

Transforming today's hospital to meet tomorrow's needs

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The development of the hospital, as an institution, has been driven by two interrelated forces; changes in demand for health care, in particular changing patterns of disease, and changing supply of health care, largely the development of new technology. An understanding of how these might change in the future provides insights into the way that the hospital should respond. The main implications are that the future hospital must be designed in a way that embraces flexibility and must be much better integrated with the rest of the health care system. The difficulty of doing so should not be underestimated.

The evolving role of the hospital

Hospitals, despite their image as immovable concrete objects, both architecturally and culturally, resisting every attempt of the policy-maker to bring about reform, have been changing continuously, although these changes have largely been in response to changing circumstances, rather than in anticipation of them (McKee and Healy, 2002). Hospitals will con-

tinue to change, but to understand what they might look like in the future one must first understand the path they have already traveled.

The earliest hospitals could offer only the most basic care. Most illnesses were self-limiting — patients either recovered spontaneously or died. Hospitals provided a place where they could be supported and comforted until nature took its course. They were small, widely dispersed and often based on religious establishments. By the middle of the nineteenth century, however, the situation was changing. The growth of cities fuelled by the industrial revolution threw up many new challenges. Overcrowded unsanitary living conditions provided a breeding ground for infection in a population that had lost traditional social support networks. At the same time, asepsis and safe anesthesia transformed the work of the surgeon, who was no longer limited to procedures such as draining abscesses and amputating limbs. It was now possible to undertake a wide range of complex procedures inside body cavities, and for the patient to have a reasonable chance of surviving. As other technologies emerged it soon became clear that there were benefits from concentrating expensive facilities, initially operating theatres but also laboratory and imaging facilities. Concentration of patient care was encouraged by the rise of scientific medicine, to meet the needs of both medical research training.

Taken together, these factors paved the way for the development of the modern hospital. Yet the empha-

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sis on the more dramatic elements of health care, such as surgery, meant that others developed with little conscious thought. Emergency departments became a common, and frequently chaotic, entry point to the hospital, even though those passing through them may have very diverse needs and final destinations. In those countries where hospitals included outpatient clinics, they had to fit in with what was often seen as more important inpatient work (Waghorn and McKee, 2000). One hundred and thirty years later the Lancet's description of the outpatient clinic in St. Bartholomew's Hospital, in London retains some degree of familiarity. It reported that one morning «120 patients were seen and dismissed in an hour and ten minutes, each with a doubtful dose of physic ordered almost at random as if the main object were to get rid of a set of troublesome customers rather than to cure their ailments» (Anonymous, 1869). Despite increasing evidence of the importance of integration with primary and social care in the management of chronic diseases, this is still largely underdeveloped.

Yet despite the many changes in the way care is provided within the hospital, ranging from the number of electrical sockets needed for each bed (as rest and recuperation gave way to ever more intensive monitoring and therapy) to the number of professionals interacting with an individual patient, the basic structure of the hospital has often failed to adapt. Indeed, even now, some hospitals designed along the same basic lines as they would have been a century ago, often with little thought for how health care will change in the future.

The situation is complicated further when one begins to consider the roles that hospitals play in society. They go far beyond acute care, although this is not always obvious, at least in international comparisons, which often focus on what is easily measurable, such as numbers of beds or physicians (Anderson *et al.*, 2003). New patterns of treatment involving multi-professional teams working in diverse settings blur the interface between in-patient, specialist outpatient, primary and social care, making these traditional measures even less useful than they ever were. Yet even to think of the spectrum of health care delivery is too restrictive. Hospitals are also settings for training an increasingly diverse body of health professionals, as well as being centres for research. Balancing these roles can be problematic (McKee and Mossialos, 1998). And it is too easy to ignore the role that hospitals play outside the health sector. A hospital closure in a declining post-industrial area may make financial sense for the health care system but may be the final nail in the coffin for hopes of economic regeneration of that area. For these reasons,

the roles and distribution of hospitals cannot be looked at purely from the narrow perspective of the health care system (Healy and McKee, 2002).

The range of factors that could impact on the future hospital is enormous so, in the space available, it is necessary to be selective. Consequently this paper takes a narrower perspective, looking at changes in the demand for and supply of health care.

Changing demand

It is only possible to touch on some of the ways that changing demand for health care will impact on the hospital of the future (McKee *et al.*, 2002). Three examples illustrate the potential importance of such changes. The first is the growth of antibiotic resistance. The late 20th century may, in retrospect, be seen as a transient period when humanity was briefly ahead in the evolutionary struggle against micro-organisms (Porter, 1977). Antibiotic resistant organisms pose a real threat to the viability of the hospital as presently understood. The second is the growing complexity and chronicity of health care, both in terms of aging populations with controllable multi-system diseases and the diversity of specialities and professional groups required to respond. This will require new organizational structures that seamlessly cross existing boundaries and means that a system premised on patients requiring acute interventions unconnected from each other is increasingly inappropriate. The third is changing public expectations, fuelled by both a growth in consumer culture and easier access to information via the internet, both changing the balance of power between patients and providers. Each has important implications for the hospital as an institution, in some cases challenging its continued existence.

Changing supply

While recognizing the importance of changing demand, the major focus of this paper is the potential change in the supply of health services. The next section examines the delivery of different types of care; it is then followed by an examination of the changing workforce.

Emergency and urgent diagnosis: only a very small number of patients attending emergency units have major trauma (typically < 1% in Europe, although somewhat higher in the USA because of the easier access to firearms). Others will have conditions that could be prevented by improving access to primary

care, illustrated by the higher level of preventable admissions in the USA than in Canada (Billings *et al.*, 1996). However some who could go elsewhere may still choose to go to a hospital, often because the alternatives are not perceived as sufficiently accessible. One approach is to accept the current situation and to employ skilled primary care physicians in emergency departments, a strategy that has been shown, in the United Kingdom, to increase cost-effectiveness (Roberts and Mays, 1998). Yet well-designed alternative models of care can be as effective and more acceptable to patients. These include increased accessibility out of hours to primary care, and stand-alone minor injury units, possibly staffed by nurses rather than doctors, although this may be more expensive than the traditional model (Sakr *et al.*, 2003). However a potential benefit is that, if existing hospitals close, such units can ensure continuing access to emergency care for dispersed populations. Information technology can now create virtual links to larger centres (Palombo *et al.*, 2003) and rotation of staff can make it easier to maintain high quality care.

Another group of patients attending an emergency department do so because it is the established means to reach a diagnosis. Although this could be achieved without admission, the response has often been to admit first and diagnose later. Rapid assessment, using high quality diagnostics and based on a limited number of systematic protocols can limit admission to those who will really benefit. For example, new technology, such as troponin assays for diagnosis of myocardial infarction (Aroney *et al.*, 2003), may make it possible to create assessment units separate from general hospitals.

But what about those few patients who have sustained major trauma? Here, the evidence is not straightforward. Although trauma centers have proved effective in improving outcomes in the USA (Trunkey, 2003), this was not the case in an evaluation in the United Kingdom (Nicholl and Turner, 1997). However another British study showed that improved outcomes could be achieved by applying new working methods, such as the creation of trauma teams and greater use of protocols, in existing units (Lecky *et al.*, 2002), although after these changes were put in place, in the mid 1990s, there were few further improvements, suggesting that the available gains had been achieved. Such internal reorganizations may, however, pose a problem in smaller hospitals: a survey of Australian hospitals found that many that did not have trauma teams were unable to create them because of insufficient staff (Wrong and Petchell, 2003).

As care settings become more diverse, methods are needed to ensure that patients arrive in the right

place. The advantage of the emergency department is that it offers a single entry point for many patients who do not know where to go. The challenge becomes how to move this traffic guidance system one step back. Consequently, some countries have developed telephone help lines, where trained staff, often nurses, working with carefully designed protocols, can advise patients where to seek help, or even reassure them that either treatment is unnecessary or they can provide advice on self care. An example is the British NHS direct scheme. However a word of caution is required. Initial results have been mixed (George, 2002), and a systematic review of alternative models of out-of-hours care concluded that, while robust evidence on outcomes was lacking, this approach may have the potential to reduce cost but at the expense of increased patient dissatisfaction (Leibowitz *et al.*, 2003).

Taken together, these considerations could imply a significant change in emergency services. The evidence for centralizing major trauma care is not overwhelming, and must take account of context, such as geography. However there is a stronger case for stripping out many of the other functions of the emergency department, a move that will have major implications for those functions, such as major trauma, that remain. As always, the implications of such changes for the rest of the health care system must be thought through carefully.

Inpatient care: hospitals typically have significant numbers of patients in acute wards that have ceased to benefit from medical and nursing care and are more appropriately cared for in other settings. In internal medicine and orthopaedic surgery in some countries this can be in excess of 50% of patients. Streamlining care processes can reduce this somewhat but the greatest gains are in providing alternatives, such as rehabilitation beds, skilled nursing facilities, home care and nursing homes (Hensher *et al.*, 1999). However it should be noted that these options, while often enhancing the patient's quality of life, are not necessarily less expensive (Parkes and Sheperd, 2003).

Surgery: advances in anesthesia and surgical techniques, particularly minimally invasive procedures, mean that many operations that would once have required a stay in hospital of several days can be performed on an ambulatory basis. There is already enormous variation in the extent to which different procedures are undertaken in hospitals or in free-standing clinics or physicians' offices, with the latter being common in countries where there is direct access to specialists.

There is increased interest in the separation of scheduled and unscheduled surgery. Especially in countries with limited hospital capacity, a few emergency medical admissions can create chaos with routine surgical lists. There appear to be significant productivity gains from paying attention to the organization of surgery.

Children's care: the care of children has seen especially large changes. A combination of immunization, improving social conditions, and safer food supplies mean that many of the previously serious childhood diseases are now rare. Many of the conditions that do affect children are more appropriately managed in the community, with high quality services increasingly available. Consequently most hospitals will only provide ambulatory care for children, with a very few providing specialist in-patient care for diseases such as childhood cancer.

Obstetrics: the nature of obstetrics is also changing. There is a challenge to the over-medicalization of childbirth that has been customary in many countries (Johanson *et al.*, 2002), drawing on evidence that many routine interventions are ineffective (Enkin *et al.*, 1989). In those countries where home facilities are satisfactory, there has been a substantial reduction in the time spent in hospital following a normal delivery, often to 24 hours or less. But at the same time there is a pressure from the public, supported by an increasingly voracious legal profession, to produce perfect, risk and pain free births. These factors are pushing obstetrics in two contradictory directions. There is growing interest in freestanding midwife-led childbirth centres, caring for low risk pregnancies. But at the same time some mothers' wishes for pain free births (epidurals) and defensive practice appear to be leading to an increase in assisted deliveries and the need for intensive neonatal care is increasing in some countries because of the increase in multiple births associated with greater use of in vitro fertilization as well as the ability to rescue infants at ever earlier periods of gestation. Consequently there are also some pressures to centralize services.

Improvements in diagnostics: in diagnostics, reducing cost and miniaturization is also making it possible to disperse activities that were previously concentrated in a central laboratory. Where skilled interpretation is required, as in pathology, it may be possible to have a single facility provide services to several hospitals or, as is already the case in many countries, be situated in stand-alone facilities. Images can be sent around the world allowing expertise to be accessed regardless of location.

New ways of working

This section examines three of the many ways in which the hospital workforce is changing; greater specialization, changes in working hours, and changing professional roles.

The increasing complexity of health care is driving a process of super-specialization. This has benefits but also drawbacks. For example in some countries there is concern that breast surgeons are increasingly uneasy about undertaking emergency general surgery. Much general internal medicine too, requires specialists that have a wide knowledge across a range of conditions as so many patients (particularly the elderly) have multiple conditions. Yet at the same time, the growth of specialization is creating a gap into which the patient with multi-system disease is at risk of falling. As a consequence, the idea of a generalist whose expertise is in the diagnosis and treatment of a range of common conditions may be making a come back. In the USA these physicians, termed «hospitalists» may have particular skills in the organization and co-ordination of increasingly complex care pathways (Meltzer *et al.*, 2002).

Both the USA and the European Union face restrictions on hours that staff, in particular junior doctors, can work (Pickersgill, 2002; Steinbrook, 2002). This will threaten the viability of many small hospitals, so acting as a major force for centralization of acute care. Yet even larger hospitals face problems and one response involves developing new types of professional and in particular to extend the roles of nurses (Larkin, 2003). For example, some hospitals in the United Kingdom are experimenting with integrated teams of physicians and nurse-practitioners to provide out-of-hours cover (UK. Department of Health, 2003). However an expanded role for nursing will bring substantial changes in the nature and status of the nursing profession, who will no longer be willing to accept often low pay and a subordinate position in the clinical hierarchy. These trends are accentuated by the increasing shortage of nurses in many parts of the world (Buchan, 2001), so putting further pressure on hospitals to develop even more imaginative strategies for the way staff are used.

Underpinning these developments is a breaking down the traditional barriers between different professions. For example, in Sweden, in the late 1990s, two-thirds of hospitals ran nurse-led heart failure clinics (Stromberg *et al.*, 2001), with improved patient outcomes (Stromberg *et al.*, 2003). In The Netherlands a nurse-led clinic for diabetes achieved better outcomes than the traditional model (Vrijhoef *et al.*, 2001). In the United Kingdom nurse-led clinics have been shown to be more effective than the traditional

physician-led model in detecting renal damage among people with diabetes (Craig *et al.*, 2003), in managing anticoagulant therapy (Connor *et al.*, 2002), and in improving the quality of care of people with chronic airways disease (Sharples *et al.*, 2002). The division of roles between health care professionals often owes more to history than logic (Dawley, 2002). Yet these have continually changed, and will change further in the future, although the precise nature of these changes will vary considerably, reflecting national cultural, legal and regulatory contexts.

The hospital and the health care system

Before looking at the process of change, it is necessary to place the hospital within the broader health care system. Hospitals are still seen as institutions separate from the systems in which they sit, a trend encouraged by developments in many countries where hospitals in publicly-owned systems are being given greater autonomy, using mechanisms such as quasi- or internal markets. The countries of post-communist Eastern Europe have been the subject of many such experiments (Healey and McKee, 2002), causing the inherited distribution of facilities to be frozen in time as none of the newly autonomous hospitals wants to do anything that will threaten its status, even if it would enable it to respond more effectively to the health needs of its local population. Indeed, as the experience in these countries shows, there is a need to shift the nature of the discourse of reform of health care delivery, away from the often implied or actual identity with «hospital reform» to one more akin to health network reform.

One of the greatest challenges is how to build links across the primary-secondary care interface, although there are examples of good practice from many countries (Hensher and Edwards, 2002); for example, the British National Service Frameworks offer guidance in several key areas (UK. Department of Health, 2003).

Investing in change

Although this paper has only been able to examine a few of the pressures facing hospitals, it is clear that major changes will be needed, both at the level of the health care delivery system, and within individual hospitals. This will require sustained system-wide investment in facilities, people, working relationships, and knowledge (McKee and Healey, 2002).

While many countries have some form of control over capital planning, few have taken a systematic, proactive approach based on anticipated changes in health needs and responses. One that has, and with the added complication of working with different forms of hospital ownership, is France. Regional bodies, the *agences regionales de l'hospitalisation*, proactively plan how care will be provided for a defined population, enabling the closure of existing facilities and their replacement with others better adapted to the needs of the future, such as cancer and AIDS centers that combine health care, training and research (McKee and Healey, 2002). However the successes achieved must be interpreted in the light of France's long-standing record of investment in infrastructure, whether in health care or in sectors such as transport and, in many countries existing channels of capital financing reflect complex boundaries between different tiers of government or between the public and private sectors, making co-ordination difficult (Thompson and McKee, 2004).

Investment in people is essential. Major change is traumatic and large-scale reductions in hospital capacity impact adversely on remaining staff (Valent, 2001), especially those transferred to other facilities (Armstrong-Stassen *et al.*, 2001). This is exacerbated by poor communication (Davidson *et al.*, 1997), but effective management can make a difference (Burke, 2002).

Change requires a new approach to relationships between managers and clinicians. In many countries there has often been a tacit understanding that managers should not intervene in the clinical work of any kind. Attempts to change this relationship have often been strenuously resisted. Conversely, those clinical leaders who have sought to innovate and make their practice more effective have come up against bureaucratic barriers to change (Edwards *et al.*, 2003). Managers and clinicians need to be able to work together, in particular ensuring that they bring with them their junior staff, who are often the last to hear about any major change.

Finally, there is a need to be realistic. Too often, enthusiasm for new ideas, such as process re-engineering, has failed to be matched by the reality of what is eventually achieved (Aiken and Sloane, 2002). Implementing change in health care organizations is not easy. It requires action at many levels, with involvement of all those affected (Shortell *et al.*, 1998). As Ham *et al.* have recently noted, in relation to improving quality, success is likely to involve a long slow journey rather than a massive leap (Ham *et al.*, 2003). On the other hand, many of the developments outlined here have already been achieved somewhere.

Yet there is an alternative interpretation. Christensen *et al.*, writing in the *Harvard Business Review* (2000), argue that the inertia within health care systems is so great that they are unable to adapt to what they describe as «disruptive innovations». Instead they propose radical change, including the creation of new organizational forms and widespread deregulation. They may be right, but there is also a need to be aware of the susceptibility of health care to the law of unintended consequences, in particular in relation to the other roles of the hospital in training and research.

Conclusions

This paper has quite explicitly not proposed a vision of what the future hospital might look like. Prediction is always fraught with problems, even more so where the pressures for change are as complex as those described here. The one thing that is certain is that the future «hospital» will be different from what it is today. It will treat patients with different diseases, using different clinical interventions. It may even become a virtual entity, with its existing services dispersed widely, although this will pose major challenges for its other roles of training and research. The pace of change, which has been accelerating rapidly since at least the 1970s, will become faster still.

There are, however, several other important messages. First, while there is great scope for learning from experience elsewhere, this should be tempered with a greater recognition of the importance of context, so avoiding some of the mistakes that arise when one model is transplanted into a quite different setting. Second, the individual hospital of the future must be designed for maximum flexibility as the internal configuration of a hospital being built today is likely to change several times over its lifetime. Third, hospitals must engage actively with other, frequently more flexible parts of the health care system, and they must accept that changes in technology and information systems challenge the logic that led to the emergence of the hospital in the first place.

These conclusions may seem obvious, but experience suggests that they need to be reiterated. In particular, policy-makers should avoid reforms that create incentives for health facilities not to collaborate in ways that meet the needs of the population they are serving, and those that inhibit change within the hospital, such as the type of public-private procurement contracts being signed in some countries that make any change for up to 30 years prohibitively expensive (Pollock *et al.*, 2002).

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□ Resumo

ADAPTANDO O HOSPITAL DE HOJE ÀS NECESSIDADES DE AMANHÃ

O desenvolvimento do hospital, enquanto instituição, tem sido movido por duas forças que estão interligadas: a mudança na procura dos cuidados de saúde, nalgumas doenças em particular e na prestação dos cuidados de saúde, sobretudo pela implementação de novas tecnologias. A compreensão sobre a forma como essas mudanças podem continuar a fazer-se sentir fornece pistas para o modo como o hospital deve responder. As principais consequências são o facto de o futuro hospital dever ser concebido de um modo que pressuponha flexibilidade e que esteja integrado de forma mais completa no conjunto do sistema de saúde. A dificuldade de concretizar este objectivo não deve ser subestimada.



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