AN ECONOMIC PERSPECTIVE ON HOSPITALS

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Anthony Harrison

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An outside observer of UK policy for hospitals might be forgiven for concluding that the main economic issue facing policy makers is how to build them fast - where fast means in less than ten years - and that the second most important issue is how best to dispose of them (where best means for the maximum price) when eventually they become redundant.

Underlying both issues lies the fact that, within a non-market economy such as the NHS has been since its inception, interest rates and the cost of capital tend to be ignored so neither construction delays nor idle assets give rise to cost penalties. Thus, where economic issues do present themselves, they tend to have a different form from that they take on a more market orientated economy such as the US health care system. Nevertheless, within both sorts of economy, we would expect that certain economic facts were the same (after allowing for other differences such as differences in labour and other costs between economies at different stages of development).

One area where we would look for similarities is in the question of optimal size. Hospitals are multi-product organisations. Each product (specialty) may be provided at low or high volumes. Hospital may specialise or aim to cover the full range of products (specialties) and support services. Are there advantages from clustering of activities on one site - like the economics of agglomeration assumed to arise in industrial concentrations in small parts of large urban areas? Or can the whole or parts of some activities be performed elsewhere at lower-overall cost?

These are matters for the hospital itself. The other side of the coin is the

question of access: the larger the hospital, the further must its clientele travel. Distance may impose both economic (time and cost) penalties to users, and health penalties if time is crucial to survival. It may also impose penalties in terms of staff access and recruitment.

Economies of scale/scope or agglomeration are traditional areas of economic analysis. They can be investigated by using statistical methods to compare units of different size or carrying by the detailed analysis of the costs of executing each function, sometimes known as the engineering approach. Another method might be called the professional approach. That involves assembling groups of people with relevant experience and, often in the absence of hard or quantitative information, requiring them to express a view on the advantages of size. Yet another way - not available in the UK - is to look at the results of market processes: have large suppliers driven out small? If large and small co-exist, does that mean that advantages of scale are not marked or even absent, or that each is actually carrying out a different if apparently similar function - as, for example, the small and large companies in the motor industry?

Although, as some of the literature cited in the excerpts in annexes 2 and 3 shows, there is statistical evidence and professional opinion on the advantages or otherwise of size, the issue is far from clear-cut. Statistical findings and professional judgements either conflict or are inconclusive. As relative costs and technologies change, we would scarcely expect there to be a 'right' answer anyway. Moreover, to put the question in terms of scale may be to hide the real options available. A better formulation might be to ask what

benefits or cost penalties arise from 'unpacking' the bundle of activities that are carried out within large hospitals and, either carrying them out in smaller units or outside the walls of the hospital altogether, at home or in other non-clinical environments.

Within that formulation, we can picture the comprehensive role of the hospital coming under attack from several 'unpacking' activities:

i) development of day surgery and other out-patients activities which reduce the need for on-site services;

ii) development of 'hospital at home';

iii) changes in supply of support services which allow economies of scale to be enjoyed at smaller sites (e.g. cook/chill and new forms of energy technology);

iv) retention/development of small units for minor surgery linked to primary rather than acute care;

v) removal of, in particular, geriatric patients, to other less clinical settings;

vi) development of specialist units, e.g. for day surgery, or other treatment outside the main site, but possibly within hospital control.

In general, the evidence, either of the market or within non-market systems, case studies, suggests that these threats are real, i.e. that these developments do offer lower costs than those obtaining in large general purpose units, or other advantages such as greater convenience to patients.

A recent King's Fund/NAHA study (New Horizons in Acute Care) summarised the implications as follows:

> *'Hospitals in the future are likely to be very different from now. Our analysis suggests that the need for beds will decline as greater use is made of day surgery and day investigation facilities and as more emphasis is placed on care by GPs, self care and care in the home. A core of intensively used beds, grouped to provide maximum flexibility, will remain, with appropriate support from radiology and pathology departments. Pathology tests will be carried out increasingly on wards and at the bedside. It will be difficult to justify a central laboratory for every hospital. Economies of scale are likely to dictate that laboratories will serve much larger populations than currently. Radiology, or diagnostic imaging departments as they may become known, will be more accessible and the technology will be used by a wider range of personnel. Fewer traditional operating theatres and more day surgery suites will be required.*
>
> *As the need for beds declines, hospitals are likely to serve larger populations in order to justify the critical mass of facilities required to maintain a satisfactory service. This will be reinforced by a*

> *stronger emphasis on quality assurance and clinical audit, coupled with consumer pressure for higher standards. Increasing research evidence indicating that better results are obtained in hospitals where staff are experienced in treating specific conditions is likely to result in greater specialisation within the medical profession. The emergence of regional specialist centres may be at the expense of district based services. A loss of accessibility may be the price to be paid for higher quality care.*
>
> *As a consequence, a district general hospital serving a population of 250,000 may provide only general specialist services such as general medicine, surgery, obstetrics and gynaecology, paediatrics, and trauma and orthopaedics. Even within these services, the full range of treatment might not be provided as doctors concentrate on their areas of expertise. Where there is evidence of higher standards, health authorities may well decide to purchase some specialist services from outside their district. The wider range of services and specialties may be limited to a small number of centres serving a number of districts. At the same time, there may be a need for facilities for convalescent care at a local level, with less intensive medical and nursing input. Recent experiments using convalescent beds, hotels (Worthing), and hospital-at-home (Peterborough) schemes have shown good results, and point the way to possible future developments.'*

However, although many case studies of the impact of individual changes can be found, it is harder to find assessments - as opposed to general scenarios such

as the King's Fund study just cited - of their full implications for the allocation of resources to hospital based services. What that requires is the capacity to simulate the cost (and other) implications of different patterns of delivery, not simply at current cost levels but also, because of the long lead time needed for planning major structural changes, at those likely to obtain in the medium to long term: as Bob Evans has put it:

> *'...there appears to be a great deal of scope for lowering hospitals costs, and improving the effectiveness and efficiency of the hospital "industry" in particular program areas. No one programme innovation by itself will have a major impact - even if it were possible, say, to do all tonsillectomies on a day care basis, the influence on overall hospital use would be minimal. But across all forms of questionable utilization, the potential for reduced hospital use appears to be very large indeed. No one has yet attempted to assemble to literature on alternatives to conventional in-patient care, to see what the aggregate impact could be. A study which looked, diagnosis by diagnosis, at the savings in hospital use which have been demonstrated in some form of experimental or field trial, without deterioration of patient outcome, would almost certainly yield very large numbers indeed.'* (Source: R. G. Evans, Strained Mercy, 1984)

This challenge does not appear to have been taken up. Although economists have tried to establish the existence of scale economies, taking the hospital as the unit of analysis and accountants the cost of carrying out individual operations, little effort appears to have been put into developing techniques

of examining things as they might be, as opposed to how they are. In the UK for instance most of the effort going into the costing of hospital services has been directed at creating budgetary frameworks within the existing pattern of provision. The effort going into exploring the cost (and other) implications of running things differently has been modest, confined to a small amount of statistical modelling of a few hospital functions. It is one of the curiosities of the apparently highly centralised UK system that, although hospital building has been very tightly controlled by the centre, the amount of operational research/economic work devoted to developing the techniques for find 'best' patterns of provision has been very limited.

Costs

Underlying some of the 'threats' mentioned above are changes in relative costs arising from technological developments such as less invasive surgery on the one hand and economic changes on the other. The latter arise mainly from the labour-intensive nature of hospital care which means that higher productivity in the economy as a whole tends to put up health care costs relative to costs in general. Other factors of course may also be at work, including internal cost-push factors such as new technology, but in the UK relative cost shifts have accounted for most of the increase in the real level of hospital costs in the 1980's.

The basic economising response to shifts in relative costs is to seek different factor mixes which promise lower costs. Capital intensity in the hospital setting tends to refer to the extent of high tech treatment available

for diagnosis and treatment. In this context, higher capital intensivity means higher cost (and possibly higher benefit as well). In most industry contexts, greater capital intensity is seen as a means of reducing other inputs, particularly labour. Just what scope is there for such substitution in hospitals?

In the UK, there has been a long-established design effort within central government devoted to producing an economical hospital. Although the new designs, particularly the so-called NUCLEUS design, appear to have produced reductions in running costs (including medical expenditure), the returns are very low on the capital invested - just 1 or 2%, very far from being adequate to justify new investment. Several quite different implications may be drawn from such figures: one, that for all the effort put into them the designs are poor in economic terms; two, that the real benefits from new facilities lie in benefits to patients; three, that replacement hospital building is simply not worthwhile.

In other areas, such as the physical fabric, particularly heating/lighting/ventillating, returns appear to be much higher and can be obtained without major investment. The obstacles to achieving them appear to be organisational rather than technical. However, useful though cost-savings in these areas may be, they are unlikely to contribute much to overall cost reductions. For important though the physical framework for hospital activity may be, the bulk of the costs lie elsewhere, in the nursing and medical functions.

HOSPITAL EXPENDITURES (excluding capital)

		%
Wages and Salaries of which:		73
Medical	11	
Nurses/Midwives	33	
Ancillary/Maintenance	10	
Medical Purchases of which:		9
Drugs	3	
Equipment	3	
Other Purchases		18

Source: NHS Accounts

In these areas, the key form of substitution is more likely to be of one form of labour for another, specifically doctor/nurse substitution and substitution within the broad range of nursing skills, right down to unskilled (or at least not formally trained) assistants and ultimately household for professional care.

These are far from being uncharted areas, particularly in the US. But, in the UK, professional development appears to have an internal logic of its own,

which works regardless of the need to contain costs. This will have to change, as the following extract suggests.

> *'Since cost containment is certain to continue be one of the dominant themes of late twentieth century health care in advanced countries, it is clear that the widespread adoption of a new mode of organising nursing work will depend on its cost effectiveness. The extent to which these organisational changes permit - and are seen to permit - the more effective use of scarce and expensive staff will be a critical determinant of the fate of the new nursing. Since one of the most important sub-themes of cost containment in health concerns the cost-effective management of doctors' clinical work, the chances of nurses being allowed greater professional autonomy without careful attention to the effect of this on health costs is very unlikely. The new nursing will need to demonstrate that changes in nursing skill-mix and the organisation of nursing work use resources more effectively than traditional methods. Since cost is far easier to measure than quality, nurses will find this difficult to do (Buchan, 1990). Moreover, as mentioned above, improving cost effectiveness will raise a number of politically contentious issues including the appropriate deployment of untrained staff and the substitution of nursing for medical staff in key areas.'* (Source: New for Old? Prospects for Nursing in the 1990s, Virginia Beardshaw and Ray Robinson)

Important though substitutions of various kinds may be, there are, of course, many other general cost reduction strategies.

One of these is competition. In the UK, as a result of a specific Government initiative, support services - usually provided in-house - have been subject to competitive tendering. Although in-house teams have usually won, costs have been reduced by, overall, some 10%. The recent White Paper promises to extend the scope of competition to medical services. How exactly that will work out will depend critically on the regulatory framework, which we go on to consider later.

Another general strategy is to increase throughput with the aim of spreading fixed costs over a larger 'output', mainly by reducing length of stay and simultaneously reducing nominal capacity as measured in bed units. Such a strategy appears to have the merit of swimming with the technical and medical tide. Length of stay appears to fall 'naturally' i.e. without specific management action to bring it about, although the rate at which it has fallen varies between countries and parts of countries (see, for example, the recent review by Myfanywy Morgan and Roger Beech, *Variations in length of stay and rates of day case surgery: implications for the efficiency of surgical management*, Journal of Epidemiology and Community Health 1990).

In an as yet unpublished paper, I conclude that reduction in bed capacity has been the main source of the cost savings made within the NHS in the 1980s. But such cost savings have not been enough to produce unit cost reduction.

Experience of the last ten years in the UK does suggest that hospital performance, in terms of activity per unit resource, has been improved but the growth in the cost of resources employed has meant that costs have not

actually fallen. The first column of the following table shows the activity index for NHS hospitals calculated by the Department of Health: the second, the volume of resources employed and the third their cost. The index shows a rise relative to resource volume of about one percent a year over the whole period, but it has risen less rapidly than costs. The rate of increase reflects both the labour intensivity of hospitals and relative gains in pay for medical and nursing staff.

COST WEIGHTED ACTIVITY INDEX FOR HOSPITAL AND COMMUNITY HEALTH SERVICES

	Cost Weighted Activity Index	Expenditure adjusted for changes in input unit costs	Expenditure in real terms
		74 - 75 = 100	
1974 - 75	100.00	100.00	100.00
1975 - 76	97.14	101.70	104.18
1976 - 77	103.10	102.00	104.90
1977 - 78	105.66	105.11	103.12
1978 - 79	106.89	108.01	104.92
1979 - 80	107.07	106.91	107.18
1980 - 81	113.23	109.91	119.14
1981 - 82	115.22	112.14	119.80
1982 - 83	114.63	113.38	120.35
1983 - 84	120.96	113.52	121.02
1984 - 85	124.57	113.40	121.83
1985 - 86	127.90	113.59	121.79
1986 - 87	129.80	114.16	126.57
1987 - 88	131.94	116.17	132.64
1988 - 89	133.07	116.55	137.28

The interesting economic question is how much further the process of increasing throughput/shortening stay can go, without incurring: i) clinical

costs and ii) economic penalties, as a result of action specifically to reduce hospital costs. As length of stay is relatively long in the UK, the answer would seem to be, someway yet. In parts of the US, the answer appears to be less clear-cut after sharp reductions in length of stay in response to the regulatory measures introduced in 1980's.

In formal terms, the question of length of stay can be expressed as: does the cost of reducing it exceed the benefits lost from so doing? In other words, it is part of the larger question of whether the value of the activities carried out in hospitals exceeds the costs. In the US, with its much higher levels of surgical intervention, the question of over and unnecessary treatment appears much more serious than in the UK where rationing of access and of the technology available for diagnosis and treatment is endemic. In both countries, however the economic question is the same: how can be the point where benefit equals cost be identified? At present, neither country appears to have an objective mechanism for doing so.

Organisation and Incentives

One sign of the imperialism of economics is the treatment of organisational and management issues as economic ones. In the present context, that has meant trying to fit the hospital within the economists' typical framework of maximising behaviour. But, of course, the key question is: maximising what?

Although the language and the analytic apparatus which go with it may be off-putting, the question which economists using the maximising approach are

trying to resolve - how does 'the hospital' respond to the financial environment in which it finds itself? - is a central one in the regulated and quasi-competitive health care systems which both the UK and the US are moving towards (if from different starting points).

In the UK, the main statistical work on the behaviour of hospitals was carried out 20 years ago by an American, Martin Feldstein. Since then, little further has appeared - perhaps the idea of hospital behaviour at the aggregate level has not been taken seriously. The process of introducing general management in response to the Griffiths report, could be regarded as an attempt to make British hospitals single organisations as opposed to a confederancy of sometimes competing interests while the creation of hospital trusts will take that process one stage further, as indeed will the lesser changes implied by the introduction of quasi-contracts within district health authorities.

There is massive experience in both countries of supplier regulation, particularly of public utilities. To sum it up in a sentence, the suppliers tend to dominate the regulators because they have the greater expertise, which dominance may be strengthened by lack of competition, inherent because of natural (spatial) monopoly or artificial - i.e. induced by restrictive practices or political pressure. This summary appears to apply across differences in organisation, financial structures and ownership. Both the US and UK experience are assessed in a forthcoming book by a former senior civil servant with extensive experience of nationalised industries: his central and ultimately pessimistic conclusion is that while the lessons of history enable the grosser regulatory mistakes to be avoided, ultimately any regulatory

regime is likely to be corrupted by pressure of one sort or another. This conclusion was based on the experience, extending back to the railway age, of regulating public utilities.

As Alain C. Enthoven has remarked (*Health Affairs* Summer 1988), health care finance and delivery are exceptionally complex fields of activity, arguably much more complex than the public utilities. It will become all the more so if, as some of the above paragraphs suggest, there are routes towards lower costs which have significant implications for the pattern of service delivery and organisation. At all times, a distinction will be required between services actually supplied by hospitals and hospital type services: the latter are those which it may be economic to unpack from the central organisation in the various ways outlined above. The more important this distinction, the greater the regulatory task, since it will mean that potentially sharp conflicts of interest will develop between existing and new suppliers.

The kind of difficulties likely to be encountered are well illustrated in a recent analysis of costs in American Hospitals by Jerry Cromwell and Dena Puskin (*Hospital Productivity and Intensity Trends: 1980-1987*, Inquiry Fall 1989). This examined the impact of Medicare's prospective payment system on hospital activity. The results are not easily summarised because of the complexity of the reactions: improvements and falls in productivity: rapid but temporary movements from in to out-patients and reductions in length of stay. In these ways, the hospitals showed themselves to be economically adaptable institutions. There is no doubt the new control system did bite,

but not in ways that were readily unpredictable nor necessarily desirable.

Another paper by Jack Hadley & others (*Profits and Fiscal Pressure in the Prospective Payment System: Their Impact on Hospitals*) reinforces the point that hospital response is hard to predict and, once established, to interpret. Their conclusion that prices should be set on a hospital rather than group basis serves to emphasise how easily regulation can develop into very detailed control indeed. However, they fail to say how one to one control is to work in practice, though the history of that form of regulation is not encouraging. These examples are intended purely as illustrations from an enormous literature. The main conclusion to be drawn from it is obvious enough: that even years of experience are an insufficient basis for determining how it should best be carried out. It remains a matter of learning by doing.

In the UK, the system of finance is very different from that analysed in these studies. Nevertheless, a similar kind of game has been played in the last ten years between the NHS and the Government, as the Government have tried to squeeze, largely by broad-brush financial measures, better performance out of the acute hospital sector. The game has turned around the question of whether better performance is feasible and, if so, how much. The Government strategy is to claim substantial improvements can be made, so extra services can be provided with more or less the existing level of resources: the hospital system's proponents to claim that they cannot, so extra finance must be provided if service priorities are to be achieved.

The game might perhaps be best described as blind man's bluff, not only

because we have no adequate measures of system output, but also because no consciously chosen strategy for cost containment or cost reduction has been defined. Or, perhaps more accurately, within the chosen strategy of imposing general financial pressure, the best routes to lower costs have not been identified. As a result, as earlier remarks have implied, we have no idea what the scope for cost reduction or productivity improvement is. We can presume that increasing throughput per bed has reduced costs through allowing rationalisation of capacity but cannot be sure how much further that process can go. Similarly, both the short and long run gains from shifting to ambulatory care have not been established precisely even though nearly all the evidence suggests both will lead to cost reductions.

While such 'strategic' changes look attractive, so do such 'tactical' measures as improved control over admissions and better scheduling of operating theatre capacity as well as such apparently simple areas as energy costs where the potential for savings is well established. In the UK, in any area such as theatre management which has been the subject of detailed investigation by, for example, external efficiency auditors or value for money teams, potential for savings have been revealed which appear easy to achieve but even here we do not have a clear idea of the overall potential.

As the following quotation suggests this deficiency is not specific to the UK.

> *'The divergent cost containment strategies of the 1980s shared a basic premise: budgets constrained by one or another means would cause providers to become "more efficient" producers of medical care.*

Identifying and eliminating wasteful practices did not seem so imposing a task. Hospitals, in particular, had been nurtured and shaped by a cost-based payment system that rewarded excess and punished thrift. Yet, as we enter a new decade, we do not find a sleeker and more efficient delivery system. Rather, we find still costly institutions suffering increasing financial distress. The expected revaluation in health care productivity based on innovations in service delivery has not taken place.

To be sure, inpatient stays have shortened somewhat, and some outpatient services have replaced inpatient treatments. But little else appears to have changed. Hospitals now employ more people to treat fewer patients than they did in 1983, despite cost-saving incentives under Medicare's prospective payment system (PPS). Increasing severity of illness does not, by itself, account for this growth in labour inputs. Labour hours per case-mix adjusted admission declined during the first two years of PPS but for the past three years have been on the rise again.

Strategies adopted by private payers to hold down costs both inside and outside the hospital show no better results. The returns from various forms of managed care (for example, health maintenance organisations, preferred provider organisations, and utilisation review) have been disappointing. While employers are spending less on inpatient care as a result of managed care than they otherwise would have spent, increases in outpatient costs are absorbing much of this

> *savings*. (for source, see Annex 1, where the rest of the article will be found).

As already hinted, this experience is not new. The early railway companies also ran rings round their would-be regulators, precisely through such 'cost-shifting'.

Even though, as of now in parts of the US and prospectively in the UK, competition between suppliers is being partially relied on as a means of identifying the scope for lower costs, it seems unlikely that it will be generally effective, in part because of supplier collusion, in part because of the braking effect that concern over quality will, rightly, exert over pure price competition and, in part, because some of the basic economics of some hospital activities may be against it. As the King's Fund study already cited implied, there may be marked economies of scale in some functions and not in others. In effect a natural spatial monopoly may exist for some functions, some front-line such as accident and emergency, others support, such as pathology laboratories.

In the absence of competition, or where competitive forces are muted, what will be the driving force for lower costs? The detailed answer has to be health system specific because institutions determine options, but in broad terms, it must be the customer/regulator. The question that poses is what the institutions playing those roles need to perform it effectively in terms both of powers and information.

In Annex 1, the rest of the quotation from the paper by Stuart H. Altman and his colleagues can be found, which attempts to answer this question. What is striking is that it could - some institutionally specific references apart - have been written about the UK.

The UK has, potentially, one great advantage, that strong central institutions do exist which are in a position to carry out the kinds of work identified and to disseminate it. I have in mind here the NHS Management Executive and the Audit Commission. The experience of the 1980s has been, however, that central initiatives are hard to implement particularly where they demand diversion of resources from exisitng activities (community care and preventive programmes are examples of this). In the 1980s, the UK 'solution' is greater competition. But that will not alleviate the rationing effect of tight cash limits. The final question, therefore, which I will pose but not attempt to answer, is whether the competition environment we are likely to have, as opposed to what might theoretically be available, is one in which productivity will rise faster than in the 1980s.

ANNEX 1

Extract from 'The Need for a National Focus on Health Care Productivity', by Stuart H. Altman, Jason Goldberger and Stephen C. Crane, Health Affairs, Spring 1990.

Labour market trends. The need for the industry to make more effective use of resources has become all the more pressing because of a restructuring of the health care labour market. Health care is an extremely labour-intensive industry, with labour costs making up 50 percent or more of many hospital budgets. Historically, health employers have been able to take advantage of a large pool of female and minority workers willing to work for relatively low wages. Current demographic and cultural trends underlying the shortage of nurses and other health workers, however, suggest that the days of cheap labour may be over. As the baby-boom generation ages, the demand for health care workers is likely to intensify as general labour supply growth slows down. With the demise of a labour market of women who in the past saw few career opportunities outside of nursing and teaching, health care providers compete fiercely with other employers for workers.

Projections of tightening labour markets are not limited to nurses and other skilled health workers. A recent study by the state of New York on supply and demand issues in the health work force highlights the problem facing nursing homes, home health agencies, and other community-based providers in filling nursing aide positions. Shortages at both the high and low ends of the labour

market are putting increasing pressure on administrators to raise wages and improve quality of work life. Institutions unable to pass along these costs now face the untenable choice of insolvency or understaffed units. Given the labor-intensive nature of the health industry, if providers cannot tie wage increases and job redesign to productivity improvements, costs will explode.

PROMOTING PRODUCTIVITY

In the wake of the disappointing results of competition and the cost containment efforts of PPS, it is time to question the assumption that financial necessity alone can serve as midwife to a more efficient health care delivery system. A national effort is under way to advance and disseminate knowledge of the relative clinical effectiveness of various treatments. A comparable effort should be undertaken to find more efficient ways of providing needed services. There is also a clear and separate need to identify organisational arrangements that help clinicians cope with the uncertainty endemic to the practice of medicine in ways other than "if you're not sure, do more."

Limitations: past and present. Up until now, our cost containment strategies have placed the full burden on the individual institution - be it hospital, nursing home, or home health agency - to develop more efficient ways to use human and capital resources to produce care. This must change. Absent a tangible plan to help providers become more productive, continuing to ratchet down payments is not likely to lead to the desired result of a health care

system that is less costly but still uncompromised in quality. Despite increasing pressure from Medicare PPS to limit expenses, hospitals have not been able to sustain the productivity gains they made during the initial years of PPS. This reversal suggests that administrators have reached a limit to the savings they can squeeze out of their institutions through shortened stays, improved scheduling of procedures, and other minor modifications.

Sustainable increases in health care productivity will require a fundamental rethinking of the organisation of work. The individual health care institution - the agent expected to adapt to financing incentives on its own - is not likely to be up to that task. Certainly the evidence from other US industries regarding the capacity of individual firms to make productivity breakthroughs is not encouraging. Despite intensifying market pressures to revamp their production processes, broad segments of US industry have not been able to keep pace with the innovations of their Japanese and European competitors. Health care institutions, with no history of efficiency improvements to draw upon and with far more vexing issues to deal with than their counterparts in manufacturing face, are ill-equipped to undertake this reorganisation alone.

Health administrators, acting to ensure their institutions' survival, likely will adopt those strategies that promise the most immediate and certain returns. A recent Institute of Medicine study observes that within health care organisations "there has been little research and experimentation in structuring staffing policies and working environments." Until the task of

overhauling the basic organisation of work is made more accessible, few administrators will choose this unproven and conflict-laden strategy. Instead, they will resort to those strategies that have worked in the past: limiting access to those unable to pay, shifting costs to vulnerable payers, developing new markets and dropping "unprofitable" services, and lobbying public officials for financial relief.

NEED FOR A NATIONAL FOCUS

If we are to avoid the scenario of more restrictive access and more cost shifting with no noticeable improvement in productivity, there must be specific research and planning on how to do more, or at least the same, with less. And, this new information must be available to those institutions expected to move into the brave new world of efficient health care.

Purpose. Commitment to a national focus on health care productivity would make this task more accessible to all institutions - those well-equipped to meet this challenge and the many smaller, less well endowed institutions that stand little chance of making such an adaptive leap on their own. The purpose of this focus would be to: (1) develop ways to make better use of resources, both labour and capital, to deliver treatments and services; (2) encourage institutions to improve the "learning curve" of health care organisations so that clinicians and support staff at all levels can share in and build upon the advances of others; and (3) identify organisational arrangements that help clinicians cope with uncertainty without automatically doing more. This

effort would complement the task of eliminating inappropriate care through better effectiveness and outcomes research. Thus, progress on cost control would not be completely reliant on the development of new clinical information.

Public and private sectors. It is unreasonable to expect that individual health care institutions will undertake the kind of research and development efforts we propose. The hospital that devotes its resources to developing a fundamentally different way of coordinating its labour force could not prevent other hospitals from copying its innovation. By the same token, it could not force these providers to share in the costs of the development of this knowledge. At a minimum, therefore, a cooperative effort among providers is required.

Furthermore, because few providers, or even consortia of providers, could afford the substantial investment required for this kind of research - and even fewer could undertake the risk - both the public and private sectors should be involved. Private foundations, historically key supporters of innovation in health services delivery, once again will need to play an important role to launch this venture. But the major burden must be borne by the public sector, particularly the federal government.

The scope of innovation required to produce a more efficient delivery system and the protective instinct of each sector in the system argue against leaving individual providers to their own devices. The hospital industry probably

would not consider innovations that challenge its central role in the delivery system. The same bias likely would hold true for any segment of the health care world. A national focus on health care productivity could encourage all players to rethink how best to fit the different pieces of the delivery system together. It might also provide the direction and leadership to avoid some of the pitfalls of otherwise unmanaged efforts at productivity innovation.

Fundamentally, health care reform is too important to leave to institutional responses and too pressing to leave to chance. The turmoil, uncertainty, and widespread failures and dislocations that mark transition periods in other industries are not tolerable when it comes to health care. We need to find a different path to innovation - a path that moderates disruption and protects patient care without slowing the process of innovation altogether. Social interest in health care is clearly to promote the quick diffusion of any productivity advances and to encourage social ownership of new ideas. A national effort will help provide the resources to determine what changes are necessary and create the visibility to disseminate the findings.

ACTIVITIES FOR CHANGE

Comparative analysis. What kinds of research and development activities would spur innovation? One important activity would be to compare other health care systems with the US system. Canada, for instance, keeps health costs down not by serving fewer patients or serving patients less in need of care than in the United States, but by using fewer inputs to deliver this care. These savings

come from both lower administrative costs and lower direct care costs per case-mix adjusted discharge. The source of administrative savings - a single public payer and global budgeting of hospitals - is easy to understand. The source of clinical savings is not so obvious. In recent articles on these cost differences, Joseph Newhouse and colleagues and Robert Evans suggest that the next step is to look at the actual ways in which care is delivered in the two countries. For instance, what labour and capital inputs are used for particular treatments? To what extent do different organisational arrangements (for example, methods of clinical decision making, coordination of services, and so on) account for differences in cost? Is Canada experiencing the same trend toward greater reliance on a more specialised and better-educated work force to deliver care? If so, is its system better able to make use of these highly skilled workers to keep costs down? There is a wealth of knowledge to be gained from such comparisons.

Similar comparative and evaluative analyses should be performed on domestic health care institutions and organisations. Staffing ratios and organisational arrangements are known to vary by region and institution. Certain organisations are also suspected to be innovators either by design, by need, or both. Rural institutions, for instance, facing shortages of individuals with critical skills, have developed new ways to deliver services. It is important to identify these innovative institutions and organisational arrangements, to measure their productivity and efficiency, and to assess the reasons for their success or failure. Analysis of a failure can prove as enlightening as consideration of a success. The analyses envisioned here

would be similar to the studies of medical practice variations performed by John Wennberg and others, except that the focus would be on productivity and efficiency.

Utilisation analysis. The driving force for productivity improvements in industries other than health care historically has been improvement in capital. In the health sector, however, improvements in medical technology generally have added further to the cost of health care and have been labour increasing rather than labour saving. Even as new technology becomes more routine, labour requirements often do not change. Moreover, the physical design and structure of health care institutions have remained virtually unchanged over the past thirty years, despite substantial changes in medical practice, reimbursement incentives, and modes of organising the delivery of health services. Analytic studies and administrative attention thus must focus on ways to better use labour, capital, and facility design to increase the efficiency of health care delivery.

Analysis of barriers and constraints. Yet another activity would be to identify and analyse potential barriers and constraints to productivity improvement. It is not sufficient merely to have an idea about how to improve productivity. It is also necessary to understand the factors that might limit or prohibit these changes. For instance, what role does the existing system of facility and occupational licensing and regulation play in dampening responses to problems of productivity? How can financial incentives be used most effectively to stimulate and reward productivity improvement, and to

avoid or sanction poor performance? What organisational and professional factors must be overcome to promote the adoption of productivity-enhancing changes?

Teamwork training. It is also time for the health care sector to rethink the way it trains both managers and clinicians. Strategies that call for new work relations among caregivers are bound to fail as long as medical schools and residency programs continue to neglect training on cooperative practice styles and team building between physicians and other health professionals. In general, education programmes for all levels of health workers need to be subjected to a new level of scrutiny. What change should be made in the way we educate and train clinicians and administrative staff to produce a work force capable of initiating efficiency improvements?

A FOCUS FOR DEBATE

If the crises of cost, access, and quality are to be addressed effectively through the issue of productivity, the national effort must develop a cooperative working relationship among payers, providers, consumers and policymakers. Placing increasing burdens and expectations upon providers without involving them in the process of developing the plans and rationale for change is a formula for frustration, if not failure, as recent history has shown. Payers, consumers, and policymakers, however, cannot afford to be held hostage by arguments that only providers are able to interpret what is best for patients and society. For too long, issues of productivity have been

missing in the debate over national health policy. It is time to focus attention on this important dimension of the organisation and delivery of health services.

ANNEX 2

Economies of Scale

In the UK, there appear to be no recent statistical studies of economies of scale. A study of the costs of different building forms by the Department of Health's Building Directorate, however, incidentally utilised scale as an explanatory variable, but failed to establish any relationship.

A number of US studies are summarised in the following two extracts:

A: R. G. Evans: Strained Mercy

> *'Certain very specific results have arisen from these studies (Barer 1981, 1982). First the initial interest in scale economies has been seen to have been misplaced. Early United States studies gave widely divergent results (Berki 1972; Lave and Lave 1979); Canadian studies consistently showed unit costs rising with scale, more or less indefinitely, unless adjustment is made for differences in case load characteristics between small and large hospitals. After such adjustment, scale effects become rather unimportant. The characteristics of patients treated, as represented by age, sex and diagnosis, exert a much more significant influence on relative costs, explaining half to two-thirds of differences across hospitals in costs per separation. Inpatient costs in teaching hospitals appear to be*

significantly higher than in non-teaching, even after deduction of costs directly allocated to education. Short-run utilisation variables - occupancy, length of stay, case flow rate (cases per bed per year) - usually have the anticipated effects; costs per day fall as utilisation rises, indicating that hospitals are mostly on the falling (negatively sloped)segment of the shor-run average cost curve. Cost per episode of course rises with length of stay, but not proportionately. Marginal costs per case or per day are significant - an empty bed is not as costly as a filled bed - but are perhaps in the neighbourhood of half of average costs.

Most striking of all, Canadian studies consistently show that a combination of scale, short-run utilisation level, and patient characteristics variables 'explain' a very large proportion of inter-hospital variation in costs per day or per case - usually in the range of 70 - 90 percent and in some studies close to 95 percent. This finding indicates a very high degree of managerial uniformity, presumably induced by t he centralised reimbursement system and associated oversight. It does not indicate either uniform efficiency or uniform inefficiency, of course, but only that most variations can be 'explained by', or associated with, identifiable characteristics of the hospitals's situation, not differences in management.'

B: Paul J. Feldstein: Health Care Economics

'The following is a brief summary of the findings on economies of scale. Because of the conceptual and data limitations in conducting such studies, it is difficult to be precise with regard to exact estimates for the effect of any of the theoretical variables on hospital costs. Economists studying hospital costs disagree as to whether the various studies have been able to hold constant all the other factors affecting hospital costs. Some general findings, however, do appear among the various studies. First, there appear to be slight economies of scale: hospitals with approximately 200 - 300 beds appear to have the lowest average costs. The shape of this average-cost curve is hallow; that is, it does not fall sharply, nor is the minimum point much below that of hospitals on the ends of the curve.

Although difficult to determine empirically, hospitals may also be subject to economies of scope, that is, hospitals with greater service capability may be subject to larger economies of scale. The reason for economies of scope is that it may be less expensive to produce several services jointly than it is to produce each separately. Services that have an interrelationship with one another may have lower costs when they are produced together within the hospital. The implication of the above is that services which are subject to economies of scope are more likely to be provided regionally or in

larger markets.

Finding economies of scale (or not) for the hospital as a whole is insufficient for policy, planning, reimbursement, or any other purpose. For example, there are presumably large economies of scale in laundry operation; such information would be useful for a make-or-buy decision. Can a hospital produce its own laundry services more cheaply than it can buy such services from another hospital or from a centralised laundry service? The same analysis can be undertaken for other services within a hospital. For highly specialised services,such as lithotripters, the extent of economies of scale can be used to indicate how many such services can be offered in a given area. Which hospitals should be the ones to offer such services is a separate question, determined by the hospitals themselves in a market-competitive situation or by a regulatory agency when planning is used. Information on economies of scale by service can be used by a regulatory agency to set reimbursement levels, and then any hospital able to provide the service at that price can do so.

Another finding based on studies of economies of scale is that the mix of patients in the hospital is an important determinant of hospital costs: in some cases, case mix explains more than 40 percent of the variation in average costs between hospitals. The implication of this finding is that with prospective reimbursement for hospital payment, accurate measurement of the hospitals' patient mix and the complexity

of the cases is important in establishing a hospitals' prospective rate.

Studies that have attempted to estimate the effect on hospital costs of physician input have found that both the number and specialty mix of physicians have a significant effect on costs.

The finding of slight economies of scale suggest that many hospitals could exist in a community, possibly competing with one another. Since hospitals appear to add services in a very predictable way as they grow, 'basic' hospital services are not subject to large economies of scale. (There are also probably good substitutes available for most of these services in a non-hospital setting [eg. the physician's office].) In a large community there is little reason why there should not be multiple hospitals, although it is unlikely that each of the hospitals in the community would have all of the same specialised facilities. There would thus tend to be a less competitive market in a particular area as far as more highly specialised services such as open heart surgery are concerned. The demand for such highly specialised services is generally not of an emergency nature; the relevant market is likely to be at a state or even a regional level. Even for these services, it is unlikely that a case can be made for treating them as a natural monopoly.'

ANNEX 3

HOSPITAL SIZE AND ROLE: RECENT UK POLICY STATEMENTS:

Hospital Plan, 1962:

> In recent years there has been a trend towards greater interdependence of the various branches of medicine and also an increasing realisation of the need to bring together a wide range of the facilities required for diagnosis and treatment. Hence the concept of the district general hospital which provides treatment and diagnostic facilities both for in-patients and out-patients and includes a maternity unit, a short-stay psychiatric unit, a geriatric unit and facilities for the isolation of infectious diseases. Provision is made for all other ordinary specialties, but there are a small number of specialties, such as radiotherapy, neurosurgery, plastic surgery and thoracic surgery which need a larger catchment area and would be provided only at certain hospitals. The size of hospital this concept implies would normally be of 600-800 beds serving a population of 100,000-150,000. Some district general hospitals, particularly where more specialties are provided, might be larger. Others would be smaller, though they would rarely be of less than about 300 beds. Each would be located in or near the centre or one of the centres of population of the area which it serves. The district general hospital offers the most practicable method of placing the full range of hospital facilities at the disposal of patients and this consideration far outweighs the disadvantage of longer travel for some patients and their visitors.

Report of Committee on *The Functions of the District General Hospital*, 1969:

> 11. Perhaps we should begin by discussing the essential function of the hospital component of a comprehensive health service for the population of a defined area; we see this as being to provide those medical, para-medical and nursing services which, either because of the specialised skills and equipment or because of the degree of care required, cannot economically be provided in the patient's own home or at the health/group practice centres in the community (see paras. 40-46 below). It is now generally accepted, and we are ourselves convinced, that this function can more efficiently and effectively be performed by a comprehensive district general hospital than by a number of separate hospitals each with limited functions. Not merely can supporting services be more economically provided at one central site (see para. 22), but the patient who may be suffering from a combination of different conditions should not have to be referred from one hospital to another: he should ideally be able to obtain whatever hospital treatment he requires from a team of consultants working together in the one district general hospital. (We say "ideally" only because there are certain highly specialised forms of treatment - see para. 30 - for which it is not possible to provide in every district general hospital.)

12. We therefore do not favour any further development of separate children's, women's, accident, orthopaedic, or other single-specialty hospitals: we rather consider that these services should be provided at district general hospitals in children's departments, maternity and gynaecological departments, and accident and orthopaedic departments. (The children's department should be a comprehensive one, including adequate provision for assessment as well as for in-patient care, and should be staffed by doctors, nurses, teachers, etc. qualified to work with sick children; all child patients should come to this department.) We would however concede that in the major conurbations and cities not every district general hospital need include a department of each of these types: for in these areas the advantages of concentrating these services into larger units may perhaps outweigh the disadvantages (notably in the recruitment and training of staff) of limiting the range of services which the individual district general hospitals can give to the districts they serve.

21. Appendix A shows that only in general medicine and general surgery are there at present sufficient consultants to staff a hypothetical network of district general hospitals each serving 100,000-150,000 population with teams of two consultants in each in-patient specialty. We are aware, if only from the long waiting lists for treatment, that consultant staffing in orthopaedics and in gynaecology needs to be strengthened; and the representatives of the Royal College of Physicians agreed with us that paediatrics is another specialty that needs to be expanded, especially because of the need to bring all child patients under paediatric supervision and to develop centres for the assessment of handicapped children. But whatever expansion of consultant staffing in these specialties (and of supporting staff and services) may be justified by the potential demand, we must recognize that the available supply of suitable manpower and of training opportunities, as well as of finance, is limited: it would surely be rash to assume in current hospital planning that there will in due course be such large increases in the numbers of consultants in obstetrics and gynaecology, orthopaedic surgery and paediatrics that two of each would be available for every district general hospital serving 100,000-150,000 population. Yet we have said in paragraph 12 above that we think it essential that each district general hospital (except perhaps in the major conurbations and cities) should include a children's unit, maternity and gynaecological departments, and accident and orthopaedic departments. It follows that we must think of considerably fewer district general hospitals each serving (on average) a considerably larger population. Indeed, the larger the population to be served, the more comprehensive the range of specialties in which teams of two or more consultants can be employed.

- SUPPORTING SERVICES AND STAFF

22. Another factor pointing in the same direction is the need for efficient organisation and staffing of supporting technical and other services. We are informed that for several of these (e.g. pathology,

> central sterile supply, laundry) studies have already shown that concentration into large units each servicing 200,000 population or more would be advantageous; and we believe that as the array of supporting technical and scientific services required in hospital medicine (some of them very expensive) continues to increase and ramify it will become less and less possible to provide at smaller hospitals all the services and staff that will be required. We appreciate that it is possible to provide these services centrally to serve more than one district general hospital, but in the case of pathology at least we doubt whether such service from a distance can ever be entirely satisfactory: the optimum solution would appear to be the large district general hospital with its own service departments.

Hospital Services: The Future Pattern of Hospital Provision in England - DHSS Consultation Paper 1980:

> 10. Experience has shown that a large degree of concentration on a single site may in itself have serious disadvantages. Communications of all kinds within the hospital become more complex and difficult, as does management. Patients and relatives, as well as staff, find the hospital too impersonal. It often suffers from physical disadvantages, such as distance between different departments and the need to provide air-conditioning to internal areas, with high energy requirements. It is sometimes supposed that one building is cheaper to build and run than two, of equivalent functional content, but this may not always be the case.
>
> 16. In England, out of a total of some 2,000 hospitals over half have less than 100 beds and a further 600 hospitals have between 100 and 400 beds. The Government has already made clear its wish to retain small hospitals wherever sensible and practicable, though recognising that some closures of old, inefficient or badly situated units are necessary. Constraints on building new hospitals, social and geographical factors all suggest that many larger hospitals should also be retained. In urban areas they could form an economical and effective part of comprehensive district general hospital services provided on several sites. In rural areas and smaller towns they could provide a range of hospital services, but not merely long stay services, for the local community. Providing locally in small and medium-sized hospitals for patients not requiring the full range of dgh facilities, and particularly for those who require relatively long stays or frequent visits, admirably meets the community need for "our local hospital" - even though the range of services provided might differ considerably from hospital to hospital, according to local circumstances.
>
> 4. Plans for major hospitals being developed to provide comprehensive district general services typically include, in accordance with past guidance by the Department, a major Accident and Emergency department, a psychiatric unit, most of the District's acute beds, all obstetric beds, and up to 50% of geriatric beds required for the assigned catchment area,

together with supporting diagnostic and rehabilitation services. Some, particularly teaching hospitals, also contain regional or supra-regional specialties. It is proposed that this range of service should be retained in the main hospital which may itself be part of a dgh complex. But on what scale need they be provided? Recent calculations in the Department have suggested that a balanced hospital containing the major A and E unit, associated surgical and medical services, the majority of maternity beds, the childrens' unit, a smaller psychiatric unit and a modified target of 30% of geriatric beds would require a minimum of 450 beds. For a catchment population of 200,000 this would leave about 500-600 in these specialties to be provided elsewhere. Sometimes - where the catchment population is larger or for other reasons - it might be appropriate to provide up to 600 or so beds in the main hospital. These figures do not cover the inclusion of sub-regional (e.g. ENT), regional (e.g. neurology) and supra-regional services, and there may also be a case (in addition to such special services) for greater concentration of services in teaching hospitals; some 200 or so additional beds may be needed for these purposes.

Royal Commission on the NHS:

10.46 Although it is generally agreed that DGHs should be responsible for the delivery of specialised services, they have disadvantages. The TUC, for example, in their evidence to us pointed out:

> "There is a limit, however, beyond which the general hospital becomes too large and impersonal and the sheer physical distances within the hospital become too great."

The larger the DGH, the greater the population served, the more serious the problems of communication within it and of access to it are for patients and staff. The size of the hospital will also affect capital and revenue costs.

10.47 The optimum size for a DGH has yet to be determined, but a range of sizes, to take account of local conditions and needs, will probably be required. The "nucleus hospital" approach looks to offer the greatest flexibility in response to what are certain to be changing needs. We believe that increasingly the human aspects of hospital size, such as good communications, building up group loyalties and good industrial relations, will be seen to be important for both patients and staff. These are matters which need to be researched.

The place of general practitioner hospitals in the organization of hospital services, (*Health Trends*, 1982):

During the early years of the NHS the services of specialists were provided to all parts of the country. This had an important influence in the mental downgrading of the general practitioner units in the minds of administrators of the hospital service. For example, the establishment

of consultant surgeons in towns that hitherto had had none very quickly undermined the position of general practitioner surgeons who might have been performing the ordinary run of minor, intermediate and some major surgery in their cottage hospitals for many years. A number of general practitioner hospitals were accused of having low standards of care and excessive lengths of stay (Robinson, 1973). The climate of opinion became such that small hospitals were regarded as an anachronism to which some day someone would have to find a solution.

The Ministry of Health's (1962) first comprehensive plan for hospitals concluded that local general practitioner hospitals were no longer needed; the majority of beds would be in district general hospitals and the small hospitals would gradually be replaced - though some would be used for long-stay elderly patients. In the next few years a number were closed, but the vehemence of the local opposition tested the resolution of both RHBs and Ministers. A change in official policy was soon being planned and in 1974 a Memorandum was published which promulgated the idea of at least one small "community hospital" in each health district (DHSS and Welsh Office, 1974). It would have between 50 and 150 beds and be staffed by general practitioners but under the general oversight of consultants; patients would mainly be convalescent or long-stay, and no surgical operations would be performed. However, not many existing general practitioner hospitals had as many as 50 beds and the proposals proved generally unacceptable to general practitioners and difficult for RHBs to implement, though a few community hospitals were opened (notably in the Oxford Region).

In May 1980 the DHSS published a consultation paper on *The future pattern of hospital provision in England.* In his foreword the Minister for Health recognized that there was, after all, a need for small hospitals and suggested that it was right (or at least expedient in the present financial climate) to make the best use of what already existed. He stated his intention of giving health authorities the greatest possible discretion, within broad policies and within their financial allocations, to arrange their services in the way best suited to their local circumstances. The policies outlined in the paper did not define the size or content of "small hospitals" but emphasized the benefits they could bring to local communities; it further encouraged careful assessment of their potential and the development of their services "for those patients not needing the full panoply of investigation and treatment". The "small hospitals" referred to are mostly general practitioner hospitals.

Role and Function of Community Hospitals (King's Fund, 1987):

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