AN ECONOMICS COMMENTARY

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Monday 14th March 2005

Summary

The themes of the Kerr Review are taken to be:

- greater emphasis on preventing illness and treating chronic disease with less emphasis on the acute hospital
- a wide range of intermediate care services in between existing primary and secondary care to offer more choice to patients and clinicians
- a similar range of schemes for managing unscheduled and emergency care
- telemedicine and IT schemes to improve access and communication
- networks of care as a way of ensuring a balance between access and high quality services

The approach used has been to review the research literature to find studies that support or refute these themes. Lacking the resources to systematically review all possible studies, the emphasis has been on reviewing the most recent UK studies. These are likely to be most relevant to Scotland in 2005.

The literature on priority-setting was reviewed to determine what the UK public say they want from the NHS. Eight factors were derived and with the addition of two constraints on what the NHS can do these were taken as criteria for judging the proposals at a broad strategic level, as follows:

Core values

1. Maintain universal access to health care that is free at the point of consumption
2. Judge changes by the impact they will have on the health of the population as a fundamental goal of health care
3. Meet needs based on how urgent they are as a first priority, then according to the extent of the health gain, and finally by the extent to which they reduce health inequalities within society.

Processes of care

4. Keep as much care in a local setting as possible, allowing patients to choose their preferred option.
5. A critical factor in the patient's view of the success of a contact with the health care system is whether the person they spoke to seemed to listen to them or not.
6. Within limits people will put up with things like longer waiting times if they feel they are being kept informed and involved in decsion-making.

Priorities

7. When decisions have to be made about which services are the most important, the public will support a decision that gives a high priority to children.
8. There is a good level of support for funding prevention and screening services.

Constraints

9. The system must be sustainable, notably in terms of staffing.

10. The health care system must operate within the budget allocated to it by the government.

Compared against these criteria the Kerr Review proposals seem to be moving in broadly the right direction.

The next analysis considered the evidence on the relative cost-effectiveness of a broad range of services. This was used to judge whether there was support for the proposed shift of emphasis from acute care to prevention and management of chronic diseases. The evidence shows it is not possible to make generalisations (such as "prevention is good") but there are certainly groups of services within the fields of prevention and chronic disease that could be expanded while selected acute services are reduced. Overall, the evidence suggests this would improve the health of the Scottish population.

The third area of analysis was the literature on the costs and benefits of different types of intermediate care schemes. The evidence is not especially high quality or plentiful, but what there is suggests a very mixed picture. A critical issue is how we define the benefit of a scheme. Economic evaluations usually look for improved health at an acceptable cost, but many of these schemes improve accessibility at increased cost. Examples include outreach clinics, walk-in centres, and NHS Direct. Other schemes do seem to free up resources in a cost-effective way, including early discharge schemes. A third group of schemes may improve outcomes but will almost certainly do so at increased cost e.g. chronic disease management, GPs with a specialist interest. One conclusion that emerges clearly is that telemedicine must be handled with caution. In the more extreme geographical situations in Scotland it can be cost-effective but there are many studies which conclude it costs more money from the NHS point-of-view with no gain in outcomes.

The fourth area reviewed was the organisation of unscheduled care. Here the evidence was even sparser. Minor injuries units do seem to be a cost-effective alternative to A&E departments but very little can be said beyond this.

The fifth area considered was organising care through networks, using IT to support this and ensuring NHS boards co-operated in the planning and management of services. Almost no economic evidence was found to help judge whether these changes were cost-effective or not. At present the costs are more evident than the benefits, which are diffuse and hard to capture.

The Kerr Review proposals are then set in the context of health care reforms. The literature they have most in common with is that of demand management with its emphasis on graduated access to specialists services and the filtering of demand for care at all stages, with patients returned to a local level of care as soon as it is safe to do so. This type of reform takes quite a lot of the status quo as a given. For example, it assumes there is sufficient capacity to meet need, waiting time targets, etc. and that there is a long-term plan to keep demand and supply in balance (with sufficient resources to achieve this).

The next section reviews the evidence on the potential barriers to implementing change, especially in intermediate care and changing the acute sector. The key problem is in organising change so that nobody involved feels they are unambiguously losing out as a result. This will make reform difficult to deliver.

The final section summarises the weaknesses in the studies used to draw conclusions for the sections above. It is not intended to undermine those findings but to act as a reminder that they quality of the evidence is far from perfect. However, it is argued that conclusions based on imperfect evidence are better than none at all.

Introduction

This chapter is an economic commentary on the rest of the Kerr Report (referred to as "the Review"). Economics is the study of the allocation of how scarce resources (staff time, hospital beds, equipment, etc.) are allocated with the goal of getting the best value for the population of Scotland.

Section 1 establishes criteria to evaluate the proposals of the Review, based on the research evidence on what the public wants from the NHS.

Section 2 considers the shift from acute care to preventative and chronic disease care in terms of the economics evidence.

Sections 3, 4 and 5 review the costs and benefits of selected intermediate care schemes (section 3), emergency care services (section 4) and managed clinical networks, IT and management arrangements (section 5).

Section 6 considers the impact of changes on the acute hospital, principally in terms of costs.

Section 7 sets the proposed changes in a broader context, showing how these fit with other options for changing the NHS.

Section 8 looks at some of the issues in implementing the changes in practice, attempting to identify some of the likely barriers based on research findings.

Section 9 discusses the quality of the research evidence used in the earlier sections of the report and highlights issues in its interpretation.

The Objectives of NHS Reform

Creating a framework for judging reform

The success or failure of any policy, changes or reforms is judged with respect to the objectives they were trying to achieve. The objectives of public services are notoriously difficult to capture because they are complex, and the health service is typical in this respect. A fundamental problem is who should decide what these objectives are, and if there are many objectives, which is the most important?

Problems arise when one group's objectives fall seriously out-of-line with another's: for example in the summer of 2004 several NHS boards in Scotland decided that the balance of evidence suggested limited centralisation of hospital services would give a sustainable service in terms of medical staffing that offered better health outcomes from treatment and that this was sufficient to justify any loss of access in terms of increased travelling time for the public. Many people did not agree with this trade-off. The Health Committee of the Scottish Parliament in its report "Reshaping the NHS? Workforce Planning in the NHS in Scotland" (2005) says the NHS failed to understand what is important to:

- the public – maintaining local facilities and services (para 135), and
- patients – took too narrow a view of patient care, ignoring long and difficult journey for care that can affect welfare for example (para 136).

A tax-funded system, working in a parliamentary democracy, must take account of the views of the public when it is making changes of this type. The framework developed in this section identifies what people think matters and then applies this to the proposals of this Review.

What do the public want from the NHS?

The debate about the objectives of health care has not yet truly started. For example, when waiting time figures are released, discussion might focus on which is the most relevant statistic, the waiting time or the numbers who are on the list, or whether it is more important to look at the longest waiters or the median wait. However, there are bigger questions. For example, what are the health consequences of waiting two months for an operation instead of one? What is being spent on waiting time reductions and is this the best use of the money? Are reduced waiting times are more important than (for example) helping people to stop smoking? and so on.

Scotland urgently needs a debate about what it wants. This should not simply be an opinion poll: there is research evidence that people change their views both as a result of factual information presented to them about the consequences of different choices and

also as a result of having taken part in a group discussion of the topics[1]. The debate must a core set of values that can be used as the basis for future judgements, both nationally and locally, on the way the NHS moves forward.

As a starting point, this section reviews the research literature to see what that can tell us[2]. Three groups of studies were identified:

- the first group looks at the principles the public want to be used in setting priorities within the NHS – these help to determine what is most important to people;

- the second group looks at which aspects of individual health services people value the most – this tells us how important they think waiting times are relative to how far they have to travel to get care, for example;

- the third group looks at different types of health services and asks which ones the public think are the most important for funding – this gives a guide to what people will think of changes in spending patterns resulting from reforms.

These are considered in more detail in the following sections.

What are the core values of the NHS?

The main focus was on studies in the research literature on priority-setting, principally UK studies in the last 10-15 years carried out from an economics point-of-view. Four studies were identified, none of which were carried out in Scotland.

Lead author	Study	Findings
Richardson	Public panels, Somerset 1997	Strongly favour universal care regardless of cause of illness, age of patient or cost.
Dolan	Questionnaire, York, 2003	In setting priorities "health gain" and "consequences for health without treatment" are two of the most important considerations
Roberts	Questionnaire, England, 1999	Respondents most influenced by quality-of-life and did not choose consistently in line with health gain maximisation principles.
Cookson	Focus groups, England, 1999	Support for three broad principles in setting priorities: 1. broad "rule of rescue" giving priority to those in

[1] Dolan et al invited 60 people to two separate meetings in north Yorkshire. They found that discussion of the issues:
(i) made people reflect on the role their views should play in decision-making
(ii) more sympathetic to the need to make difficult decisions
(iii) about half the respondents initially wanted to give lower priority to smokers, heavy drinkers and illegal drug users but after discussion many no longer wished to discriminate in this way.
The finding that deliberation makes a difference was confirmed by a Canadian study (Abelson).

[2] If the search is confined to work carried out in Scotland, the answer is "very little"; for this reason, studies from all of the UK have been considered.

		immediate need 2. health maximisation 3. equalisation of lifetime health

The studies seem reasonably consistent and suggest that fundamental objectives of the NHS should be:

- to maintain universal access to health care that is free at the point of consumption
- to judge changes by the impact they will have on the health of the population as a fundamental goal of health care
- to meet needs based on how urgent they are as a first priority, then according to the extent of the health gain, and finally by the extent to which they reduce health inequalities within society.

Which are the most important aspects of the way a service is provided?

The second group of studies use a research technique called conjoint analysis[3]. This asks people to respond to survey questions based on different characteristics of health care, and this shows how important they think each aspect is and how willing they are to "trade-off" one good thing against another: for example, it is possible to say whether people would be prepared to travel another ten miles to see a doctor of their choice.

Ten relevant studies were identified, nine of which were carried out in the UK and one in America (this was included because it related to setting up a regional centre for cancer surgery). The ten studies fall into four groups:

- centralisation of specialist services
- waiting for scheduled surgery
- out-patient services
- services for minor injuries or emergencies

The studies are summarised in the table attached.

The broad lessons that emerge are as follows:

[3] This involves identifying the characteristics (or attributes) of a health service and using a questionnaire to find out how important each aspect is. For example, if a patient has a health need the attributes might be (i) how far the patient has to travel to get care, (ii) how long they have to wait, (iii) who sees them, and (iv) whether their needs are met. Levels are then selected for each attribute so distance travelled might be one mile, ten miles and twenty miles. Scenarios are then generated by a computer programme selecting a level for each attribute. For survey purposes these are made into pairwise comparisons ("would you prefer scenario A with these characteristics or scenario B with these characteristics?"). By asking each respondent to pick between a number of different pairs of scenarios it is possible to determine which attribute they think is most important and also to quantify the relationships between the attributes.

- If a regional service is being considered at least 20% of the population will prefer their local hospital, irrespective of any attractions of the regional service in terms of better outcomes or reduced waiting times.

- A sizeable number of patients (possibly as many as half) will accept worse health outcomes (including a higher risk of death) and a longer wait (of 4-5 months) to be treated at their local hospital.

- In the out-patient and elective surgery settings the most important factor is a good health outcome.

- People waiting for elective surgery would be willing to pay an extra £12 in travel costs to reduce their waiting time by one month[4]. On the other hand people requiring a scan would wait 5.5 days *longer* to have it carried out locally.

- In out-patient clinics and minor injury services people have a traditional view of who they want to see them with preferences for doctors over paramedics, for example. However, the single most important factor is whether the person the patient sees appears to listen to them.

- In the minor injury situation patients also have a strong preference for being told how long they will have to wait. The location of the service and waiting time is generally less important.

From this the following fundamental principles emerge:

- People identify strongly with their local hospital and some will use it even if better quality care is available elsewhere. Local hospitals should be maintained and developed wherever possible. Some people are happy to travel, especially if they can reduce waiting times[5]. The health care system should embrace such choice and remove barriers to it happening.

- A critical factor in the patient's view of the success of a contact with the health care system is whether the person they spoke to seemed to listen to them or not.

- People are prepared to put up with some things (like longer waiting times) if they are kept informed.

Which services are the highest priorities?

[4] Richardson (1992) found 53% of people questioned would definitely be willing to travel outside of their district to reduce waiting times.

[5] These conclusions reflect those of Luff et al reviewing earlier literature on behalf of the English National Beds Inquiry. They found the majority were willing to travel for shorter waits but "a minority will resist travel in most circumstances."

The priority-setting literature was searched for recent UK studies. Only two examples were found and a third study from Sweden was included as a comparator from a country with a similar system to that in the UK.

Lead author	**Study**	**Findings**
Baker	Interviews, Edinburgh, 2001	Priorities for treatment 99.7% emergencies 97.7% life-threatening conditions 88% treatable conditions that seriously affect quality of life 75% incurable terminal disease To provide these priorities 39% thought it was okay to make people with less serious conditions wait longer Of those who did not consider it acceptable to make people wait, 88% were prepared to pay more in tax to provide this
Bowling	Interviews, Great Britain 1996	Ranked treatments 1. treat children with life threatening illness 2. special care and pain relief for people who are dying 3. preventive and screening services and immunisation 4. surgery to help people carry out everyday tasks e.g. hip replacement 5. district nursing and community services / care at home 6. psychiatric services for mental illness 7. high tech surgery, organ transplants and procedures for life-threatening conditions 8. health promotion / education to help people lead healthy lives 9. intensive care for premature babies weighing less than 680g with only a slim chance of survival 10. long-stay hospital care for elderly people 11. treat infertility 12. treat people aged 75 and over with life threatening conditions
McKee	Sweden	Group 1 Treat life-threatening acute disease and diseases which, if left untreated, will lead to permanent disability or premature death Treat severe chronic disease. Palliative terminal care. Care of people with reduced autonomy Group 2 Prevention with documented benefits

		Rehabilitation services Group 3 Treat less severe acute and chronic disease Group 4 Borderline cases Group 5 Care for reasons other than disease or injury

Some of the findings confirm the point made earlier that the public attach the highest priority to meeting the needs of those in immediate peril that could be life-threatening (the "rule of rescue"). This might be thought of as corresponding to emergency care. After this the findings are more variable but two conclusions emerge:

- When decisions have to be made about which services are the most important, the public will support a decision that gives a high priority to children.
- There is a good level of support for funding prevention and screening services (and less emphasis on high tech services than some media coverage would suggest).

Bringing the research findings together
The literature search was not systematic and there are gaps in our knowledge of what the public wants from the NHS, but some key themes have emerged. Before pulling these together, there are also some constraints on achieving what the public would like from the NHS, principally that any changes must be sustainable (notably in terms of staffing health services) and the total cost must not exceed the total funding available. Adding these two constraints to the eight aspects the public values about the NHS gives ten criteria for judging NHS changes.

Ten principles

Core values

1. Maintain universal access to health care that is free at the point of consumption
2. Judge changes by the impact they will have on the health of the population as a fundamental goal of health care
3. Meet needs based on how urgent they are as a first priority, then according to the extent of the health gain, and finally by the extent to which they reduce health inequalities within society.

Processes of care

4. Keep as much care in a local setting as possible, allowing patients to choose their preferred option.
5. A critical factor in the patient's view of the success of a contact with the health care system is whether the person they spoke to seemed to listen to them or not.
6. Within limits people will put up with things like longer waiting times if they feel they are being kept informed and involved in decsion-making.

Priorities

7. When decisions have to be made about which services are the most important, the public will support a decision that gives a high priority to children.
8. There is a good level of support for funding prevention and screening services.

Constraints

9. The system must be sustainable, notably in terms of staffing.
10. The health care system must operate within the budget allocated to it by the government.

The strength of this summary is that it attempts to articulate what the public wants as the basis for a judgement about whether the system is moving in the right direction. The weakness is that the research literature is quite patchy, sometimes old, and rarely from Scotland. For example, much of the evidence comes from England and while there are probably many similarities people might think differently about accessibility of health care because the geography of the country is so different to Scotland. Similarly, some of the studies were carried out a decade or more ago: important new health issues emerge every year, such as the recent emphasis on clean hospitals, which might not have been a factor when the research was carried out.

There are also some surprising omissions from the list: for example, waiting times do not have the same high priority commonly assumed by politicians. Luff et al in their review

of evidence for the English National Beds Inquiry found a clear preference for care in a setting other than a hospital ward, but this was not assessed in the literature reviewed. Another possible core value not highlighted by the research but shared by many Scots is the importance of fairness in access to treatment (e.g. intensity of feeling over "postcode prescribing"). This means the ten principles need to be tested with Scottish people in 2005 to ensure they are relevant.

What does the Review propose and does it match the principles?

The Review emphasises meeting needs and improving patient-focussed outcomes. It takes the view that ends (getting people better) are more important than structures of health care (such as hospitals). Indeed, it seeks to transfer care out of the hospital and into the community. It envisages the use of networks of health care professionals rather than a doctor-centred model. It questions further increases in the role of acute care, stressing the need to do more for chronic diseases and prevention. It does not do this at the expense of emergency health care, with detailed proposals about how this care will be organised.

How do these match up with the criteria listed above?

Criterion	Review	Addressed?
1. Universal care	No change	Yes
2. Health focus	Emphasis on outcomes and needs	Yes
3. "Rule of rescue"	Changes to unscheduled care services but network proposed to increase appropriate use of services	Yes, although case for safety of changes must be clearly demonstrated to the public
4. Keep care local	Does not guarantee every building will remain providing the same services at present but does guarantee networks of care will make appropriate skills available locally	Yes in terms of care that is available, although case for changing the way buildings will have to be carefully explained to the public
5. Patient communication	Changing skill-mix away from medical staff to other health care professionals – while many doctors are good communicators the evidence suggests some patients can find them difficult to talk to.	Yes, so long as staff receive good quality communications training
6. Informed public and patients	?	?
7. Children as a priority	Not specifically	No – see comment in following section
8. Prevention and screening as a priority	Proposes shift in focus away from acute hospital and towards	Yes

	prevention and screening	
9. Sustainability	Intend to change the way acute hospitals work to make them sustainable in terms of staffing. Networks intended to help a variety of threatened hospitals to continue to function.	Yes
10. Stay within health budget	Uncertain – depends on which measures are adopted and to what extent. Community services are cheaper than hospital services but savings are only realised if hospitals close.	See comment in following section.

The proposals thus seem to fit with many of the principles. Universal care is maintained, there is a renewed emphasis on needs and outcomes rather than simply meeting demands and a change of focus to achieve this. The proposals are designed to take some of the pressure off of acute hospitals, thus making them easier to staff, encouraging sustainability. However, further work will be required in several areas:

- The ten criteria selected from the research literature need to be tested again in Scotland in 2005 to find out how well they describe what the public truly wants from the health care system.

- While testing the criteria some exploration of their relative importance and how the public regards trade-offs between the criteria is also required. For example, centralising some care in specialist facilities may improve some outcomes at the cost of access – how do the public feel about this? And what if better quality care costs more: what do the public regard as acceptable when there is not enough money to do everything?

- The Executive must work to try to keep the two constraints to a minimum: this might be in terms of improved workforce planning to ease the shortage of skilled staff, and in terms of the efficiency with which existing resources are used to ease funding pressures.

- The public will take some convincing that their preferred option (sometimes defence of the status quo) is not feasible and will be especially sensitive to changes in access to emergency care (threat to “rule of rescue”). This requires careful and detailed presentation of what is proposed.

- Patients might be suspicious of the loss of the doctor as the traditional centre of care, but if the staff who take on the work display good communication skills then there is the potential to increase overall satisfaction.

- The total cost of any changes is still not known – while there is great potential to substitute relatively cheap community services for expensive hospital care, savings will only be realised if hospital buildings are closed.

- The national priorities and targets for the NHS in Scotland need to be reviewed to see whether children's health has a sufficiently high priority.

- As care shifts away from the hospital, new performance indicators are required to show how workload is changing. This will require new data collection systems using measures that get away from hospital-based measures such as admissions and bed-days.

Having established that the proposals are moving the NHS in the directions indicated by the research literature, the next question is whether each of the changes proposed offers good value for money.

Shifting the Balance of Resources: from Acute Care to Chronic Diseases and Preventative Services

The status quo and the changes proposed
In 2003/04, the expenditure share of different health programmes in NHS Scotland was as follows:

Care programme	Spending (thousands of pounds)	Share of total
Acute	£2,386,083	37%
Primary care	£2,243,337	35%
Community	£591,608	9%
Psychiatry	£581,318	9%
Geriatric assessment	£227,900	4%
Maternity	£214,551	3%
Geriatric continuing care	£140,360	2%
Learning disabilities	£93,466	1%
Young physically disabled	£5,508	0%
Total	£6,484,131	

The Review proposes two ways in which health spending priorities might change. First, there will be a shift towards management of chronic diseases in primary and community care. Second, there will be more emphasis on helping people to look after their own health, and this might take the form of promoting self-care or preventative services (health promotion or screening). The resources might either come from elsewhere in the NHS or by taking priority when new money is being allocated. In either case, to be sure that resources are used wisely, we must ask, "How much good will these resources do in prevention or chronic disease management? And what are we going to lose out on in the acute sector?" Toop and Richards question whether it is ethical to divert resources into primary prevention programmes in primary care given their modest benefits.

To restate this problem, if the cost per unit of health gain is lower for preventative and chronic disease services than for acute services then the shift described might reasonably be expected to offer good value. Finding a way of measuring health that compares across very different programmes is not easy, but the currently preferred method is the year of good quality life, also known as the QALY or quality-adjusted life-year. This is intended to combine changes in length of life and in quality of life so very different programmes can be compared. The cost-effectiveness ratio is the net cost of the new service divided by the net QALY gain.

Assembling the evidence
Cost-effectiveness results were assembled from two sources:
(i) research studies published in journals – this focused on UK studies published within the last five years, and
(ii) studies carried out by the National Institute for Clinical Excellence (NICE).

When there was an obvious, significant gap in the studies assembled non-UK studies[6], older studies and studies that looked at life-years gained but not quality-of-life were used (e.g. cholesterol-lowering drugs, HIV drugs, surgery for cataracts).

The attached table ranks the services on the basis of their cost-effectiveness ratio. At the top of the table, there are the studies with the lowest cost per QALY ratios. These give health gain cheaply; indeed the very highest ranked studies predict that introducing a new service will give cost savings and QALY gains as well. (The new service is said to dominate the old service). Going down the table it costs more and more to gain a year of good quality life: in this sense the services ranked offer progressively poorer value-for-money.

Four key findings

The first finding is that there is a huge range in the cost-effectiveness of health services. Thirteen services had cost savings and a QALY gain (effectively a negative cost per QALY, dominating the existing service); these offer excellent value for money. At the other end of the scale eight services had a cost per QALY in excess of £100k, with the highest having a cost per QALY of over a million pounds; these offer poor value. For example, if service A costs £100 per QALY and service B costs £100,000 per QALY, then for every 1 QALY from funding service B we could get 1,000 QALYs from funding service A.

Very little is known

about how much is spent on any individual service in the NHS in Scotland, but it should be a high priority to find out so that we can be sure that existing resources are being used to obtain as much health gain as possible.

The second finding is that preventative services can be more cost-effective than treatments carried out in acute care, *but only under some circumstances*. Some preventative services have a very high cost per QALY (e.g. influenza vaccination for people aged 65-74, exercise classes for older people) and thus offer poor value. On the other hand, some acute hospital services offer very good value (e.g. surgery for cataracts, specialist chest pain observation units).

This is illustrated in the following table. Services are grouped into primary prevention (keeping healthy people healthy), secondary prevention (stopping people with a condition or illness from getting worse) and tertiary prevention (treatment of established illness). Cost-effectiveness results were grouped into less than £10k (good value for money), £10k to £30k (acceptable value-for-money) and over £30k (questionable value-for-money). The distribution of results was as follows:

	Better than £10k/QALY	£10k to £30k per QALY	Over £30k per QALY
Primary prevention	9	10	3
Secondary prevention	33	12	15

[6] Where data were taken from other countries, the cost-effectiveness ratio was simply converted using the current currency exchange rate.

Tertiary prevention	13	17	9

This demonstrates that under each of the three groups of services there are examples of good and poor value-for-money. However, there is plenty of scope for switching from acute sector treatments that offer poor value to preventative services that offer good value. In the table this would be the equivalent of switching spending from the bottom right-hand corner to the top left-hand corner. This will result in long-term improvements in the health of the Scottish people without adding to the cost of the NHS.

For example, a group of primary prevention interventions targeting smoking, exercise, diet, cholesterol-lowering drugs for the highest risk groups, condom distribution, and some accident prevention measures has an average (median) cost per QALY of £6,018. This suggests that the recommended shift from acute care to preventative care can be supported so long as the change is based on careful selection of programmes, reflecting their cost-effectiveness.

Two further sources of evidence support this conclusion:

- first, a Scottish study assessed the contribution of different factors to the decline in coronary heart disease mortality between 1975 and 1994. The study estimated, 51% of the reduction was due to changes in risk factors (principally smoking) and 40% to medical treatments. This suggests that big reductions in mortality can be achieved through changes in lifestyle that are not expensive for the NHS. On the other hand treatments that are expensive such as coronary artery surgery and angioplasty contributed little to mortality reduction.

- second, the Wanless report considered three different scenarios for the future of NHS spending in England based on varying assumptions, the most significant of which related to the extent of self-care for health. Under an assumption that current trends continue the NHS is predicted to cost £184 billion by 2022, with life expectancy of 80. Assuming target levels for self-care are achieved the cost would be £161 billion with life expectancy of 82. However, if target levels of self-care are exceeded the cost will be £154 billion with life expectancy of 83. Again, this demonstrates the potential value of promoting health.

The third issue that can be addressed with the cost-effectiveness table is the shift from managing acute needs in hospital to managing chronic needs in the community (including primary care). Again, it is only possible to address this in general terms. The table shows there are a variety of highly cost-effective interventions that can be carried out in primary care for people with chronic diseases. These include services for people with osteoporosis, diabetes, coronary heart disease, asthma, depression, and heroin addiction. The caveat to this is that patients must be carefully selected. Secondary prevention aimed at people with chronic disease *but at low risk of complications* can be very poor value for money. As noted above there are also a range of primary prevention services that can help prevent the development of chronic diseases e.g. through the management of obesity, etc.

Again, it must be emphasised that acute hospital services are not inherently poor value for money. From the data in the table, hospital services that emerge as having poor value for money are those that are either (i) expensive treatments targeted at patients who are less likely to benefit, and (ii) expensive treatments for people who are close to death. To set against these cases, there are many highly cost-effective hospital services including angioplasty and cancer drugs for people with a good chance of recovery.

The final finding was the lack of any pre-existing evidence to make these sorts of judgements. While these data were available, they were scattered throughout the literature and across websites. There was no existing table of UK cost-effectiveness results and the evidence assembled is patchy. For example, there is a study of the cost-effectiveness of an *additional* HIV drug as a supplement to existing treatments; however, there are no UK studies of the cost-effectiveness of existing HIV drug treatments in the first place. There are no studies of common treatments like hip or knee replacements, anti-depressant drugs, or most emergency services. Given the significance of data on the value of investments in different services it is essential that NHS Scotland starts to invest in assembling the data it needs to base decisions upon.

Conclusion

The Review recommends that there should be a shift in attention away from acute care and towards preventative services and management of chronic diseases. The cost-effectiveness results assembled here suggest that so long as the services involved are carefully selected on the basis of cost-effectiveness data, this can be a change that will improve the long-term health of the population of Scotland without involving any additional spending.

Shifting the balance between hospital and the community: intermediate care

Intermediate care has been described as, "[C]are given after traditional primary care and self care, but before or instead of the care that is available deep inside large acute hospitals. It seems to address on of the limitations of many health systems: the lack of a wide range of specific and integrated facilities that can address complex needs." (Pencheon). The Review highlights the opportunities to develop such care in a range of ways.

Reviewing the research evidence on this topic suggests the range of services and these have different characteristics that can be divided as follows:

- does the service meet new needs and demands before they get to secondary care or do they meet existing needs and demands?
- is the service provided by the same group of staff or whether there are "skill-mix" changes (i.e. different staff group of staff provide the service, typically nurses instead of doctors)?
- is the service provided in a different location (e.g. in community rather in hospital)?

Using this system, the range of intermediate care services can be characterised as follows:

	New or existing demand	**Substituting staff**	**Changing location**
Outreach clinics	Both	No	Yes
Walk-in centres	New	Yes	Yes
NHS Direct	New	Yes	No
Nurse phone triage of calls to GP	New	Yes	No
Nurse practitioners instead of GP	Both	Yes	No
Nurses specialist in particular areas	Both	Yes	In part
GPs with a special interest	Both	Yes	In part
Follow-up clinic led by nurse or GP	Existing	Yes	Yes
Community hospitals	Both	Yes	Yes
Early supported discharge	Existing	Yes	Yes

Kernick suggests three roles for intermediate care:

- substitute for secondary care services, freeing hospital resources for other purposes or reducing hospital staffing requirements;
- addition to secondary care services, complementing or enhancing an existing service; and
- meeting previously unmet needs – patients who would not have consulted now do so, increasing total workload.

The economic case for introducing intermediate care services seems straightforward: care that was previously being provided by highly-paid specialists in hospitals with high levels of overhead costs are being moved to a primary care setting to be run by staff who might

be paid half the amount the specialist is. Intuitively, the change seems likely to offer good value-for-money. However, the "worst case" scenario would be as follows:

- There are additional costs in primary care in employing more staff to carry out the work.
- Existing staff need training in the new skills and there are administrative costs in terms of arranging patient appointments, maintaining records, communicating with referring clinicians and collecting data on workload so this effort appears in national statistics.
- In the "worst case" scenario primary care staff do not have the skills or resources to offer as good a service as secondary care staff, so quality could suffer.
- Primary care staff may not work as quickly as secondary care staff, so less patients are seen in a session, wiping out any cost advantage per hour favouring primary care staff.
- Primary care staff might have less faith in their judgement and require more diagnostic tests then secondary care staff, so additional facilities are needed in the community or a direct access service to laboratories, X-ray, etc in the hospital.
- Primary care staff might still refer some cases to a hospital specialist for a second opinion.
- Hospital resources freed up are not converted into cash savings, as this may well involve giving hospital staff their notice, but are used for other purposes – this means the NHS has the costs of the hospital staff still plus the costs of the primary care service.
- Making care more accessible by providing it in general practice rather than a hospital might cause more patients to present for treatment as distance travelled and waiting times are likely to be less.

While it is very unlikely these would all apply at the same time, the economic case for switching services in this way is not clear-cut. The other two roles Kernick proposes, a complementary service to secondary care and a service to meet previously unmet need, would almost certainly involve additional costs, at least in the short-run. Well-designed cost-effectiveness studies can measure and value all of these factors and suggest a conclusion about overall value-for-money, weighting benefit against cost.

Similar arguments can be made with regard to skill-mix changes. Kernick and Scott quote a study that claims between 30 and 70% of the work of doctors can be carried out by nurses. Much of the recent health policy debate in Scotland has focused on a lack of doctors but there is a lack of skilled nurses too – are there enough to be used in this way? Is it the best use of the limited number of highly skilled nurses? And what if these nurses (not unreasonably) expect their pay to rise to close to the levels of doctors when they are taking on more specialist tasks? Finally, evidence is needed from well-designed studies to show that nurses can provide at least as good a quality of service as doctors. Again, it is not immediately obvious in advance that changes in skill-mix will be cost-effective.

The following sections review economic studies that have tried to estimate the cost-effectiveness of the different types of intermediate care service in the UK. Reviewing economic studies of the primary care / secondary care interface in 1996, Scott noted such

evidence was “scarce and inconclusive” while Goddard et al found that three years later there was “little evidence that this is a cost-effective strategy.” In part this reflects the view that primary care research has traditionally been the poor relation of hospital-based research and the policy debate in this area such as the impact of policy changes on GP workload have often been based on anecdote (Pedersen and Leese). In the cost-effectiveness field, there is a greater volume of literature to draw on in 2005 but it has not kept pace with the rapid expansion of service models with the result that the coverage is still very patchy; however, some general conclusions can be drawn.

Outreach clinics

Outreach clinics are outpatient clinics run by a hospital specialist in a primary care setting rather than a hospital. The potential advantages of outreach services can be summarised in the following table (adapted from Powell):

	Identified by:		
	GPs	**Patients**	**Hospital specialists**
Advantages			
Ease of access for patients	☺	☺	☺
Improving GP-specialist communication	☺	☺	☺
Reduced waiting time for appointment	☺		☺
Patients seen in familiar setting	☺	☺	☺
Reduced non-attendances	☺		☺
Disadvantages			
Increased demands on admin and staffing	♣		
Additional facilities needed e.g. accommodation	♣		
Inefficient use of specialists’ time	♣		♣
Patients still need to visit hospital for tests	♣		♣
Infrequent/inflexible follow-up clinics	♣		

Four key studies were identified (note that the Bowling & Bond and Gosden studies were included in Powell’s review – they are included here because they were the largest and the only one specifically considering costs respectively).

Lead author	**Study**	**Findings**
Powell	Systematic literature review 15 UK studies	Main advantages: improved GP/specialist communication better patient access and experience But additional direct cost, poor use of specialist time No consistent difference in outcome
Bowling	Case-control study of	OR patients spend less time waiting and need less

and Bond	38 out-reach clinics and 38 matched out-patient clinics in England	follow-up clinics. They are more satisfied but health benefits at 6 months are small. Patients' costs are lowered but NHS costs are higher.
Gosden	3 dermatology and 3 orthopaedic out-patient clinics in England	Patients have lower personal costs (although the difference is not statistically significant) Out-reach clinics were significantly more expensive in terms of staff time, travel and opportunity costs. Case-mix differed between out-reach and out-patient clinics so treatment costs couldn't be compared
Gruen	Cochrane review of 73 studies, 9 of which met inclusion criteria	Improves access but no evidence of impact on health outcomes Works better as part of a multi-faceted approach (collaboration with primary care, education). Leads to improved outcomes, more efficient and "guideline-consistent" care, less use of in-patient beds. Additional benefits may offset additional costs

Gruen et al found that outreach clinics achieved the best results as part of package of intermediate care changes and this seems the most promising approach. On the other hand the additional parts of the package increase costs further and it is not evident that the benefits are sufficient to justify these.

Most studies conclude (i) patients are more satisfied, (ii) patients have lower costs (from Powell typical travelling time savings are 20-30 minutes and waiting time savings are about another 20-30 minutes). However, outcomes are no better (which is hardly surprising since care was being provided by the same group of staff, simply in a different setting). Against this, the cost per patient is consistently higher, possibly by as much as 50%.

Summary

Outreach clinics are safe and satisfy patients. However, they are expensive and no study has established the extra satisfaction to patients justifies the cost. Under the right circumstances this type of service could be highly cost-effective but the NHS must carefully consider its willingness-to-pay for better access before spreading this service model.

Walk-in centres (WICs)

In a systematic review of the published literature on walk-in centres, Salisbury and Munro found they provided care of reasonable quality. A typical user was an affluent person of working age, probably when other services were closed. This study found there was insufficient evidence to comment on cost or impact on other services.

Other studies have partly filled this gap. Chalder looked at 14 towns with walk-in centres and 14 control towns that did not. Comparing the situation before-and-after the

introduction of the WICs there were slight reductions in A&E and GP consultation rates, but these did not achieve statistical significance. There was no impact on use of services out-of-hours. Hsu carried out a similar study but with only one town yet findings were similar; the only additional finding was that minor injuries unit attendance was higher in the town with the walk-in centre, possibly because the two centres were in the same building.

The main evaluation work is the Department of Health study commissioned from University of Bristol. This found:

- Most people attended between 9am and 4pm, despite extended opening hours
- quality of care based on 5 scenarios found WICs were better than NHS Direct. Compared to general practice, WICs were at least as good on 3 scenarios and less good on 2 scenarios
- It was not possible to comment on the content or appropriateness as while data were recorded on consultations they were not coded in a standardised way.
- In terms of impact on other services half the users surveyed said they would have used the GP otherwise and a quarter would have gone to A&E. However, analysis of activity data suggest a very small impact on A&E and an uncertain impact on general practice. There was no impact on out-of-hours services.
- The research team conclude that while WICs generated some additional demand it was mainly a substitute for other NHS services – this seems to be a fairly optimistic view for WICs.
- WICs are unambiguously more expensive than primary care services – the cost per patient seen was £31 in the study period although as workload increased this fell to £24 after centres had been running more than a year. However, a GP visit costs £15 and a practice nurse contact costs £7.

Summary

There are no formal economic evaluations of walk-in centres but the evidence suggests they increase cost and that this must be set against providing more accessible care (and, presumably, satisfaction) among users. The impact on other services seems to be small and may take some time to show.

NHS Direct

The evidence on NHS Direct is considered alongside emergency care in a later section.

Nurse triage of calls to GP

Bunn et al carried out a systematic review of the literature for the Cochrane Database. They found nurse triage of calls could reduce the number of surgery contacts and out-of-hours contacts but the effect on other services (such as A&E and even repeat GP contacts) was unclear. Chapman et al reviewed a similar evidence base and found nurses could manage a high proportion of out-of-hours calls safely and effectively. There is no evidence that GP contacts are merely deferred as a result.

These findings are borne out by an RCT comparison of nurse triage via a general practice with NHS Direct (Richards et al). The practice-based triage was found to be more likely to resolve the problem, to be 7-8 minutes quicker, and to cost less.

Nurses have been used to triage calls to the GP seeking same day care. Richards evaluated a service in York and found "same day" GP consultations were reduced by 29-44% although the people who called were more likely to see a nurse. Attendances at A&E and routine appointments also went up. Costs were slightly higher with the triage system, so the main benefit seems to have been that demand was made more predictable.

In an out-of-hours situation, a study of 55 practices in Wiltshire found that nurse triage cost £81k and saved £94k in other NHS resources freed for other purposes (Lattimer et al).

Summary

There are benefits to this type of service but the impact on costs is equivocal. The cost-effectiveness is highly uncertain.

Nurse practitioners as an alternative to the GP

Several studies have compared nurse practitioners (NPs) and GPs in primary care (the table lists those that have also reported on costs):

Lead author	Study	Findings
Venning	First point of contact with GP RCT in 20 centres in England & Wales	NP consultations longer, order more tests, arrange more follow-up No difference in prescribing or outcomes. Patients more satisfied with NP even after controlling for longer consultation. No difference in costs.
Kinnersley	Patients seeking "same day" appointment RCT in 10 practices in England & Wales	Generally patients more satisfied with NP. Resolution of symptoms & concerns did not differ. Consultations with NP were longer and pts reported receiving more info. There was no difference in prescriptions, tests, referrals and reattendances.
Shum	Minor illness service RCT in 5 practices in England	Patients more satisfied with NP. NP consultations were longer. 73% of NP patients were managed without involving a doctor. There was no difference in prescription rates.
Horrocks	First point of contact with	Patients more satisfied with NP.

	GP Systematic review of studies 11 RCTs and 23 observational studies	NP consultations were longer. No differenced in health outcomes. NP order more tests. There was no difference in prescriptions, referrals and reattendances.

Reviewing this evidence Chapman et al concluded that for minor conditions nurse practitioners were at least as safe and effective as GPs. They tend to provide longer consultations and order slightly more tests although they do not seem to refer more. Studies vary as to the number of cases nurses involve GPs in, ranging from 4% to 27%. However, they note there are no data for serious or rare conditions, so little is known about how nurse practitioners diagnose or manage these cases.

Summary

Nurse practitioners working to protocols can manage patients traditionally seen by the GP. While they have a lower cost per hour they also take longer with patients so there is no evidence of differences in costs. NPs are unlikely to produce savings on existing costs (since GP time freed up will be redeployed) but might reduce the need for more GPs.

Nurse-led intermediate care

Nurses can also be trained in a specialist role. Fall et al report that nurses trained in ear care achieved as good an outcome as GPs at lower cost and increased patient satisfaction. Stewart et al report on the impact of community nurse specialists in the management of heart failure. They predict that these nurses would pay for themselves in terms of the value of bed-days freed up from admissions avoided. However, these would more likely be cardiology beds freed for other uses rather than cash-releasing savings.

Sheppherdson studied nurse-led beds in a community hospital for patients with short-run nursing needs. This was used mainly by elderly patients and patients with multiple sclerosis requiring respite. No economic evaluation or costing study was carried out.

Richardson carried out an RCT comparing nurse- and consultant-led hospital wards for people who had been admitted essentially because they needed nursing care. They showed outcomes were the same but that hospital costs on the nurse-led ward were higher because patients stayed longer; however, post-discharge costs were lower for the nurse-led ward patients. The overall impact on costs was unclear.

Summary

Little economic evidence is available, and the overall impact will depend on whether these services are substitutes to existing services or complements. Savings are likely to be in terms of avoiding expanding acute hospital capacity even further in the future rather than cash-releasing savings.

Formal liaison between GP and specialist in chronic disease
Mitchell undertook a systematic review of the literature on formal GP involvement with a specialist team. Seven studies were identified. There were improvements in GP skills, more use of appropriate test strategies, and better detection of complications. More patients were retained within treatment programmes and patient satisfaction was high. Most health outcomes were unchanged, however.

Nocon reviewed diabetes clinics in Bradford, comparing the 19 that were run by GPs with a Special Interest (GPwSI) with all the others. The GPwSI group had significantly fewer referrals to out-patients but significantly more attendances and more referrals from within the GP's own practice. Costs were similar to an out-patient clinic. Attenders tended to be older and have had diabetes for longer.

Combining Nocon's findings with those of Kernick, the *potential* pluses and minuses of GPwSI are as follows:

Pluses of GPwSI clinic	**Minuses (in Nocon study)**
Accessibility	Lack of strategic planning in location of clinics
Short wait for first appointment	Long wait at some clinics
Continuity of staff	Poor communication with some referring GPs
Increased patient throughput and clinical capacity	
Encouragement of professional development	
Possible retention of staff	
Release of secondary care resources	

The UK literature on the role of GPs with a Specialist Interest is still developing, and it is possible that the optimal service model for using these staff to their best effect has still not emerged.

Summary

As Kernick has pointed out there is little evidence that GPwSI is a cost-effective development. This is likely to be an area that will attract a lot of interest in the future and it is important that well-designed research studies establish whether the diversion of scarce GP time is justified. However, the potential to manage chronic diseases in particular using this model is huge and suggests this should be a high priority for future work.

More diagnostic facilities in the community
The search did not identify many studies of this type. Wordsworth and Scott compared ultrasound scanning in a general practice in rural Aberdeenshire with the likely alternatives if no scanner were available (as judged by local GPs). Despite scans costing more in general practice than in hospital (mainly because the GP scanner was used less than once per day) they conclude the scanner is cost-effective as it averts sufficient emergency admissions in particular to justify its cost. Patients also strongly preferred having scans performed locally. However, the study design was weak (with no group without a scanner) and it is uncertain how much can be concluded as a result.

Summary

There is not sufficient evidence to comment on the cost-effectiveness of diagnostic facilities in the community. However, the Aberdeenshire study above found the scanner was only used 247 times in a year and NHS boards must consider how expensive equipment can be used most intensively.

Assessment units as an alternative to admissions
There is considerable potential for some form of triage of patients priori to admission to the ward; for example, in work carried out for the English National Beds Inquiry Goddard et al found that between 15 and 50% of adults admitted to general medical wards in the UK did not need to be there. International studies suggest the same is true of 10 to 20% of children admitted (although it must be acknowledged that none of these studies was carried out in the UK).

Ogilvie carried out a systematic literature review on alternatives to hospital care for children with acute medical problems. Up to 40% of children seen in an acute assessment unit do not need admission, and there is little evidence of serious consequences as a result; however, up to 7% of those discharged come back to hospital again. There is some evidence these units reduce costs and users seem satisfied.

Hardy et al describe a service development in Cambridge where an Admissions Avoidance Team was established in an A&E unit with a Rapid Response Community Team at a total cost of £114k (1999 prices). A limited comparison was carried out with a historical control group, readmissions were slightly lower with the new scheme and length of stay was reduced. 97% of patients were satisfied.

Summary

The evidence reviewed was limited. Assessment units have the potential to avoid admissions, freeing up valuable resources but no attempt has been made to show whether these savings are sufficient to justify their cost.

Follow-up clinics

Once a patient has been treated in hospital they are traditionally followed-up at regular out-patient clinics. Hughes et al studied cardiology clinics in one area of Scotland and found that the reasons for continuing to call patients back was not always apparent. In between clinic appointments almost all patients saw their GP anyway, suggesting the scope for switching follow-up from the clinic to primary care and/or nurse-led services. Some of the most recent UK evidence (where costs were considered) is summarised in the following table:

Lead author	Disease area	Finding
Bailey	Scheduled surgery Controlled trial of follow-up 6-12 weeks after discharge versus instructions to patient to initiate follow-up as required	No difference in outcomes Group with no planned follow-up had fewer clinic visits and lower hospital costs, GP contact costs and patient travel costs. 38% of patients with no planned follow-up had an out-patient visit anyway
Hewlett	Osteoarthritis RCT comparing fixed OP appointments with access for pts when they needed it	No difference in outcomes after two years. The direct access group had 38% fewer hospital appointments. Satisfaction and confidence significantly higher in the direct access group.
Grunfeld	Breast cancer follow-up RCT comparing specialist OP follow-up with primary care follow-up	No increase in delay to diagnosis of recurrence No increase in patient anxiety No deterioration in quality-of-life Costs to patients and the NHS were lower No difference in the costs of tests ordered
Moore	Lung cancer follow-up RCT of nurse-led follow-up versus conventional management	No difference in outcomes. Nurse-led patients significantly more satisfied. Used slightly fewer resources. More likely to die at home.
Uppal	Nasal surgery Conventional versus nurse-led telephone follow-up	Nurse-led service has potential for substantial cost reduction
Gradwell	Dermatology RCT of normal care versus additional nurse appointment in usual routine	No difference in outcomes but patients who had seen nurse were better aware of how long to apply treatment for, how to get repeat prescription and how to get further support. 33% of follow-up appointments were

		cancelled as a result.
Williams	Inflammatory bowel disease RCT comparing fixed OP appointments with access for pts when they needed it	No differences in outcome Direct access patients had fewer clinic visits but some had difficulty obtaining an urgent appointment No differences in in-patient, GP, prescribing or patient travel costs. GPs and patients preferred direct access
Rogers	Inflammatory bowel disease RCT comparing traditional OP system with patient using direct access when they feel it is needed	Patients preferring direct access liked sense of control, fit with daily routine but knowing care was available in an urgent situation Patients preferring old system like security
Pinnock	Asthma RCT of telephone follow-up compared to appointment in primary care	More patients were reviewed by phone than in surgery Telephone consultations were shorter No difference in health status

All the studies that compared an existing out-patient system to a primary care or nurse-led alternative found equivalent outcomes, lower costs and higher satisfaction.

Summary

This is probably the strongest evidence of cost-effectiveness in the intermediate care field. However, there are still some concerns since it is not clear that all the studies considered the full range of factors highlighted in the "worst case" scenario at the start of this section.

Community hospitals and step-down beds

Coast et al carried out a review of the appropriateness of admissions to general medicine and care of the elderly wards of an acute hospital in Bristol. It was estimated that between 8 and 14% of the patients could have been managed in other ways with those mostly commonly cited being GP beds and emergency out-patient appointments. Of course, community hospitals are a long-established part of the NHS in Scotland and are probably the most important existing example of intermediate care.

Stark et al examined acute hospital bed use by GPs in the Highlands, comparing those who did and did not have access to GP beds. GPs with access to GP beds used less acute beds for medicine and care of the elderly but overall (acute plus GP beds) their bed use was higher. This is a similar conclusion to Hine et al's study in Bath, which concluded that community hospitals save on bed-days in acute care especially in medical and geriatric beds but the overall use of beds (acute hospital plus community hospital) was higher in a population with access to a community hospital.

Round et al carried out a study of emergency admissions in Devon, some of which went to a general hospital and some to one of five community hospitals. The study was not randomised but data on patient characteristics suggests the two groups of patients were not dissimilar. Outcomes were the same, the length-of-stay was the same, and the community hospital group used less tests and medicines, making it the cheaper option. Clearly great care must be taken in generalising from this study but this shows the potential of community hospitals providing high-quality care.

Summary

Community hospitals have an important role to play in reducing inappropriate use of acute hospital beds. Total bed use is increased as a result (a finding confirmed by Hensher et al's review of the evidence) but little is known about whether this reflects higher quality (helping people who are in need but might not have been admitted) or not (people being admitted to community hospitals who are not in need).

Early supported discharge

These forms of intermediate care are aimed at allowing people to be discharged from hospital earlier than would otherwise be the case – however, this must be supported so that subsequent care needs are met. The following table shows a variety of schemes that have considered costs:

Lead author	Study	Findings
Beech	Stroke patients RCT conventional care versus early discharge	In year after early discharge patients have lower NHS costs (additional community costs are less than savings on in-patients). However "main benefit is to release capacity for an expansion in stroke caseload" so no financial savings.
Lambert	Patients with rheumatoid arthritis in Edinburgh RCT of in-patient care or day care	No difference in outcomes Hospital costs were lower for the day care group but these were partly offset by higher community, readmission and travel costs. Total costs were about 10% lower with day care.
Cotton	Chronic obstructive pulmonary disease (COPD) patients in Glasgow RCT	Note majority of COPD patients were not eligible due to co-morbidities. Reduced hospital stay by about three days. No difference in readmission rates.
Tuggey	COPD patients in Belfast Before and after study of introduction of ventilation at home scheme	At least as effective and reduces hospital costs But in highly selected group of patients

In a systematic review Richards and Coast identified 15 RCTs of post-discharge support for the elderly. These were mainly from America so there are concerns about their generalisability to Scotland. . They conclude that there is some evidence combining needs assessment, discharge planning and a method for implementing these plans is effective. However, there is no evidence on whether this is cost-effective.

It should also be noted that several studies from other countries outside the UK have shown negative results:

- Australian study of home-based chemotherapy for cancer (King et al) – domiciliary service staffed by hospital-based oncology nurses. The domiciliary service was more expensive for the health service because of extra nurse time per patient.
- Dutch study of early discharge after hip fracture to a nursing home with specialist rehabilitation (Polder et al) – due to (i) early discharge patients receiving more intensive care during limited hospital stay and (ii) the costs of hospital care being simply transferred to nursing home care.

Hospital at Home is a form of early supported discharge arrangement whereby a specialist outreach team provide on-going treatment for patients in their own home following an earlier-than-normal discharge. The following table reports the findings of studies that have also reported on the costs of change:

Lead author	**Study**	**Findings**
Campbell	Elderly medical and orthopaedic	At 3 months mean HAH cost is 60% that of the hospital group
Jones	Leicester	At 3 months costs were almost identical, slightly favoured HAH
Hensher	Orthopaedics Design unclear	HAH is cheaper per day but lengthen episode of care so total cost is higher
Hollingworth	Orthopaedics (hip fracture) in Cambridge Case-control based on geographical availability of HAH	Total costs lower with HAH
Coast	Elderly patients in Bristol	At 6 months HAH patients had lower total costs Results may generalise to schemes of similar size & scope in similar contexts No evidence of increased burden on carers (subsequent paper by Gunnell et al)
Sheppard	Scheduled surgery, elderly and COAD in Oxford(?) RCT	No difference in costs for orthopaedic and elderly patients HAH increased costs after hysterectomy and COAD. GP costs increased for elderly and COAD patients.

Sheppard	Elderly and stroke Cochrane Review	16 trials identified Elderly patients – no difference in outcomes Stroke – conflicting evidence Patients prefer HAH but carers do not HAH reduces hospital stay but increases total length of episode of care Conclude unlikely to be a cheaper alternative
Bagust	Children with breathing problem, diarrhoea and vomiting, or fever in Liverpool RCT	Impact on NHS costs is equivocal depending on how the scheme is implemented Costs to parents were lower with HAH Children and parents expressed strong preference for HAH
Ram	COPD Cochrane Review	7 studies no significant differences in readmission and outcomes Patients and carers prefer HAH Patients must be carefully selected (only 25% might be suitable)

Summary

There is good evidence that early discharge schemes (including hospital-at-home) have an equivalent outcome to traditional in-patient care. Most studies find that the cost per episode is lower with HAH, although in some studies it is clear that only a minority of patients would be eligible. However, the in-patient capacity freed is likely to be reused for other patients and will not be cash-releasing.

Summary

If this literature search had been restricted to well-designed economic evaluations only a handful of studies would have been available. The search was broadened to include any study that commented on the cost impact of introducing intermediate care. The picture that emerges is quite patchy but some general findings are as follows:

(i) most patients prefer intermediate care services when they try them – the service is likely to require less travelling and may involve longer face-to-face contact with staff who patients find it easy to talk to, especially where the service is nurse-led.

(ii) most published studies found that the intermediate care service is as safe as the existing service, although some authors have admitted that their research was not designed to look at the ability to manage rare diagnoses or complications

(iii) very few studies claim the intermediate care service will reduce NHS costs: some say costs will be equal while others admit the intermediate care service will be more expensive. An additional concern is that some of the research studies have only considered the most obvious costs without considering some of the subtle implications of a shift to intermediate care listed at the start of this section. It is possible that their conclusions are slightly favourable to intermediate care.

These findings confirm those of Goddard et al in work carried out for the National Bed Inquiry. They predicted only a limited impact on the demand for acute beds and this might be because the schemes reviewed do not specifically identify and target the patients most likely to be involved, typically the elderly. Rather, some schemes such as walk-in centres seem to have more to do with patient convenience. The intermediate care schemes would certainly represent a graduated system of care but (i) there is a danger this will result in loss of communication between the component parts and (ii) lowering access costs may create rather than channel demand. Little is known about whether uncovering and addressing this unmet need is cost-effective.

Hensher et al reached the same conclusion: schemes like these "may have drawn off demand from hospital at the margins … Paradoxically, however, they may have emptied beds which then admitted yet more patients – at a faster rate than beds were being closed." This may represent good value-for-money, of course: there is no literature to report on this subject.

We also know little about which intermediate care scheme(s) should take priority in the sense of being funded and implemented before the others. Ideally this would be the scheme that is most effective but NHS boards will have to make their own judgements on this issue in the light of local circumstances.

In conclusion, given the pressure on acute hospitals some expansion of intermediate care services seems inevitable. Locally, the NHS should be under no illusions about this saving money, although it certainly might avoid the need to appoint more hospital staff. Clinicians must also be involved in drawing up clinical guidelines to ensure that the service retains the same level as safety as is enjoyed with specialist care. On a more optimistic note, there is considerable evidence that patients benefit in terms of access and the quality of consultation, raising public satisfaction with the system.

Telemedicine

Telemedicine has the potential to improve patient access and co-ordination between primary and secondary care. However, the equipment is expensive and may simply change the referral threshold for care. A review of the cost-effectiveness evidence in 2002 (Whitten et al) found that of 24 studies considered many suffered serious flaws in their methods and it was concluded there was no good quality evidence on the cost-effectiveness of telemedicine.

This review considered studies published since that date.

Lead author	Study	Finding
Jacklin	Out-patients in London and Shrewsbury RCT	At 6 months costs were higher for the teleconsultation group.
Scuffham	Dental out-patients in Highlands and Islands	Kingussie and Orkney were linked to Aberdeen. NHS costs per patient were higher by £36-44 Patient cost savings were modest in Kingussie but substantial in Orkney. Patients still incurred costs in having to travel for diagnostic tests. There was also more preparation time for the local dentist.
Loane	Dermatology in Northern Ireland RCT	Outcomes similar (just over half of patients in each group were managed after a single consultation) Costs of teleconsultation were slightly higher. Patients were satisfied with teleconsultation.
Bamford	Histopathology Report of national network	A national network was established by providing low-cost equipment. Pathologists were reluctant to learn new skills, partly because they were too busy. Local IT staff did not see it as part of their role to help. There were technological problems as well. “This project has not achieved its aims.”

The study of Jacklin et al has one of the strongest designs; this found that NHS costs were raised by about £100 per patients to save patients about £10 in travel costs. These figures can vary enormously with circumstances, though: in Scuffham’s study savings to patients varied from £1 in Kingussie to £270 in Orkney – given that additional NHS costs were £36-44, this would make the scheme cost-effective in Orkney but not in Kingussie if a broad perspective on costs were adopted. (Note Kingussie is about 40 miles from Inverness on an A-road, whereas Orkney to Inverness requires a plane or ferry trip).

There is likely to be a substantial learning curve in the use of telemedicine. For example, Ferguson et al report on the use of the technology for minor injuries in Grampian and

found referrals to Aberdeen for A&E decreased with experience. This learning curve extends to selecting the types of procedure that might be suitable. For example, Eadie's review of telesurgery pointed to the potential of the technique but also the problems (e.g. availability of facilities, lack of tactile feedback). They suggest the best role might be in complex minimally invasive surgery, where supervision of the procedure can be offered by an expert at a regional centre.

Summary

At the current stage of its development, the economics evidence shows telemedicine is very unlikely to save on NHS costs. Including costs to patients, it might be cost saving in the least accessible parts of Scotland but this assumes the NHS is wiling to incur an additional £1 in costs to save patients £1 in travel costs. More work is needed to explore the role of this potentially valuable technology but at present it should be used very sparingly outside the context of a research setting.

Managing chronic disease

Future costs of chronic illness
As the population ages, chronic diseases are likely to increase. At present the prevalence of most of these types of condition rises with age (e.g. diabetes, COPD, heart disease). The assumption is that this will be a major driver of future health care costs. A review of the research evidence certainly confirms that many authors have predicted the size of these rises in costs. The examples found include respiratory disease (including asthma, COPD, cystic fibrosis and lung cancer) (Chung), heart failure (Stewart), type 2 diabetes (Bagust), dementia (MacNamee), hepatitis C (Howie), pressure ulcers (Bennett), atrial fibrillation (Stewart) and erectile dysfunction (Ayta). The absence of conditions such as osteoporosis and mental illness from this list reflects the failure to identify UK-based studies of this type rather than a lack of likelihood their costs will rise too.

Unmet need: opportunity for improvement
Before switching resources from acute care to the management of chronic disease it would be helpful to know which chronic health needs are not currently being met. There is no systematic evidence on this subject, but research papers exist which suggests the following areas:

- osteoporosis (Kerr)
- renal disease (Feest)
- foot pain and disability (Garrow)
- musculoskeletal symptoms (Lock)
- osteoarthritis requiring hip joint replacement (Milner)
- urinary incontinence (Stoddart)
- lower urinary tract symptoms (Treagust)

In addition there are services where people's needs are being met but only in part: mental illness is a good example (e.g. Boardman, Ramana, Bebbington) but others can be found for most chronic conditions.

American approaches
Much has been written about the way chronic conditions and high-risk patients are managed in America.

Disease management
A recent study by Fireman et al looked at the application of disease management principles to the care of chronic conditions in the Kaiser Permanente Group population in north California. In practice this meant the use of:

- clinical guidelines
- patient self-management education
- disease registries
- risk stratification of patients so that "high-risk" individuals could be targeted for more intensive effort
- proactive outreach

- reminders about treatment
- multidisciplinary teams
- performance feedback to providers

High-risk patients might also receive intensive coaching over a period of months and frequent telephone follow-ups.

The study looked at data from before and after the application of these programmes. They found that many aspects of the quality of care had improved e.g. proportion of patients taking medicines of proven efficacy and cost-effectiveness. Costs of managing these diseases did not fall, however, and the authors conclude that while this programme improves quality, it does so at increased cost.

From an NHS point-of-view, the key questions would be:
(i) what did this cost and how do American outcomes compare to Scottish outcomes?
(ii) are the Amercian lessons likely to transfer to a Scottish population?
(iii) are all the components of the programme cost-effective?

The Evercare Programme
Evercare is a programme to manage the needs of frail older people. It is designed around five principles:

- individualised, whole-person approach to care focusing on promoting function, independence, comfort and quality of life
- primary care as the central organising force
- provide care in the least intensive manner in the least intensive setting
- avoid adverse effects of medicines
- use data to inform decision-making

In America, the use of Evercare in nursing homes has led to improved care, reduced hospital admissions, reduced costs of care and increased patient satisfaction.

A pilot scheme has been run in England and the evaluation report has recently been reported. In practice the main unique features were (i) routine data were used to identify an "at-risk" elderly population (those with 2 or more emergency admissions in the past year), (ii) training of Advanced Practice Nurses to manage these patients, and (iii) care organised around the patient, not traditional organisations and demarcations. The scheme certainly provides preventative care and responds quickly to needs, but the evaluation authors note that other schemes being piloted do so as well.

The scheme has only reduced emergency admissions by 1% although the evaluation team say that under very optimistic assumptions this could rise to 6%. They attribute this to two things: (i) the weakness of using past emergency admissions as a predictor of future emergency admissions, and (ii) differences between the American and English Evercare models, notably the lack of intensive home nursing when the patient is acutely ill in the English model.

The cost has been high: in the initial period the cost has been £455k per primary care trust. There are 132 patients per PCT so this is equivalent to £3,445 per patient. At present the benefits of this are not apparent.

Summary

The costs of chronic care are predicted to rise rapidly. While high-quality data are not routinely available current care is likely to be sub-optimal. It is tempting to reach for solutions from abroad but the two case studies here warn against that approach: neither seems likely to live up to its initial promise. The Evercare example seems expensive, but may ultimately offer good value if it extends life in good quality; it is also possible that some other model will fill the gap in current services in a more cost-effective way. The Kaiser example illustrates that chronic disease management can be cost-effective but is unlikely to be cost-saving. It also shows that it would be highly desirable to know which of the elements of the chronic care package offer value-for-money and which do not.

Emergency Care: intermediate and specialist services

Context
In 2000, an editorial in the BMJ (Nicholl and Munro) described a network for emergency care as follows:
(i) regional centres based on a population of 2-3 million "reflecting the widespread belief that centralised, specialist services provide more expert and therefore better care";
(ii) A&E departments "serving populations of about half a million" providing care for serious emergencies e.g. single system trauma, stroke, myocardial infarction, hip fracture; and
(iii) less serious problems e.g. out-of-hours care, minor injuries unit, walk-in centres.
While the present review does not necessarily endorse the size of catchment populations, it does recommend that a network will find different solutions to meeting patients' needs in a graduated system. Compared to the traditional model of emergency care this means that at least two types of care are required: a shift in responsibility for minor injuries to intermediate care and centralisation of some services.

NHS Direct[7]
Research suggests many users of the service are satisfied but the socio-economic profile of those using it suggests a danger that existing inequalities might be widened as a result.

This service costs £90 million per year, yet Munro et al could find no evidence they had affected use of other services ("Evaluation of NHS Direct: Impact and Appropriateness" J. Munro, M. Clancy, E. Knowles, F. Sampson and J. Nicholl, SCHARR October 2003). The National Audit Office speculated that NHS Direct might be saving £45 million per year in 2002 but the more recent findings of Munro seem to undermine this.

Out-of-hours (OOH) arrangements
Leibowitz carried out a systematic review of the literature and identified six service models for OOH:

- practice-based services
- deputising services – increases workload as there is a high rate of domiciliary visits
- emergency departments
- co-ops – reduce workload when used with telephone triage
- primary care centres
- telephone triage and advice – reduces immediate medical workload

There was very little evidence about the effect of different models on outcomes. However studies consistently find patient dissatisfaction with telephone services. No evidence on costs was reported.

[7] NHS Direct only refers to the system in England, but as the research literature relates to this system rather than the Scottish NHS24, the English term is used here.

Two studies have found systems have had no impact on A&E attendances (Stoddart in Glasgow, Pickin)

Nurse-led minor injuries unit (MIU)
An RCT showed that a nurse-led minor injuries unit was as safe as junior doctors doing the same job (Sakr Lancet paper). There was no difference in a variety of measures of process. In a before-and-after study in Sheffield, this finding was repeated. It was also shown that waiting time in the nurse-led minor injuries unit was much shorter. Overall costs were higher in the nursing unit because more patients were referred for follow-up out-patient appointments.

Teleconsultation
Brebner report on a teleconsultation system covering 14 community hospitals in north east Scotland. Patients were mainly suspected fractures occurring during office hours on week days. 77% of patients were managed locally with the remainder transferred to Aberdeen.
Bowman reviewed the management of eye problems through telemedicine and report that doctors using the virtual system tended to opt for safety.

Ambulances & Helicopters
Clearly transfer of critically ill patients will be a subject of concern if care is centralised. Fischer analysed ambulance response times in 1997/8 in Surrey and found the average was 8mins 52secs.

Scenario	Change in average response time
Additional ambulance	- 9 seconds
Shifting ambulances from early mornings to Saturday evenings	- 5 seconds
Crews sit in their ambulances	- 4 seconds
Answer only 10% of calls	- 63 seconds
10% increase in demand	+ 8 seconds

Helicopter ambulances have a high public profile. They are fast when airborne but there may be delays in response time, time at the scene and restrictions in terms of landing space and weather. Two UK economic evaluations were identified, plus a study from Finland for comparison:

Lead author	Study	Findings
Brazier	London	Costs £2 million per year, no evidence of improved outcomes. Nicholl found any benefit was restricted to the very severely injured and that this would be about 1 patient per month..

Nicholl	Cornwall and the Isles of Scilly	Costs £595k, ambulance cover would have cost £98k. On average the helicopter was 10 minutes faster.
Kurola	Rural Finland	3 lives saved in 588 missions plus 42 patients who benefited in other ways (mainly cardiovascular disease) 28,444 euros per beneficial mission

Brampton concludes that as there is so little supportive evidence the money would be better spent on well-equipped and trained road ambulances. This view was shared by Rouse, despite showing a small reduction in response times in Cornwall. In Dublin, Dardis found no change in transfer time for neurosurgery patients. In Texas when the air ambulance was withdrawn response times did not go up (Chappell).

Summary

The economics evidence is strongly against the use of air ambulances in general, although the Finnish trial suggests for very remote areas they may still offer good value; however, it is not clear whether any area of the UK match the extreme geography of rural Finland.

Triage by A&E doctors

McGugan and Morrison report medical triage of patients seen in A&E with a problem of more than 3 days duration and there were no adverse outcomes in the pilot study.
In an American RCT (Washington et al) non-acute conditions were safely assigned to be seen in primary care the next day.

Primary care units in A&E

Dale carried out an RCT of GP versus hospital doctor care for cases triaged as being of primary care type in A&E. The total cost per patient was lowest for the GP (at £32, compared to £45 and £58 for registrars and SHOs respectively). Cooke also found that waiting times were much shorter when a GP carried out this work.

Nurse practitioners (NPs) versus doctors in A&E

In an RCT carried out in Glasgow, nurse practitioners in A&E managed cases as well as a SHO. Patients were slightly more satisfied with the NP system and found NPs easier to talk to. NPs were found to provide more information on accident prevention and on the injury itself.

Centralisation

Simpson describe a “before-and-after” study of the centralisation of A&E services within Sheffield, an industrial city of 471,000 people. Two A&E sites were reduced to one, a minor injuries unit was established and an emergency medical admissions unit. Costs

have risen but this is in line with national trends. The system has coped but this is attributed to the availability of adequate beds for admissions by the authors.

Nicholl and Turner carried out a “before-and-after” study of the introduction of a regional trauma centre, in north Staffordshire in the early 1990s. The gains in survival were modest, although the difference between the proportion of major trauma patients treated at the centre rose from 33% before its formal introduction to 39% three years later. It is thus unclear whether the centre was not very effective or not. No costs were reported.

Kelly and Westaby carried out an economic evaluation of the likely effect of moving to a trauma centre system and predicted a net cost per QALY gained of between £942 and £1,376; however, this was carried out in 1990 and the figures are likely to be out-of-date in 2005.

Summary

The evidence on changes in the emergency care network is patchy (Roberts and Mays also comment on this in their review of this area), and the consideration of costs is very poor. The only specifically designed economic evaluation was the 1990 study by O’Kelly and Westaby. Where evidence does exist, such as the intermediate care of minor injuries there is a strong suggestion that services have lowered the self-referral threshold rather than relieving pressure on A&E.

In a recent editorial in the Emergency Medicine Journal, Wardrope and Driscoll claim NHS Direct, walk-in centres and face-to-face computer triage are all examples of systems that have been introduced “without adequate evidence.” They say their success has been measured in terms of the number of people using the services but that this has been added demand, not substitution for other services. This “has sucked up resource and staff that might have been more effectively employed in primary care or in A&E. We will never know the answers to these questions, for trials with adequate design have not been carried out.”

Changes in emergency care seem inevitable in the face of pressures on medical staffing. However, there is an urgent need for better information about the cost-effectiveness of the changes.

Networks, IT and management

This section draws together three themes in the Review: managed care networks as the basis for organising patient care, information technology to support networks and other forms of care, and the management arrangements such as joint working at NHS board level.

Managed Care Networks

Networks are defined as "linked groups of health professionals and organisations from primary, secondary and tertiary care working in a co-ordinated manner, unconstrained by existing professional and [organisational] boundaries to ensure equitable provision of high quality effective services." (Edwards). These are not traditional, "loose" networks, nor are they "hub-and-spoke" which were arguably about the inter-relationship between hospitals and clinicians. MCNs should be focused on the needs of patients.

An analogy that will appeal to NHS Scotland is between the network and a clan. Meijboom suggests that when outputs can be measured easily and where the transformation from inputs to outputs is well-understood markets or hierarchies are a good way of managing resources. When the opposite applies the idea of the clan is much more useful. A clan "is coordinated by trust based on shared norms and values … [T]he clan is characterised by a high goal congruency while it is difficult to determine individual performance." (p. 38).

Edwards found much to praise about networks, listing the following advantages in his BMJ editorial:

- Exploit opportunities for specialisation without excessive loss of local access – important for growth of cancer and heart disease networks?
- Focus on clinical issues
- Flexible to changing environment.
- Best use of scarce specialist time
- Standardise care
- Improve access
- Reduce "distance decay" where distance from specialist centres leads to poorer outcomes
- Increase interaction between people from different backgrounds may stimulate creativity and innovation.
- Might address situation where staffing pressures would other wise mean total withdrawal of local service

He notes some dangers such putting members at odds with their employing organisation, for example on who decides about a consultant appointment, drug formulary, operational policy. However, he suggests that with strong leadership these problems can be overcome.

Alberti suggests MCNs as the model for emergency care, claiming, "networks have certainly helped in services for cancer and coronary heart disease." He even suggests networks might eventually become budget-holding organisations in the NHS. Edwards can think of nothing worse than if networks are "seen as the next structural panacea and turned into new NHS organisations… it could create a model very similar to that adopted for the privatised railways, with the attending problems of competing priorities, a lack of connection between the parts and confusion about responsibilities."

In addition to this objection, MCNs seem to be judged in advance of the evidence of their effectiveness and cost-effectiveness. There are several accounts of the work of MCNs in the research literature e.g. Gregor on a regional cancer network and Dawson on a head-and-neck cancer network in west Scotland. These tend to relate to the set-up period, initial work carried out and problems encountered. No papers were identified that estimated the cost to the NHS of running a network or of measurable health benefits to patients, an impression confirmed by Carter et al. Without this information we cannot know whether this is a good use of clinician time.

Information Technology

One of the problems identified by Gregor in her account of the cancer MCN was the problems in communicating across a network of 600 clinicians working for several different organisations. Information technology (IT) has been suggested as part of the solution.

More broadly, the Wanless Report foresaw the need for a major investment in IT for the NHS in England as an essential component of a scenario that would improve population health and reduce costs. To achieve this £6 billion was allocated for a system "designed to give patients the right to book hospital appointments for the first time at their convenience. It is also intended to provide records accessible to GPs, doctors and paramedics, and introduce prescriptions at the touch of a button."[8] However, Department of Health and industry sources agree that the implementation cost is likely to be between three and five times that amount. Other examples of expensive investments include £91 million to implement an e-mail system across the NHS[9] and the costs of an electronic patient record (Chapman).

However, a literature search indicates a lack of published economic evaluations of IT schemes. Such a finding is not new. Writing in 1996, Donaldson listed the claims of IT enthusiasts and said, "Faced with such captivating images of the future of medical practice, it may seem churlish to stop and ask for evidence of the benefits of computers to the NHS." This is exactly what Lock tried to do in a review of the evidence on the value of IT spending in the NHS. He found it was "scarce and inconclusive". More recently Gustafson and Wyatt found, "Cost implications are important but largely absent in ehealth evaluations."

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[8] http://society.guardian.co.uk/print/0%2C3858%2C5037155-106542%2C00.html

[9] http://society.guardian.co.uk/internet/comment/0%2C8146%2C836537%2C00.html

Admittedly there are difficulties in carrying out evaluations in this field. For example:

- IT has many different applications
- it is difficult to specify measurable benefits
- cultural – Lock notes, "Information technology professionals generally take the view that the need for improved systems is self evident in such complex, information-intensive organisations as hospitals." Donaldson confirmed this view, "subjective methods [of evaluation] tend to subordinate established objective methods on the apparent premise that 'the system is worthwhile, it's just difficult to show that it is so'."

There is no doubt that IT systems have huge potential and that they can change practice in fundamental and possibly unpredictable ways in the long-term. However, very large amounts of money with alternative uses are being invested in IT programmes when the evidence-base is not apparent.

Management

The Review advocates joint working between the management of NHS board levels. Ideally, we would know what the additional costs of joint working are (in terms of additional meetings, etc) and the additional benefits they would bring to patients. In fact very little is known in this area. The economics evidence on NHS management and its impact on performance includes the following studies:

- Wilkin reviewed the evidence on the size of commissioning bodies (primary care organisations) in England and found that size of population covered was not associated with performance or efficiency.
- Street found there was no simple relationship between management costs and performance – it was not true to say, for example, that investing in more management led to better performance. However, the best fit of the data suggested optimal performance would be achieved with management costs of about 5-6% of total cost.
- Soderlund found that higher spending on "top-level" management was associated with poorer productivity; the total admin spend showed the same relationship. However, he notes that quality was not measured and this could be where management effort shows up.

None of this is conclusive, and to some extent it is contradictory. However, it is certainly not obvious that the benefits of joint working will outweigh the benefits; this will rely on a more intuitive judgement.

The role of the hospital

A number of the policies that would affect hospitals have been included in earlier sections such as early supported discharge or the employment of GPs within A&E departments. This section takes a brief overview of the implications for hospitals.

Managing demand within hospitals
The research literature that best describes the impact of the Review's proposals on hospitals is demand management. Edwards and Hensher list the following options for managing demand once it has reached the hospital:

(i) bed closures – this option is based on Roemer's Law which states "a bed built is a bed filled", in other words once capacity expands clinicians will change their "admission threshold" and the beds will be filled. Without the beds clinicians would find other ways to manage the patients and the issues are whether beds help provide better quality care and whether this is sufficient to justify the additional cost of the bed. The impact of bed closures are less clearly understood – there is no research evidence on what types of patients are no longer admitted and what implications this has for them: for example, does their GP send them to hospital anyway as an emergency referral that the hospital cannot turn away? This option seems like a blunt tool, failing to discriminate between patients in genuine need and those who might be managed elsewhere. The main role of bed closures could be in sending a signal to local GPs that the hospital is suffering severe problems and to discourage further referrals.

(ii) waiting lists – waiting lists have traditionally been seen as a barometer of whether the health care system is coping (i.e. whether supply of and demand for health care are in balance): when demand exceeds supply a queue forms. Again, the length of the queue and the time people are waiting sends signals to patients and primary care clinicians on their referral behaviour. In recent years political attention has focused on waiting times, however, and this is no longer a "safety valve" the hospital system can use when it is under pressure.

(iii) observation / assessment units – these have the potential to offer an alternative to hospital admission. For example, Hardern et al estimate that an investment a 10-bedded rapid diagnosis and treatment centre in Leeds would save 16 beds elsewhere in the hospital. The concern is that they will also change the threshold for referring patients to hospital and, following Roemer's Law, patients will be seen in the units who would not otherwise have been admitted with the result that the unit is full of "borderline" cases rather than fulfilling its potential. This means no cost savings will result.

(iv) early discharge – this has been covered in some detail in an earlier section but Hensher and Edwards point to the difficulties in comparing the costs of early discharge schemes with traditional care. Firstly, the days that are saved are towards the end of the patient's hospital stay and if they are recovering in that time there use of resources (and hence cost) will be below the average for the ward. If costings are based on published

figures these will tend to overstate the savings. In addition they note that cash-releasing savings are only made if wards are shut and staff taken off of the NHS payroll as a result of early discharge of patients.

Clearly the Review focuses on (iii) and (iv) rather than (i) or (ii), although the impact on bed numbers is uncertain. However, these shifts in emphasis can lead to several different models.

- In one model, hospital services are centralised in a single site within an area; in another model. This could suit a clinician agenda (with large central hospitals able to justify excellent facilities and exploiting the outcome benefits of specialisation) while managers are happy because economies of scale are exploited and costs are reduced. Unfortunately writing in 1999, Posnett argued that the benefits of specialisation were limited to a few conditions, and that any "volume threshold" for good results was at quite a low level of work. Similarly, any economies of scale are confined to expanding hospitals with less than 200 beds to between 200 and 400 beds. Posnett concludes that while the model is attractive there is little research evidence to support the policy.
- one hospitals acts as a hub with local hospitals being like the spokes in a wheel (hence the name "hub-and-spoke").
- A third model sees local hospitals as acute assessment arms of big central hospitals (Smith BMJ editorial 2001). Medical and nursing staff would rotate between the centre and the local hospitals. The local hospital would have labs, imaging and good electronic communications, allowing some patients to be sent straight home. "… patients with emergencies would reach hospital within 10 minutes rather than 30 minutes". Local facilities could build better intermediate care links with primary care.

The secondary care / tertiary care interface

The vast majority of the literature on managing care at the interface relates to primary care and the acute hospital with very little on the interface between secondary care and highly specialist tertiary care. Edwards and Hensher point out that there is a lack of a clear definition of tertiary care – while some specialties such as transplant surgery or neurosurgery are unambiguously in that sector, others such as neurology, renal medicine and oncology increasingly blur the boundaries. As a result, very little is known about patterns of referral or options for managing demand.

Economies of scale

Many of the measures proposed by the Review are designed to reduce pressure on acute hospitals. The impact on quality is considered elsewhere in this document, but what does the research evidence suggests about the impact will this have on costs?

There is growing recognition that many of the costs of providing hospital care (and health care more generally) are fixed in the short-term – these are the costs of employing staff and running buildings and equipment. For example, Scottish Health Service Costs show

that in 2003-04 the components of the cost of managing a patient on a general medical ward was as follows:

Category	Cost	Saving if admission avoided?
Medical staff	£200	Medical time reused elsewhere in hospital
Nursing staff	£392	Nursing time reused elsewhere in hospital
Pharmacy	£126	Pharmacy staff time reused but some savings on medicines not prescribed
AHP staff	£79	AHP time reused elsewhere in hospital
Laboratory	£95	Lab staff time reused, equipment costs are fixed, some savings on consumables
Overheads	£485	Very unlikely to be any savings at all
Total	£1377	

The precise financial saving from reducing general medical workload by one case is uncertain but seems likely be in the region of £100 (i.e. 7% of the cost per case). If an early discharge scheme is being considered then the savings might be even smaller: if medicines and lab tests are used more at the start of a patient's stay when they are most acutely ill then there will be fewer savings from trimming stay in hospital from five days to four.

This finding is not neither new (see e.g. Hensher et al's comment son day case surgery which, they say has not reduced admissions or costs despite enthusiastic take-up) nor is it peculiar to the NHS: for example, in a large urban teaching hospital in America 84% of costs were fixed (Joseph and Rydman).

Will a reduced number of larger facilities spread these fixed costs across more patients so the average cost per patient would fall? Intuitively it seems possible: set-up costs are spread more thinly, specialist staff are used closer to capacity, there are opportunities for "learning by doing", and so on. The research evidence suggests that if these things are factors then they are offset by other factors such as problems managing larger hospitals, loss of co-ordination, etc. Posnett says the research evidence shows economies of scale in expanding hospital bed size up to 200 beds, but that after this there were constant returns to scale (i.e. average cost per patient neither rose nor fell as size changes). This has been confirmed by two other sources:
(i) small-scale UK studies

Lead author	Service	Findings
Bowers	Emergency orthopaedics	Centralisation makes some economies on use of theatre time but has less impact on wards
Bachmann	Cancer surgery	Volume of surgery carried out by individual doctors is at least as important as size of hospital. Doctors treating lowest and highest volumes have highest costs.
Jacobs	Intensive care and high	Modest economies of scale: a 7-bed unit is predicted to have average costs that are 96% those of a 6-bed

	dependency unit	unit
Barton	Cochlear implants	Economies of scale and scope exist up to 9 children and 20 adults per year in a centre
Hollingsworth	Neonatal care	Substantial inefficiencies but not related to scale

These studies seem to bear out that if economies of scale do exist they are very modest.

(ii) experience from other countries – for example Aletras found constant returns-to-scale in public hospitals in Greece, and Dranove analysed support services and found substantial economies of scale up to 10,000 discharges per annum but none thereafter. (This is roughly equivalent to a hospital of 170 beds based on 5 days stay and 80% bed occupancy)

Summary

After hospitals have achieved a size of around 200 beds (which is the size of the very smallest general acute hospitals on the Scottish mainland) average costs per case treated are not very responsive to the size of the hospital. Decision-makers should be wary of the use of the term "savings" in research studies: it usually means bed-days and staff time freed for other purposes and not cash-releasing savings. This casts doubt on some of the claims of research into intermediate care systems.

Cost and quality

Elsewhere in this document, the evidence on the relationship between quality of care and volume of work has been reviewed. The above section looks at the evidence on costs and quality. To complete the analysis of links between the variables, the final section would ideally be a review of the evidence on costs and quality. Unfortunately this is has not been covered in so much detail.

An example of a potentially useful research design is the study of Morey et al who explored the relationship between hospital costs and quality of care provided using data on American hospitals in 1983. They compared operating costs with an index that showed whether the hospital had more or less deaths than would be expected given the types of patients being treated. A 1% increase in quality was estimated to increase hospital costs by 1.34%, although the latter figure increased for larger hospitals. or a typical hospital the additional cost for each death voided was $29,000 (approximately £15k). However, this study is based on an old American data set so the results may well not be relevant to Scotland in 2005. This does suggest an area where further work could be commissioned, however.

Options for Reform

The problem

Since its inception, the NHS has been grappling with the problem of the gap between demands and needs on the one hand and supply on the other. The architects of the NHS thought about demand as being based on the epidemiology of treatable diseases: when the NHS was established there would be a backlog of illness to work through, then a "steady state" cost as the system managed chronic disease and new cases of acute disease. As the cost of the NHS rose rapidly in its early years the government introduced charges for prescriptions and some dental work; this is a simple way to limit demand. GPs adapted to a role as "gatekeepers" of the system: patients consulted them for access to health care and the GP decided whether this case merited treatment, referral or reassurance.

Demands have risen inexorably, however. The traditional response has been to increase supply by providing funding increases above inflation. While demand is difficult to measure the increases in supply have not kept pace. Political thinking focussed on the Beveridge-like idea that there is a finite amount of need for health services and that this changes only slowly over time (e.g. as the population ages, which is at a fairly slow and predictable rate). In the late 1980s a feeling grew that things were "going wrong" with the NHS in a way that was not temporary – Gillam said, "The sense of a growing gap between what their patients want and what the service can afford provides a stressful undercurrent in the working lives of general practitioners". The concept of "underfunding" was popular in health policy debates of the time, as though a funding increase would bring supply and demand back into line. This view seems naïve now for a number of reasons:

- While needs do change fairly slowly advances in clinical knowledge and capabilities (e.g. through the development of new medicines) redefine needs (the ability to benefit from treatment) at a more rapid rate
- There is an element of subjectivity in determining needs and as supply expands the threshold for referring or treating patients might change – for example, research evidence shows reductions in waiting lists generate increases in referrals (Smethurst and Williams). Alberti has made a similar observation about reducing waiting time in A&E departments: as these are reduced more people choose to use them. Hensher et al in their review of ways to keep people out of hospital conclude the schemes' "ability to substitute for existing services may be swamped by their impact on demand."
- There is a political imperative to focus on demands, not needs – demands might relate to waiting times, convenience, fabric and cleanliness of buildings and so on. Demands based on public expectations may change much more rapidly than needs. People do not expect to wait for health care and increasingly expect it to be provided at a time and place of their choosing. For example, part of the English Department of Health's rationale for introducing walk-in clinics was "to offer a service to the public, when the public need it and where the public need it." (quoted in Nicholl and Munro).

- Additional money made available to the NHS is not spent purely on meeting needs: for example, considerable investment has gone into new pay deals (new contracts for consultants and GPs, Agenda for Change for other staff).
- The NHS in Scotland employs 140,000 people, each of whom can think of ways in which they can offer a better service to patients. When more money is available, staff present these ideas and the new money is quickly swallowed up.
- Not all resources are used to best effect. Inefficiency might take the form of services costing more than they need to or of money being spent on low value services that meet few needs.

If this analysis is correct then simply investing more money will not address the problem. Supply will increase but not as rapidly as might be expected owing to the diversion of funds to other important ends or lost through inefficiency. The very fact that money is available and supply is expanding might also call forth further demand. This suggests other policy options need to be devised.

How can the balance between supply, demand and need be restored?

The options could be considered as affecting mainly the supply or demand side of the health economy and as being primarily about the financing or organisation of care, as shown in the following table (N.B. these are the options that can be found in the research literature, they are not necessarily options that were considered by the Review):

	Demand side	**Supply side**
Organisation of services	1. Split commissioning of care from providing care, as in England 2. Hand lead role on commissioning to another agency e.g. primary care or local government 3. Take the NHS out of political control and establish it at arm's length from the government	1. Managed clinical networks to co-ordinate care 2. Better filtering of demand and directing of patients to wider variety of service options 3. Self-governance for suppliers to meet demands as they see fit e.g. foundation trusts
Finance of services	4. Devolve budgets to primary care to commission services – strengthens GPs role as gatekeeper to other services 5. Charges for using NHS e.g. pay to see GP 6. Define core health services that are to be part of NHS package e.g. through identifying services that will not be funded, as in Oregon. 7. Set priority for service as key	4. Incentives to stimulate efficiency e.g. internal market where money follows patients and competition between hospitals is possible.

	cost drivers e.g. chronic diseases 8. Encouraging/subsidising health insurance that will increase use of the private health care sector and reduce calls on the NHS	
Other	9. Promoting self-care and greater reliance on informal care	5. Drive local managers to make local service more efficient e.g. through tougher waiting time targets 6. Tighter national regulation of performance e.g. English targets and stars 7. Expand capacity through NHS or through use of private sector

The main policy options considered by the Review are:

- demand-side policies 7 and 9
- supply-side policies 1 and 2

In other words, the review has explicitly avoided fundamental changes to the way health care is financed and organised.

The most relevant parallel for the policies that have been adopted in the research literature is the concept of "demand management", which is defined as "the process of identifying where, how, why and by whom demand for health care is made and then deciding on the best methods of managing this demand …" (Pencheon BMJ 1998). This clearly has some relevance as the Review seeks to establish a whole series of ways of addressing demands, thus addressing the point made by Rogers et al "The most notable feature about the current system is the lack of a graduated service." In a series of articles, Pencheon and colleagues set out the options for addressing the management of demand:

(i) promotion of self-care – this would manage demand before it reaches the NHS. There is a danger that this can amount to neglect or unmet need: "This needs more than simply exhortations not to use the service for minor complaints, but meaningful education and true empowerment." (Pencheon). Unfortunately at that time few of the campaigns to promote self-care had been rigorously evaluated; indeed, evaluation might be difficult because that would be designed to show a short-term measurable change when these initiatives might be encouraging long-term cultural change.

(ii) management of demand within primary care – this is not just about discouraging inappropriate demand, but also about promoting under-used cost-effective services. Ways to put this into practice included "graduated access" (i.e. having options for referral other than a specialist out-patient clinic e.g. GP specialists within locality, telemedicine), managing patient expectations, changing the nature of the relationship between health care professional and patient (including the option of more formal "contracts" between patients and the NHS), and the role of information in helping people make sound choices.

(iii) the primary care / secondary care interface – this work has focused on GP referrals to hospital. Ways to change this behaviour include guidelines for managing disease, feedback data on referral behaviour, and changing financial incentives (e.g. fundholding).

(iv) management of demand within the hospital sector – the two key policies here are in avoiding admissions where cases can be managed in local settings and early discharge where patients can no longer get any additional benefit from their hospital stay that they could not get in another setting. Hospital capacity does not necessarily fall, but patients stay for a shorter time and for any given number of beds many more patients will be treated. The recent history of the NHS is of falling bed numbers set against those beds being used much more productively.

The advantage of the demand management approach is that it starts from a diagnosis of the problem and puts forward a whole range of solutions. Typically these are by way of small changes or "fine tuning" to the status quo and hence costly and disruptive major reforms are avoided. It also maintains universal access to care free at the point of delivery.

The disadvantages could be that the expanded range of options for supplying care may confuse people and damage continuity of care. Changes to secondary hospital roles might be poorly understood and seen as "cuts" by the public while the increased responsibility for self-care is see as "passing the buck" to patients and their carers. In addition, the changes might be expensive if the new ways of managing demand create their own demand (i.e. they are not pure substitutes for existing services).

The bigger problem is that the reforms assume the existing health care system is basically working – for example, it assumes that the incentive system is sufficient to continuously stimulate productivity. Other examples include:

- does the NHS have enough capacity to meet government policy commitments e.g. on waiting times for scheduled care and on emergencies [quote from EMJ editorial]. The NHS in England felt they needed a specific National Beds Inquiry dedicated to addressing this issue but there has never been a Scottish equivalent.
- is there sufficient money in the health care system in Scotland to maintain the balance between supply and demand and is there a strategy on how to achieve this beyond the next few years? Again, the English had a specific review, the Wanless Report, commissioned to give structure to health care planning over the next twenty years; there has been no equivalent public review in Scotland.

Internal market
Soderlund studied the productivity of hospitals that became self-governing trusts in the early years of the internal market (1991/2 versus 1993/4). Trusts were less productive than other hospitals at the start of this period. While all hospitals improved their productivity trust hospitals did so more than others even when controlling for other factors. It is not clear whether (i) these gains were the product of some unmeasured factor (e.g. trust income depended on workload so trusts had a strong incentive to count all possible workload) or (ii) the gains were a "one-off" or persisted to the end of the decade.

GP payment system
Scott in 1996 noted incentives for GPs to do more was as interesting a way forward as evaluating specific schemes across interface.
Gosden carried out a Cochrane Review of payment systems in primary care. A salaried system resulted in patients being happier about their access to care.
Chapman – PMS evidence all comes from first wave. Has allowed nurse-led primary care but little evidence on its cost or quality. Evidence of improvements in mental health and care of older people [suggesting might be more gains at interface with social care rather than with secondary care?] Salary seems to have modestly improved recruitment and retention.
Campbell carried out a controlled before-and-after trail of PMS and GMS practices between 1998 and 2001. Quality of care improved in both groups but in the PMS groups there were additional gains in the management of angina and the elderly. However, the things that promoted this were not specific to PMS. The quality gain was also achieved at an increased financial cost.

Implementation issues

The research literature has identified barriers in several areas relevant to the Review. These can be considered under three headings:

1. changing care when health care worker behaviour is the only factor
2. change when patient choice is a factor as well
3. change in the face of public opposition

Changing care when health care worker behaviour is the only factor: the example of the primary care / secondary care interface

The shift of resources from secondary to primary care has been a goal of the NHS for a decade or more. In Scotland, Miller et al concluded progress in the early 1990s was slow and came mainly from growth monies rather than a fundamental shift. Craig et al explored the reasons for the relatively slow change in Scotland and in England. The NHS decision-makers interviewed agreed changes were small, non-strategic, piecemeal and not underpinned by resource transfers. The barriers they identified included (i) fixed costs in secondary care, (ii) an opinion held by some health care professionals that the shift might not be appropriate, (iii) weak incentives to shift resources, and (iv) lack of co-operation between key stakeholders. They conclude, "Those to whom power was devolved were neither equipped nor minded to engineer the strategic resource shifts …"

O'Cathain reviewed two specific local schemes that had tried to shift resources from secondary care to primary care. The barriers she identified have much in common with those identified by Craig et al:

- disincentives
- lack of information on activity and costs
- uncertainty over quality of primary care alternatives
- concern about rising primary care workload
- diversity of views within primary care
- difficulties in communication between many agencies involved
- lack of leadership by purchasers

Considering hospital-at-home schemes Fulop et al also identified opposition from some hospital clinicians as a factor.

A slightly different set of problems were identified by Bamford et al in his analysis of the failure of a national telepathology network. Apart from the predictable technological problems, the "human" barriers included pathologists being reluctant to learn new skills, partly because they were too busy, and local IT staff not seeing it as part of their role to help. They conclude starkly, "This project has not achieved its aims."

In summary, the barriers to change are:
(i) loss to those who currently care for patients – this might be on grounds of feared loss of quality of care or a more subjective unwillingness to change (for example, Sibbald et al say doctors feel the loss of their role when nurses take over some of their work)
(ii) those asked to take on new work feel themselves to be too busy – as in the case of telepathology this might extend to support staff. Andersson and Kalberg in Sweden in

1996 noted, “The expected chain reaction of integrated care did not take place, since providers outside hospital were resistant to the shift of responsibility.”
(iii) lack of unity of purpose – many different workers are involved creating difficulties in co-ordinating change and achieving common purpose.

Facilitators

Pencheon says best chance of success for intermediate care is when it is provided by an integrated system of professional teams with clarity of purpose. Sibbald et al list factors promoting success when changing skill-mix as including:
(i) using interventions of proven efficacy
(ii) education and training
(iii) removal of boundaries between staff and service sectors
(iv) pay and reward systems geared to scheme
(v) strategic planning and human resource management,
Banham and Connelly suggest change can only be implemented when there is clarity about its purpose, evidence base, acceptable risk, accountability, and quality assurance.

These analyses suggest change cannot be simply grafted on to the existing health care system and time and attention is required if it is going to take root.

Change when patient choice is a factor: the case of minor injuries
The example chosen here to illustrate the additional complexity when patient choice is a factor is that of minor injuries.

Part of the rationale for the expansion of the range services that patients can use for a minor injury is to provide an option for different levels of need. However, as Sanders points out, patients have no way of making this judgement. In appropriate attendances already create problems at A&E departments but if patients do not understand the new system then this might actually get worse. In fact patients appear to use waiting times to pick a service (Rajpar), although once they had used a new type of service once they were more likely to go back to it again.
The Sheffield system illustrates the problems that can arise even with intermediate care options. Coleman reviewed patients attending the A&E department who had been triaged to the lowest priority treatment streams: 55% were potentially suitable for intermediate care of some type but some patients had been referred to A&E by other health care workers. They conclude that only 7% of those potentially suitable for intermediate care would be likely to use it.

Change when public opposition is a factor
As noted elsewhere, doctors and managers can often agree that some degree of centralisation of services would be the “best” option for the local population. Political and public opposition can hamper or even halt these changes. For example, many A&E doctors see centralisation as the best way forward for their services but see the barrier as being “politicians fearing the alienation of potential voters by closing down cosy but ineffective local A&E departments in small neighbourhood hospitals.” (Albert and

Phillips). On a similar note, Black notes "public anxieties about losing local access to emergency services carries more political clout than professional logic".

Haycock et al provide an interesting analysis of the reaction of the public to major changes in acute hospital provision. They say, "The scale and nature of opposition to change often surprise hospital managers." They attribute this to four factors:

- Scepticism about motives: the public believe changes are driven by cost-cutting (ironically, as they point out, the changes will often cost more!)
- Symbolic importance of local hospitals to the community.
- The public place much higher weight on access and travel time than planners, believing these offset any gains from specialisation
- Hospitals are often large local employers

The success of local opposition is hard to predict but one "success" might be in stopping radical change being proposed in the first place.

They also warn that many plans are based on poor data, poor methods, or both and hence under detailed scrutiny it is common for key elements to be picked over, causing increasing loss of faith

They list 14 factors for success, as follows:
Have clear view of the objective if not how to get there ("Without goals, processes easily flail aimlessly and do not deliver results that decision-makers can act on.")
Be in a current position that is clearly untenable
Have feasible first steps
Involve key stakeholders from the start
Ensure at least a perception of something for everyone
Focus public consultation to gain support
Unify project management
Use independent facilitation
Base plans on robust analysis
Align political, cultural and managerial leadership
Ensure good enough relations between affected providers
Set up sound processes, including strategies for finance, human resources, estates and communication
Use a flexible process that can accept refinements
Allow sufficient time – multiple attempts may be necessary particularly if a culture of change has not existed previously

Black also suggests that rather than an all-or-nothing centralisation agenda, local services should be arranged around networks; this has a chance of commanding broad enough support to be carried.

Summary
The research literature identifies numerous barriers to change of the type proposed by the Review. None will come as a major surprise to those who have been active in change management. Key factors are identifying all relevant stakeholders, their potential to

thwart change and ensuring that they can understand the case for change and do not feel so disadvantaged by it that they wish to oppose or slow it.

Issues with the Research Methods

Making judgements from the evidence base
This chapter has frequently noted that the evidence is patchy and sometimes questioned the quality of the work e.g. can the conclusions of intermediate care studies be trusted when they have not included all relevant costs?

A purist position would be that no evidence-based recommendation can be made in the light of these problems. Banham and Connelly suggest three possible perspectives on evidence: advocacy of scheme, scepticism, and pragmatism. The approach adopted here has been to try to make pragmatic recommendations, including appropriate caveats, on the following basis:

(i) It is doubtful whether there will ever be entirely adequate research – a frequent conclusion of even well-designed pieces of research is that further work is needed on some aspect. Also, increasing quality of study design may actually make it more difficult to generalise the results to an imperfect real world.

(ii) Decision-makers will have to determine a future direction for the NHS in the near future and they can do this with or without research-based recommendations. There is a credibility issue for researchers: do we have anything useful to contribute and if so what is all of the research funding for?

(iii) On this pragmatic theme, very little (if any) of the current organisation of health care services is evidence-based to a standard that we might wish. The purist would thus not only make no recommendations about new services but would also recommend that most of the NHS stop functioning in the absence of evidence that it works!

The following sections deal with some of the issues with the methods used in (i) conjoint analysis studies (that helped determine the set of ten principles for NHS reform), (ii) cost-effectiveness league tables (used to inform the shift in resources to preventative and chronic disease services, and (iii) evaluations of intermediate care schemes.

Issues in Conjoint Analysis literature
These studies are informative and offer fresh insights into the views of people responding to the surveys. However, they are few and far between, and relate to the changes being considered by the current review only by chance. Only one of the studies was carried out in Scotland, so the broad conclusions drawn assume that the attitudes of people in Chesterfield, Nottingham and the Isle of Wight (to take three examples) generalise to Scotland.

Another issue is to what extent these surveys should guide policy. For example, people prefer to see a doctor in an A&E department, presumably because they find this thought reassuring and possibly because this is the system they are most familiar with. Being

seen by a paramedic rated quite poorly, but it is not clear whether the people responding were aware of the training and skills these health care professionals have. In other words, how well informed are the preferences (possibly the prejudices) being measured?

To take another example, it is notoriously difficult to use percentages and statistical concepts in public opinion questionnaires, yet 18% of Finlayson's sample claimed they would accept an operative mortality rate for potentially curative cancer surgery of over 18% (roughly six times the rate expected in a general hospital) to be seen in a local hospital. Did these people really understand what they were saying?

A further issue is that it is hard to find a common currency to make comparisons between the results of studies. How can we measure the strength of preference for seeing a doctor of your choice in a minor injuries setting versus travelling an additional ten miles in a secondary care setting? Waiting times can help in this respect (we can measure the willing ness to wait or to travel for reduced waiting time, for example) but not all studies include this as an attribute. Without this it is hard to say whether people in Aberdeen feel more strongly about their preferred attribute than people in Nottingham feel about their preference.

The final concern is that these studies tend to focus on the preferences of those people who reply and are prepared to trade one attribute against another. In practice a minority and sometimes (as in the Isle of Wight surgery case) a majority express a preference for one option (such as local care, irrespective of its characteristics) without trading between levels of attributes at all. It is harder to measure the strength of preference of these people and there is also a concern about whether their responses fit a "rational" model of decision-making.

Issues with QALYs and "league tables" of cost-effectiveness data

There are numerous issues with the concept, construction and application of QALYs. Some of the caveats with the table of cost-effectiveness results assembled are as follows:

- The table assumes international transferability of results. It is common to assume clinical trial results generalise, at least between genetically similar populations, but resource use does not transfer as easily. Different health care systems have different thresholds for treatment, use different resources when they do intervene and have different costs per item of resource use. Here, it is assumed that headline exchange rates are an adequate way of converting from local currencies to pounds.
- Studies from different years have been combined without updating for inflation. Most studies were published within the last five years so this should not be too significant.
- The studies use slightly different methods and assumptions to derive QALYs – for example, the table includes studies that use discount rates for future events of 0%, 3.5% and 6%. Ideally they would all be carried out using a common approach.
- The cost per QALY result is the net cost divided by the net benefit so it is only relevant to Scotland if the comparator technology reflects current Scottish

practice. The best chance of this being true is when the economic evaluation was carried out in the UK.

- Some authors disaggregate results for each patient sub-groups while others only report one result for all patients – it is possible that if the former approach were adopted for all technologies there would be some sub-groups of patients in whom the technology appeared cost-effective, even if it seems to have poor cost-effectiveness for all possible patients.
- The table compares point estimates of relative cost-effectiveness for clarity. This ignores any uncertainty in the estimate and an approach that showed the likely range of results would be more desirable, if harder to present.

Issues in evaluations of intermediate care schemes
There are a host of issues with the evaluation studies cited in the sections on intermediate care, telemedicine and emergency services. The five most important have been selected for further consideration below.

1. Generalisability
Many studies were carried out (i) in a single centre, (ii) in another health care system, or (iii) used highly selected health care providers in the trial. All of these limit the generalisability of any findings. For example, near-patient testing has been disappointing in practice due to the failure to address setting-specific issues that were not apparent during their evaluation (Delaney, quoted in Kernick). A similar point is made by Roberts and Mays: "Simply transferring interventions which succeed in one setting without understanding the underlying process of change is likely to result in unexpected consequences locally."
Some authors have gone so far as to say that international comparisons are simply not possible (e.g. Nathan et al were unable to compare French and American trauma care systems.)
Another dimension of the generalisability problem is over time. For example, O'Kelly and Westaby carried out an economic evaluation of regional trauma centres and while this is very interesting it is now 15 years old and it is doubtful that all of the key parameters have remained unchanged.

2. Size of studies
Small studies can only pick up large effects with certainty and this is a concern when one of the issues is whether the new service is as safe as the existing one. For example, Faulkner et al reviewed new intermediate care schemes to assess the impact on the referral rate to hospital. Of 139 studies no good quality evidence was found to judge one way or another, although it is not clear whether the studies could have detected a difference even if there was one..

3. Range of costs and benefits to include
The range of costs and benefits to include in an economic evaluation can determine the result. For example in their study of teleradiology in Norway, Johansen and Breivik found the system cost 400k kronor and saves 50k on clinics but 1400k on patient travel.

Based on health care alone there is a net cost to the system, but a net saving when patient costs are included.
Similarly, Kernick and Scott point out that the cost per hour of GP time is £21 from the point-of-view of the practice, £54 from the point-of-view of the health authority (including central overheads), and £69 from the point-of-view of the NHS (including training). These differences could be crucial in determining whether a primary care scheme is cost-effective or not.

4. The calculation of costs and savings
The key issue here is that average costs are generally used to value resource use when the actual cost or saving might be far less. For example, Taheri et al estimate that reducing length-of-stay by one day reduces total cost of care by 3% or less, so if average costs were used the gains from reducing stay would be very likely to be overestimated.
This raises the larger question of what happens to the resources that are freed up by intermediate care schemes. Beech points out that savings are only made if a ward is closed and staff numbers are reduced.
Another aspect that might affect the cost to be used is the scale of operation of a service: for example, if a new team is set up to manage cases in the community but is only working at 50% capacity initially then costs will seem very high (although quality should be excellent as well). There may also be "learning curve effects" that affect costs during the earlier life of the team, but which are not true in the longer term.

5. Results can be hard to interpret
Most of the evaluations considered look at whether the new scheme has a net cost or a net saving. This is not enough for an adequate decision, however: the new scheme might cost more but if it also offers better quality care then it might still offer good value. While few studies used the approach, the best economic evaluation method for organisational change could be cost-consequence analysis (Coast) since this allows multiple dimensions of benefit to be included.
The evaluations also supply little to help local planners estimate the size of intermediate care service they might need. For example, it has been demonstrated that while early discharge schemes can provide equivalent outcomes at a lower cost, it has to be restricted to a tightly defined group of patients. Cotton et al studied hospitalised COPD patients and had to review 360 in order to find 81 who were eligible and willing to take part, or less than 25% of potential patients.

Summary

The results of economic evaluations of intermediate care schemes must be handled with caution. The range of costs and benefits included as well as the way they are calculated can influence the results. The studies on which they are based may be too small to detect differences in less common outcomes and the results might not generalise to other settings.

Abbreviations used

GP	General (Medical) Practitioner
HAH	Hospital-at-Home
IP	In-patient
MCN	Managed Clinical Network
MIU	Minor Injuries Unit
NP	Nurse Practitioner
OOH	Out-of-hours arrangements
OP	Out-patient clinic
QALY	Quality-Adjusted Life-Year
RCT	Randomised Controlled Trial
SHO	Senior House Officer (junior doctor)
WIC	Walk-in Centre

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Main author	Country & date publshd	Technology
Graham	US 1997	Seat belts in cars
Wang	US 2003	School-based intervention to reduce obesity in youth
Bedimo	US 2002	Condom distribution programme
Selmer	Norway 2000	Reducing the daily intake of salt
Fleurence	UK 2004	Hip protectors against falls
Fleurence	UK 2004	Hip protectors against falls
NICE	UK 2005	Bisphosphaontes (alendronate, etc.)
Shearer	UK 2004	Structured treatment and teaching programme (STTP) combining dietary freedom with insulin adjustment
Mason (confirmed by CDC Diabetes Cost-effectiveness Group)	UK 2005 (US 2002)	Intensive hypertension control
Goodacre	UK 2004	Chest pain observation unit
NICE	UK 2003	Angioplasty with stent
NICE	UK 2003	Angioplasty with drug-eluting stent
NICE	UK 2002	Home haemodialysis
Based on NICE	UK 2002	Counselling
Cunningham	UK 2003	Orthognathic treatment
UK PDS Group	UK 1998	Tight blood pressure control, with angiotensin converting enzyme inhibitors or beta blockers
NICE	UK 2002	Counselling plus nicotine replacement therapy
Raftery	UK 2005	Nurse-led secondary prevention clinic
Hu	US 2004	Annual chlamydia screening ages 15-24
NICE	UK 2002	Advice plus nicotine replacement therapy
NICE	UK 2002	Home haemodialysis
Avenell	UK 2004	Surgery
Phillips	US 2000	Increased beta blocker use to target levels
UK CRC Screening Pilot Evaluation Team	UK 2003	Population screening aged 50-75 with faecal occult blood test every two years
Hu	US 2004	Annual chlamydia screening ages 15-29
Kobelt	Sweden 2002	Surgery
Williams	UK 2004	Osteopathy-plus usual-GP care
Van Os	Neth 2000	Prevention of nephropathy using guidelines
Zaric	US 2000	Expanding methadone maintenance programme
Mason	UK 2005	Lipid-lowering therapy
Mason	UK 2005	Nurse-led clinic for control of hypertension and hypercholesterolaemia
Pickin et al	UK 1999	Lifetime statin therapy
CDC Diabetes Cost-effectiveness Group	US 2002	Intensive glycaemic control

Zaric	US 2000	Expanding methadone maintenance programme
Gaspoz	US 2002	All patients get aspirin
NICE	UK 2003	Clopidogrel every 3 months
Hatziandreu	US 1988	Exercise programme (jogging)
Fleurence	UK 2004	Hip protectors against falls
NICE	UK 2002	Laparoscopic surgery
Back	Canada 2004	Highly Active Antiretroviral Therapy (HAART)
NICE	UK 2005	Teriparatide
NICE	UK 2003	Rituximab-plus-CHOP
Paltiel	US 2001	Quick relievers (e.g., short-acting beta-agonists)
NICE	UK 2002	New thrombolysis drugs (alteplase, etc)
Dong	US 2004	Treatment with ACE inhibitors from diagnosis
NICE	UK 2003	Pegylated interferon plus ribavirin
Holmes	UK 2005	Screening strategies that include HPV
Back	Canada 2004	Highly Active Antiretroviral Therapy (HAART)
Pickin et al	UK 1999	Lifetime statin therapy
Pyne	US 2003	Enhanced care for depression
Iglesias et al	UK 2002	Risedronate (a bisphosphonate)
NICE	UK 2003	Pegylated interferon plus ribavirin
Fleurence	UK 2004	Hip protectors against falls
Wonderling	UK 2004	Up to 12 acupuncture treatments
Van Os	Neth 2000	Prevention of nephropathy using guidelines
NICE	UK 2002	Insulin glargine (long-acting insulin analogue)
NICE	UK 2003	Rituximab-plus-CHOP
Tengs	US 2001	Intensive anti-tobacco education
Pickin et al	UK 1999	Lifetime statin therapy
NICE	UK 2003	Droctrecogin alfa (Xigris)
NICE	UK 2005	Bisphosphaontes (alendronate, etc.)
Pickin	UK 1999	Lifetime statin therapy
NICE	UK 2000	Methyphenidate (Ritalin)
Graham	US 1997	Airbag in car on driver's side plus seat belt
Ortegon	Netherlands 2004	Intensive glucose control and optimal foot care
Avenell	UK 2004	Diet and exercise
NICE	UK 2003	Tacrolimus
NICE	UK 2003	Angioplasty with drug-eluting stent
Anyanwu	UK 2002	Heart-lung transplantation
Eckerman	Aus 2003	Tamoxifen
NICE	UK 2003	Angioplasty with drug-eluting stent
Harris	Australia 2005	Buprenorphine
Gaspoz	US 2002	Clopidogrel for 5% who are ineligible for aspirin
Summerfield	UK 2002	Unilateral cochlear implantation
Ortegon	Netherlands 2004	Intensive glucose control
Valenstein	US 2001	One-off screening for depression
Munro	UK 2004	Free locally held exercise classes
Anyanwu	UK 2002	Lung transplantation
Miners	UK 2001	Highly active antiretroviral therapy (HAART)

NICE UK 2001 Taxane (docetxel-plus-doxirubicin)
De Vries Neth 2002 Angioplasty
Longworth UK 2003 Liver transplant
Dong US 2004 Treatment with ACE inhibitors from diagnosis
Vijan US 2000 Screening for diabetic retinopathy annually
NICE UK 2003 Pegylated interferon plus ribavirin
Fleurence UK 2004 Hip protectors against falls
Anyanwu UK 2002 Lung transplantation
NICE UK 2003 Imatinib
Vijan US 2000 Screening for diabetic retinopathy annually
Valenstein US 2001 5-yearly screening for depression
Summerfield UK 2002 Unilateral cochlear implantation
CDC Diabetes Cost-effectiveness Group US 2002 Reduced serum cholesterol using pravastatin
Stein UK 2004 Screening injecting drug users
Duff US 2003 A disinfection program
Longworth UK 2003 Liver transplant
NICE UK 2005 Teriparatide
Graham US 1997 Airbag on passenger side as well as driver side plus seat-belts
NICE UK 2005 Bisphosphaontes (alendronate, etc.)
NICE UK 2003 Growth hormone
NICE UK 2001 Temezolomide
NICE UK 2003 Imatinib (Glivec)
NICE UK 2002 Trastuzumab plus paclitaxel
NICE UK 2005 Bisphosphaontes (alendronate, etc.)
Walker UK 2003 Public place defibrillators
TAR report for NICE UK 2001 Orlistat
Longworth UK 2003 Liver transplant
NICE UK 2002 Insulin glargine (long-acting insulin analogue)
NICE UK 2005 Raloxifene
Vijan US 2000 Screening for diabetic retinopathy annually
Summerfield UK 2002 Simultaneous bilateral cochlear implantation
Summerfield UK 2002 Provision of an additional Cochlear implant
Gaspoz US 2002 Clopidogrel alone or in combination with aspirin
Duff US 2003 Disinfection programme that targets high-risk food preparation activities in all household kitchens
NICE UK 2005 Teriparatide
Valenstein US 2001 Annual screening for depression in primary care using self-administered questionnaire followed by clinician assessment.
Vijan US 2000 Screening for diabetic retinopathy annually
De Vries Neth 2002 Bypass surgery
NICE UK 2002 Beta interferon
NICE UK 2003 Angioplasty with drug-eluting stent
Allsup UK 2004 Influenza vaccination
CDC Diabetes Cost-effectiveness Group US 2002 Intensive glycaemic control

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