different contexts with different roles, to share common goals.

The quality system

Although there is no agreement on how to orient the organisations towards quality improvement, the health care administrators may adopt several integrated organisational, management and educational initiatives, acting at different levels of health care delivery.

These conditions, that all together form the quality system, must consider at least the following key elements.

- *Define values, mission, vision and objectives* The development of a quality system starts with the definition of *values* (principles that provide the cultural foundation for institution and guide people behaviour) and *mission* (purpose or reason for being). The second step regards the definition of *vision* (what the organisation will look like in the future), the strategic directions (work plan) and *objectives* (measurable actions designed to achieve identified goals).

- *Choose patient-centre approach* The patient-centre approach means that planning and delivering care are guided by the patient's and values needs, rather than by the organisation requests. It means measuring the outcomes of healthcare, taking care of comfort, informing and communicating with patients (patient's charter), promoting consumers' surveys and facilitating and analysing the customers' complaints.

- *Encourage the rising of quality improvement teams* Quality improvement teams, in particular multidisciplinary teams, represent an important means to perceive the complexity of health problems, to work towards common purpose, to overcome resistance to change and to improve quality.

  It's important that teams be interdisciplinary and multiprofessional, have a co-ordinator, write a work plan, share tasks, meet regularly, define good working practice, provide the knowledge and useful skills to progress, and prepare periodical progress reports about the activities (17).

The improvement teams may regard the following key topics: health technology assessment, accreditation and certification, rational use of drugs, prevention and control of nosocomial infections, clinical documentation, performance indicators, epidemiology and clinical methodology, information system, rational use of blood, safety workplace and ethics.

- *Recognise successes* In the context of organisations devoted to improving quality, incentives are "per se" related to personal and professional satisfaction. In the meantime it is worthwhile to define a specific program to encourage the desired behavioural changes, which include: financial, professional and other forms of incentives such as educational training, acquisition of instruments and working space, special awards, conferences

- *Promote initiatives of accreditation and certification ISO 9000* Accreditation and certification may represent a good tool for improving the process of healthcare delivery. Accreditation measures the compliance of the organisation to standards that recognise the role of patients' satisfaction, outcomes and scientific evidence, assessed by peer groups (in Italy it is a State legal requirement as a minimum condition for delivery care and National Health Service). ISO certification intends to evaluate the institutions on a basis of conformity with the operating process according to preset standards assessed by independent certified auditors.

- *Develop a comprehensive information system* Information system represents a powerful tool in the quality improvement process. It helps people to identify problems and priorities, measuring performance and effect of healthcare, choosing interventions, comparing processes and outcomes between organisations for individuating the areas of excellence that could be emulated (benchmarking).

- *Define education programs* Training and continuous education plans represent another relevant tool for innovation and quality enhancement. The initiative in this field would improve the capacity for: individuating, evaluating and utilising the knowledge useful for making decisions; working in a group and co-ordinating the people, considering the clinical practice; and introducing interventions conformed to methodology of continuous quality improvement.

- *Promote research* Research activities are considered crucial for the cultural growth of the people and a key-point for improving quality of healthcare. The research must consider the following questions: measuring effectiveness of procedures and health interventions (clinical performance indicators); evaluation of techniques able to transfer the scientific knowledge into practice, according to the evidence-based healthcare principles; and clinical trials for evaluating efficacy of health interventions.

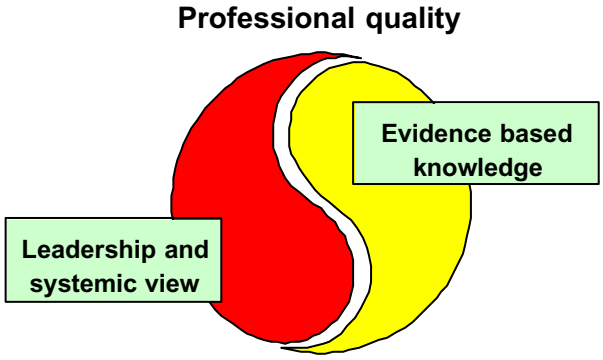
- *Improve professional quality.* The large variations in the utilisation rates of health services and in clinical practice reflect the existence of quality problems: in particular, overuse, under-use and misuse of medical procedures (16). The variations are the consequence of many different factors, including clinical competence (the availability of knowledge and skills required to act correctly), motivation (the desire to do it correctly) and barriers (circumstances that permit to do it correctly) (18)

One of the most important tasks of health care administrators is to define and implement health policies able to create, in the local context, the most favourable conditions in order to help people transform into habitual practice their best performance, and to develop projects for

professional quality improvement. In this context it is necessary to concentrate the efforts in two main directions.

- improve the attitude of physicians to work as leaders and also perceive a systemic view of health care delivery (no one can hope to achieve any result without the intervention of other people);
- help physicians to take clinical decisions using evidence based knowledge.

The first aspect regards the organisational and training initiatives carried out for improving the attitude of physicians, and other people in charge, to work as leaders, utilising the tools of continuous quality improvement. This means to provide, inspire and share a strategic vision (to look to the future and recognise the need of improvement), motivating and persuading people to change towards the shared aim, delegating responsibility for achieving the expected results with available resources, dealing with conflicts and disagreements, and understanding the systemic dimension of current health problems. Leaders are directed to define and produce changes with focus on results. Whereas managers are directed to arrange the best conditions to make it possible, focusing on the process. Of course the first one is indispensable for the success of the other (19).



The second component concerns the initiative for improving outcomes of care, creating the best conditions for successful implementation of research findings into clinical practice, according to criteria of proven efficacy, effectiveness, efficiency and safety. This means:

- to identify and make available the main sources of scientific knowledge;
- to distinguish new relevant knowledge of adequate quality;
- to evaluate the influence of the introduction of new technology into healthcare organisation;
- to promote initiatives directed to change professional behaviour on the base of research findings;
- to develop continuous education initiatives for improving clinical practice (20; 22).

Several approaches have been proposed, in local context, to improve the quality of clinical decision making, among which we should mention: clinical guidelines, internal effectiveness bulletin, continuing medical education, library and data base, conferences, opinion leaders, reminders, a commission for health technology assessment.

4. Conclusions

The evolution of disease, the changes in the practice of medicine, the rise in patients' expectations and the pressure of cost-containment call for rapid changes in the organisations and management of health care facilities.

It is also clear that, every day, a lot of patients suffer for quality problems that could have been avoided. Hospital managers and clinicians have clear responsibility in this respect.

The introduction of new systemic approaches to quality programs, particularly those inspired by the theory and the philosophy of total quality management, can help the organisation to improve the services for the patients.

It is useful to recognise that in spite of the extensive scientific literature on clinical effectiveness, there is still little knowledge about the effectiveness of single hospital management components. However, the results are, more likely, in institutions where different approaches to health care improvement are integrated into a systemic viewpoint. Research programs must be implemented to clarify the best way to introduce these methods in healthcare delivery and to make them more effective(23; 2).

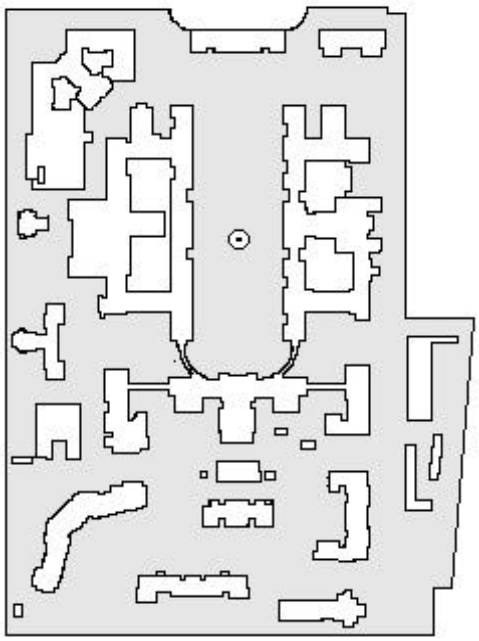
5. References

1. Saltman, R.B., Figueras, J.: *European health care Reform: analysis of current strategies*. European series, n.72. WHO regional publications, 1997.
2. Berwick, D.M.: Controlling Variation in health care: a consultation from Walter Shewhart. *Med Care* 1991; 29 (12): 1212-25.
3. Epstein, R.S., McGlynn, M.G.: Disease Management What is it? *Dis Manage Health Outcomes* 1997; 1 (1): 3-10.
4. Harris, J.M.: Disease Management Why do it? *Dis Manage Health Outcomes* 1997; 1 (1): 11-16.
5. Horn, S.D.: Tools and Techniques in disease Management. *Dis Manage Health Outcomes* 1997; 1 (1): 17-25.
6. Todd, W.E., Eichert, J.H., Toscani, M.R.: Disease Management Building a solid foundation. *Dis Manage Health* Outcomes 1997; 1 (1): 26-33.
7. ECRI: *1997/1998 Health technology forecast*. ECRI, 1997.
8. Sowden, A. et al.: Volume of clinical activity in hospitals and healthcare outcomes, costs and patient access. *Quality in Health Care* 1997; 6: 109-114.
9. Ellis, G., Mulligan, I., Rowe, J., et al.: Impatient general medicine is evidence based. *Lancet* 1995; 346: 407-10.
10. Gill, P., Dowell, A.C., Neal, R.D., et al.: Evidence based general practice: a retrospective study of interventions in one training practice. *BMJ* 1996;312: 819-21.
11. Fellin, G., Apolone, G. et al.: Appropriateness of hospital use: an overview of italian studies. *Int J Qual Health Care* 1995; 7(3): 219-225.
12. Chassin, M.R., Kosecoff, J.: Does inappropriate use explain geographic variations in the use of health care services? A study of three procedures. *JAMA* 1987; 258:2533-37.
13. Gray, D., Hampton, J.R. and al..: Audit of coronary angiography an bypass surgery. *Lancet* 1990; i: 1317-20.
14. Wells, K.B., Hays, R.D., Burnam, M.D. et al.: Detection of depressive disorder for patients rectiving prepaid fee-for-service care. *JAMA* 1989; 262: 3298-302.
15. Mayon-White, R.T., et al.: An International survey of the prevalence of hospital-acquired infection *I Hosp Infect* 1988; 11 (suppl.A): 43-48.
16. Chassin, M.R.: Is health care ready for six sigma quality? *Milbank quaterly* 1998; 76: 1-16.
17. Firth-Cozens, J.Celebrating teamwork. *Quality in Health Care*1998; 7(suppl):S3-S7.
18. Sackett, D., Haynes, R.B., Tugwell, P.: *Clinical epidemiology - A basic science for clinical medicine*. Boston/Toronto, Little, Brown and Company ,1985.
19. Reinertsen, J.L.: Physicians as Leaders in the Improvement of Health Systems. *Ann Intern Med* 1998; 128: 833-838.
20. Kitson, A., Harvey, G., McCormack: Enabling the implementation of evidence based practice: a conceptual framework. *Quality in Health Care* 1998; 7: 149-158.
21. Sackett, D.L., Richardson, W.S., Rosemberg, W., et al.: *Evidence-based medicine: how to practice and teach EBM*. 1st ed. New York, Churchill Livingstone, 1997.
22. Muir Gray, J.A.: *Evidence- based Healthcare*. Churchill livingstone, 1997.
23. Shortell, S.M., Bennett, C., Byck, G.: *Assessing the impact of continuous quality improvement on clinical practice: what it will take to accelerate progress*. Milbank Q 1998; 76.
24. Øvretveit, J.: *Integrated Quality Development in Public Healthcare*. Oslo, The Norwegian Medical Association's Publication Series, 1999.
25. Øvretveit, J., Aslaksen, A.: *The Quality Journeys of six Norwegian Hospitals*. Oslo, The Norwegian Medical Association's Publication Series, 1999.

6. Appendix

The new Ospedali Riuniti of Bergamo

Present Ospedali Riuniti of Bergamo



Ospedali Riuniti of Bergamo

Today the Ospedali Riuniti of Bergamo has about 1,500 beds and a staff of some 3,800 people. It provides over 60,000 admissions and 26,000 surgical procedures per year. It serves as the reference hospital for specialised medical services and Emergency operative centre for the whole Bergamo province, which counts over 900,000 inhabitants. It also provides basic specialities for a fair share of the population, basically for people living in Bergamo city,-aprox.120.000 inhabitants- and those living in the north-west of the province, roughly another 150,000, for whom it is still the main public hospital structure in the area.

As it is shown in the picture, the hospital, built in the Twenties, is laid out in separate pavilions reflecting the cultural and scientific situations of that time. Therefore, it is now inadequate to meet the functional, comfort, technological and safety requirements.

Structural and functional elements for the building of the new hospital

Recently, the Lombardy Region and the Health Ministry granted a long term investment of about 280 millions EURO to build a new hospital complex that will substitute the existing one. This is an important, unique opportunity to design a new complex that would satisfy the requirements of modern medicine, the patients' needs and the new health care organisation.

The main technical and functional factors that serve as starting blocks for planning the new hospital can be summarised in the following points:

- Reduction in the number of ordinary beds which must be divided into modules, not strictly related to medical disciplines, in order to allow the best utilisation of human resources and to improve functional flexibility between related medical specialities.

- Separation of the wards areas from the rest of the hospital activities, especially considering that nursing staff will be increasingly independent, in functional terms, and that physicians will be required only for precise tasks and limited periods. Patients admitted in wards must be only those who really need to stay in hospital, and patients coming for ambulatory care must follow a separate path.

- Differentiation of patient care according to its intensity:
  - routine care where most patients stay;;
  - sub-intensive surveillance, for severely ill but not critical patients;
  - intensive care for patients with life-threatening conditions or at risk of major complications.

- Other forms of care as different alternatives to routine admissions. These include:
  - a day-surgery unit with its own independent operating theatres, waiting, reception, surveillance areas and easy access to intensive care units in case of emergencies;
  - day -hospital and out-patients services, all of them with their own organisation and premises and connected with the corresponding ward area and with a separate path for the patients.

- Heavy emphasis on requirements for personalisation, humanisation, comfort, and safety of health services.

- Sharp increase in innovative diagnostic and therapeutic procedures, especially in imaging and laboratory fields, as a support for clinical diagnosis and care patients, within and outside the hospital.

- Reinforcement of consultancy services in order to make highly qualified specialised skills available, with clear access procedures and preset fees.

- Separation of "routes" within the hospital in order to simplify the users' access to the various services, respecting the rules of good hygiene practices and the needs of the workers.

- Wide use of computer and telematic facilities for health care, administration and management requirements.

- Ample spatial and functional flexibility of the structure to permit a swift adaptation to the continuing scientific and technical progress, to new functional needs and to changing health care requirements.

- Co-ordination and integration of work and services with other hospitals and health care organisations.

List of Speakers

BONALDI Antonio
(Hospital Management)

Direzione Sanitaria
Ospedali Riuniti di Bergamo
Largo Barozzi, 1
24128 Bergamo, Italy
Tel 035 269019
Fax 035 266858
e-mail: reglobs4@sanita.regione.lombardia.it

BRUECKNER Gunter , Dr.
(Output measurement)

Statistisches Bundesamt – VII GBE
D-65180 Wiesbaden, Germany
Tel: +49 611 75 47 00
Fax: +49 611 75 30 74
e-mail: Gunter.Brueckner@Statistik-Bund.de

BUXTON Martin
(Economic evaluation)

Brunel University
Health Economics Research Group
Uxbridge, Middlesex, UB8 3PH, United Kingdom
Tel: +44 1 895 274 000
Direct Tel: +44 1 895 203 331
Fax: +44 1895 203 330
E.mail: martin.buxton@brunel.ac.uk

BEIJERS Ruud
(Hospital planning)

Chief Executive Bosch Medicentrum
P.O. Box 90153.
5200 ME's Hertogenbosch , Netherlands
T: +31 73 616 8126
Fax:: + 31 73 616 81 28
Email : r.beijers@wxs.nl

BONTE Jacques
(Statistics)

EUROSTAT
Belgium
Tel: +32 4301 34685
E-mail: jacques.bonte@eurostat.cec.be

GRANADOS Alicia
(Evaluation of medical technologies)

Catalan Agency for Health Technology Assessment (CAHTA)
Travesera de las Corts 131 – 139
ES – 08028 Barcelona, Spain
Tel directo: +34 93 227 29 84
Tel: +34 93 227 29 00
Fax: +34 93 227 29 98
E-mail: granados@olimpia.scs.es

KUN Luis
(Information technologies for health)

Center for Information Management, Integration & Connectivity,
Rutgers University NY
604 Crocus Dr. Rockville ,MD 20850, EEUU
Tel: + 1 3014242257
Fax: + 1 301 4240806
E-mail:hcii@aol.com

MAYNARD Alan

Center for Health Economics
University of York
Heslington
UK – YORK Y010 5DD, United Kingdom
Tel: 00 44 19 04 43 36 66/ 43 37 18
Tel : 00 44 19 04 43 36 45 (direct)
E-mail: akm3@york.ac.uk
Secretary to Alan Maynard: Margaret Newton
Tel : 00 44 19 04 43 36 45 (direct)
E-mail:irss36@york.ac.uk

McKEE Martin

Martin McKee
Professor of European Public Health
European Centre on Health of Societies in Transition
London School of Hygiene and Tropical Medicine
Keppel Street
London WC1E 7HT, United Kingdom
Phone: +44 171 927 2229
Fax: +44 171 580 8183
E-mail : martin.mckee@lshtm.ac.uk

POULLIER Jean Pierre

Former head of the Health Division of the OECD
2 rue des Merisiers
F-92350 LES PLESSIS ROBINSON, France
Tel+Fax: 33 1 46 30 58 22

OMS-Geneve
GPE/OHS
Bureau 3061
Tel. 00 41 22 791 2503-/-2328
Email: poullierj@who.int

SALTMAN Richard

Richard Saltman, Ph.D.
Professor, Department of Health Policy and Management
The Rollins School of Public Health,
Emory University
1518 Clifton Road, N.E.
Atlanta, Georgia GA 30322, USA
Phone ++ 1 404 727 8743
Fax ++ 1 404 727 9198
E-mail: rsaltma@sph.emory.edu

TEIKARI Martti
(Hospital design)

Physician and architect
STAKES Reseach Center for Social and Health Care
PO Box 220
Fin-00531 Helsinki, Finland
Tel: +358-9-3967 2285
Fax: +358 9 3967 2278
Email: martti.teikari@stakes.fi

VANG Johannes

Director of the Centre for Public Health Sciences
University of Linköping.
S-58185 Linköping, Sweden
Fax: +46 13 22 50 95
E-mail : jvang@pip.dknet.dk

DISCUSSANTS

CALMAN Sir Kenneth

Sir Kenneth Calman KCB MD FRCP FRCS FRSE
Vice Chancellor and Warden
University of Durham
Old Shire Hall
GB-DURHAM DH1 3HP, United Kingdom
Tel: +44 191 374 7681
Fax: +44 191 374 7627

McMAHON Laurie (Prof.)

Office of Public Management
252 Gray's Inn Road
London , WC1X 8JT, United Kingdom
Tel: +44 171 837 9600
Fax: +44 171 837 6581
Email: office@opm.co.uk (attention Laurie McMahon)

SOMMER Alain

Andersen Consulting
President du Groupe d'Experts sanitaires auprès du BIAC
55 Avenue Georges V
F – 75008 Paris, France
Home:
27 rue Jean-Jacques Rousseau
F - 75001 Paris
Tel portable: 06 07 64 09 26
E-mail : alain.sommer@ac.com

SVENSSON Per-Gunnar

International Hospital Federation
46-48 Grosvenor Gardens
London SW1W OEB,United Kingdom
Tel: +44 171 881 9222
Fax: +44 171 881 9223
E.mail: 101662.1262@Compuserve.com

EHMA

BERMAN Philip

European Healthcare Management Association (EHMA)
IPA Vergemount Hall,
Colnskeagh
DUBLIN 6, Ireland
Tel: +353-1-283 9299
Fax: +353-1-283 8563
E-mail: pcberman@ehma.iol.ie
Secretary: Rena Dooley
E-mail: rdooley@ehma.iol.ie
E-mail: ehma@iol.ie

WHO

GARCIA-BARBERO Milagros
(Organization and management)

WHO European Office for Integrated Health Care Services
Marc aureli 22-36
E-08006 Barcelona, Spain
Tel: + 34 93 241 82 70
Fax: +34 93 241 82 71
E-mail: who@es.euro.who.int
Website: http://es.euro.who.int