RESEARCH REPORT 9

# Home and Hospital Care: *Redrawing the Boundaries*

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Linda Marks

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# The author

Linda Marks is a Visiting Fellow with the King's Fund Institute

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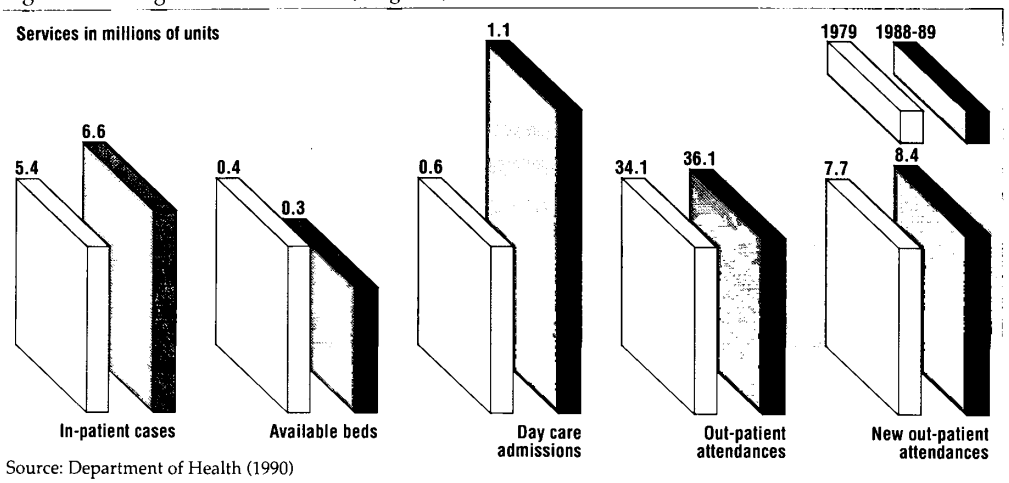
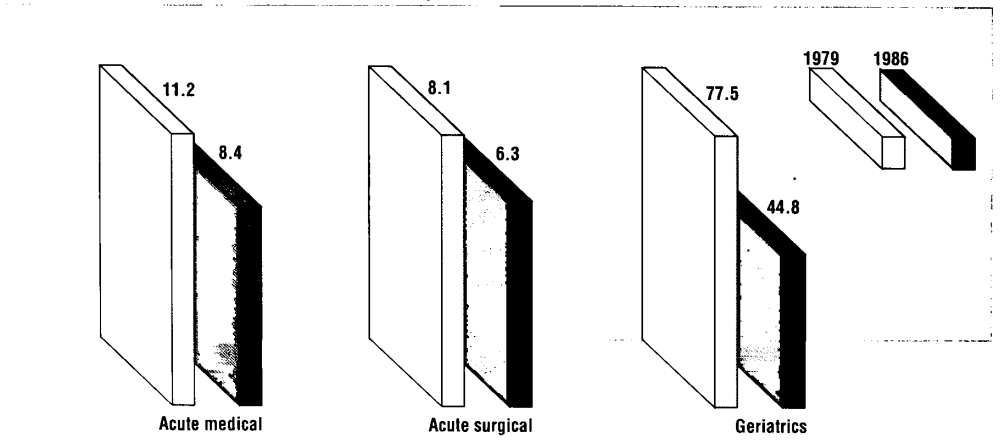
Figure 1 Changes in acute services, *England, 1979 to 1988-89*



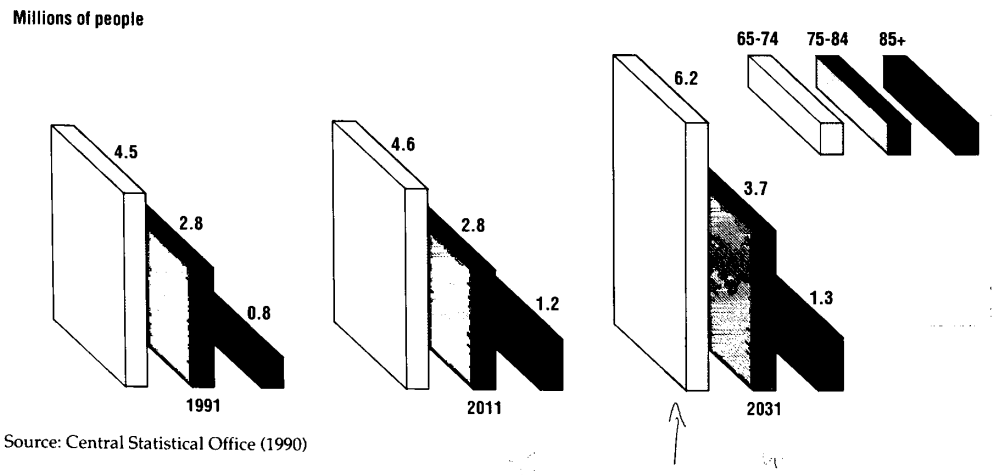

Source: Department of Health (1990)

Figure 2 Average lengths of stay (days), *England, 1979 - 1986*




Source: Department of Health (1990)

Figure 3 Projected growth of the elderly population, *England and Wales, 1991 - 2031*




Source: Central Statistical Office (1990)

a more intensive use of acute hospital resources and the gradual realignment of hospital, out-patient and primary care.

It has long been official policy to avoid inappropriate hospital admission and to provide home care whenever possible. The history of paediatric home care (see Box 1) illustrates that despite the existence of successful projects and overwhelming evidence of the psychological damage hospital admission can wreak on young children, progress in providing such a service is patchy.

This report is concerned with one aspect of the changing balance of home and hospital care: the provision of intensive levels of care for acutely ill people in their own homes. This involves bringing a hospital level of care to the home, supplying medical, nursing and rehabilitation services as well as social support and equipment. This level of care is distinct from the broad spectrum of social and rehabilitative care encompassed by the term 'community care' and the levels of care normally provided by community health services. It is referred to throughout this report as hospital care at home (HCH), although it is recognised that the term is a transitional one. As it becomes standard practice for certain kinds of hospital care to be transferred into the home, so the organisational boundaries of health care are redrawn and the meaning of the term altered.

The idea of a 'hospital without walls' is credited to the Committee of the New Zealand Board of Health, which as far back as 1961 promoted a wider concept of the role of the hospital. Similar experiments have been developed by various community agencies, such as 'Hospitalisation à Domicile', a successful French home care initiative. The Bayonne version of this service provided the prototype for the best known British experiment, the Peterborough Hospital at Home scheme (see Section 4).

There is now increased interest in developing community-based acute care (see Box 2). Demographic changes and cost constraints mean that managers and funders are keen to explore alternatives to acute hospital care; technological advances and patient preferences make home care a feasible and attractive option in certain circumstances. These are discussed in turn.

The ageing of the population generates increased demands for acute levels of care, as people over 65 presently use nearly two thirds of acute hospital bed days. Figure 3 illustrates the projected increase in elderly and very elderly people over the next forty years. As demands on acute services continue to rise, concern mounts over the costs of maintaining patients in sophisticated, high technology hospitals. Since the 1980s, in particular, governments and third party insurers have put pressure on hospitals to increase their productivity, either through working within cash limits and under strict managerial control as in the UK or through increased use of prospective pricing systems based on diagnosis-related groups (DRGs) as in the US. The early 1980s proved a turning point in the demand-led expansion of health care in the US, a change reflected in the introduction of prospective pricing systems for Medicare in 1982, a path subsequently followed by other insurers. This payment system is based on estimates of costs of treating patients by diagnosis. There are over 450 mutually exclusive and comprehensive diagnosis-related groups and payment is made on the basis of a predetermined amount per patient, regardless of the actual costs of providing care. This is a powerful incentive to contain costs and, in their concern to maximise patient throughput and reduce individual patient costs, hospital executives are trying out new ways

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## REASONS FOR THE GROWTH OF HOSPITAL CARE AT HOME

- **Increasing proportion of elderly and very elderly people**
- **The cost of maintaining patients in sophisticated high technology hospitals**
- **The high cost of constructing new hospitals**
- **Cost constraints in the health care sector and the search for cost-effective alternatives to acute hospital care**
- **Problems of hospital-acquired infection, excessive bed rest and psychological trauma associated with hospital stays**
- **Evidence of more rapid rehabilition for certain conditions**
- **Unsuitability of acute hospitals for certain kinds of care**
- **Better understanding of the possibilities of early discharge combined with intensive nursing care at home**
- **Decreasing emphasis on institutional care in all sectors**
- **Improved standards in the home**
- **Developments in home-based high technology care**
- **The importance of providing consumer choice, where possible**
- **Changes in federal policy (US)**

# Summary

The boundaries between home and hospital care are constantly shifting. Care in the community for people with long term dependencies, an increasingly sophisticated primary care service and the expansion of outreach care and day surgery have all contributed to a reassessment of the central role of the hospital.

This research report is concerned with one aspect of the changing balance of home and hospital care: the provision in the home of levels of diagnosis and care associated with acute hospitals. Although experiments in providing hospital care at home have a long heritage, current demographic and financial pressures on acute services mean that managers are now particularly keen to explore cost-effective alternatives to acute in-patient care.

Hospital care at home is one way of preventing hospital admission or of reducing lengths of stay; it invariably involves intensive nursing care and it may encompass diverse treatments ranging from home-based high technology services to palliative terminal care. The second section of this report illustrates ways in which hospital care at home may prevent admission or reduce lengths of stay, and the third section reviews one aspect of this, the expanding field of high technology care at home.

Drawing on examples from Canada, France, the US and the UK, the fourth section illustrates different ways of organising hospital care at home. Hospitals, publicly-funded domiciliary services and independent home care agencies, whether run for profit or not-for-profit, have all become involved in this form of care. While it is often assumed that this is a route to cutting the costs of acute services, the fifth section argues that cost-effectiveness has to be rigorously assessed condition by condition and that the financial implications for the health care system as a whole are difficult to fathom. Nevertheless, for some conditions and patients, the evidence indicates that such care can be clinically safe, organisationally feasible and financially viable. While the policy climate in the UK is likely to foster the expansion of intensive home care, much depends on resolving organisational and professional tensions which such changes could generate. A discussion of these forms the conclusion of this report.

# Introduction

# 1

The perception that acute hospitals form the centrepiece of health care systems is relatively recent. In nineteenth century Britain, those who could afford it were cared for at home; hospitals were largely populated by the sick poor. By the 1920s, this began to change and hospitals gained in popularity with the rich and newly emerged middle classes. Biomedical advances, including effective drug treatments and improved anaesthetic techniques, the advent of high technology medicine and the necessity of rationalising specialised staff and expensive equipment reinforced the centrality of hospital-based health care. Acute hospitals continue to dominate the health care picture both in terms of manpower and financial resources.

While critical assessments of the role of long stay hospitals have been a feature of health policy for the last 20 years or more and have resulted in the implementation of policies for care in the community, a reassessment of the boundaries between home and acute hospital care has been less evident. As early as the 1960s, however, questions were raised over the suitability of a nineteenth century model of organisation for the changing health care needs of the late twentieth century. George Teeling Smith (1969), commented:

> *The present functions of the hospital service are as follows: a small quantity of highly specialised intensive care including complex surgery; the great majority of hospital work consisting of routine treatments, not all of which may be of proven benefit; a consultant service for the general practitioner; a casualty service; and finally a diagnostic service used equally for patients in hospital and those in the community. In addition, the hospitals also have some patients who should unquestionably not be there at all (p. 194).*

He argued, for example, that different types of in-patient care should be more clearly distinguished and a better balance achieved between diagnosis in the hospital and diagnosis in the community.

Many of these issues have now been addressed, though most are not yet resolved. From the late 1940s onwards in the UK there have been reductions in lengths of stay and in the number of acute beds along with increases in numbers of patients treated per bed, in day cases and in out-patient attendances (Ham, et al., 1988). For example, from 1987-8 to 1988-9 there was a 15 per cent increase in day cases treated (Department of Health, 1990). Figure 1 summarises changes in the use of acute services in England over the last ten years and Figure 2 indicates reductions in lengths of stay, particularly striking in the case of elderly people, from 1979-1986. These changes have meant

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## PAEDIATRIC HOME CARE IN THE UK

**In 1959, the Platt Committee recommended the extension of community nursing schemes so that hospital admission of young children could be avoided wherever possible. Seventeen years later, the Court Report emphasised that 'the importance of the family must be reflected in the organisation and delivery of health services for children' recommending the creation of GP paediatricians, child health nurses and consultant community paediatricians.**

**An extension of paediatric home care is important in order to**

- **minimise the psychological trauma of hospital admission**
- **prevent cross-infection**
- **reduce the pressure on paediatric beds by avoiding hospital admission and reducing lengths of stay**
- **reduce waiting lists**
- **enable day surgery to be expanded**
- **avoid the disruption of repeated out-patient attendances**
- **reduce travelling and financial burdens on families**
- **provide support and encouragement to parents in the care of their children**

**During the 1950s schemes in Paddington, Birmingham, Edinburgh, Southampton and Gateshead showed that paediatric care could be successfully provided for children at home. However, there was a hiatus in the development of home care programmes for children until the 1980s. From 1980 to 1988 the number of schemes expanded from seven to 38, although many of these do not represent an integrated hospital at home service for children but simply the presence of a specialist paediatric nurse in the community. Expansion of these services is made easier by the fact that children already have a resident carer.**

**Sources: Ministry of Health (1959), Committee on Child Health Services (1976); Belson (1981).**

of financing and delivering home care services. Parker (1990) writes that hospital discharges into home care have increased by 37 per cent since the implementation of DRGs; that hospital-based home care agencies increased by 145.6 per cent between 1983 and 1987 and that proprietary home care agencies increased by 85.6 per cent over the same period. Home health care is now one of the fastest growing industries in the US with Medicare payments for home care increasing from $1.1 billion in 1982 to $2.7 billion in 1989 (Hafkenschiel, 1990).

This interest in home health care in the US and its scope for rapid development is in part a reflection of low levels of domiciliary care and the historical emphasis on hospital-based services. This has been fuelled by reimbursement constraints and by the economics of medical practice (Koren, 1986). Agencies are bound by the policies of insurers and financial support for home care from government and private agencies has been minimal. Only in the 1980s, for example, did home care become part of commercial insurance packages and changes in federal policy over the same period have had a major impact on the expansion of home care (Parker, 1990). Coverage is still patchy, however, and subject to variations in the interpretation of Medicare guidelines by fiscal intermediaries (American College of Physicians, 1986). It is not in the financial interests of physicians to cover home care and this is particularly the case for home-based high technology care as there is increased liability, not reflected in physician fees.

Despite the growth in Medicare-certified home health care agencies it is not the case that the US leads the way in home care. Many of the services newly provided have been taken for granted elements of the sophisticated domiciliary care network which has been part of the NHS since its inception. It is therefore important to make clear distinctions between home care, community care and hospital care at home and to be mindful of the differing connotations of these terms in the health care terminology of different countries. Nevertheless, in some aspects of acute home care, and particularly where home-based high technology is concerned, the US is in the forefront. This is clearly, in part, a response to financial pressures and the search for cost-effective alternatives to hospital care. However, it also reflects an ability to inject new ways of working into a health care system which is fragmented and particularly weak on home care.

While financial and demographic considerations are important, there are a number of other factors which promote the development of acute care at home. First, many home environments can now support a hospital level of care. Telephones, refrigeration, electricity and good hygiene mean that sophisticated home care is at least a possibility. Second, technological developments have made it easier to provide health care in the home for certain conditions, and new financing systems have provided the leverage for transferring these high technology services outside hospitals. Intravenous infusions of antibiotics, cytotoxic and pain killing drugs; the various respiratory therapies, including long term care for ventilator-dependent people; dialysis for end-stage renal disease and nutritional therapies are all areas where care normally associated with hospitals can be replicated in the home. In response to increased demands, manufacturers have developed streamlined and tamper-proof equipment specifically for the home market, including computer-based intravenous drug delivery systems, pre-mixed drugs and portable infusion pumps. This is one of the most rapidly growing areas of medical technology (Council on Scientific Affairs, 1990). Patients receiving intravenous therapy at home do not need to be immobilised, and such equipment is often less cumbersome and more user friendly than the hospital equivalent. Increasingly, in the US, manufacturers offer home care services in conjunction with their home care product businesses, delivering supplies directly to the home, collecting and disposing of infected and hazardous material, organising training for patients and carers and providing emergency cover.

While the technological problems associated with acute health care at home are often surmountable, there is immense variation between countries in attitudes to acute home care and in the types of high technology care promoted. Thus, compared to the US and most of Europe, for example, the UK concentrates on home as opposed to hospital dialysis for end-stage renal failure. In contrast, there has been little development in providing intravenous antibiotic treatment or intravenous nutritional infusion therapies at home. Policies of insurers, professional attitudes and traditional modes of organisation now exert greater influence on the expansion of HCH than the safety and effectiveness of devices.

Reassessment of the role of hospitals in providing selected sophisticated treatments is reinforced by the decentralisation of certain acute hospital functions and the development of a more sophisticated primary care service. An increasing number of diagnostic and monitoring techniques can be carried out in the home or in primary care facilities. In the UK, GP access to hospital diagnostic services has improved and the existence of multidisciplinary primary heath care teams makes it easier to carry out complex care at home. Although still not widely available for home use,

patient-directed technologies have been developed including electric stimulators for pain relief and fracture healing (Steering Committee on Future Health Scenarios, 1988).

Much of the literature on HCH pertains to cost control. However, HCH can be viewed as an essential component of a comprehensive health care service, and a progressive element in the delivery of care. Quite apart from exploiting technological advances, there are humanitarian, clinical and consumer-based reasons for providing a choice over the location of care for certain conditions and types of patients. Hospital care may carry the risk of hospital-acquired infection, a particular danger for the very old and the very young. The dangers of bed rest are now recognised as are the psychological sequelae of hospitalisation for elderly people and young children, for whom it is in itself a traumatic event. In addition, it has been shown in the treatment of stroke and of fractured neck of femur, for example, that rehabilitation can be more rapid at home than in hospital. Where intensive care is long term, as is the case for ventilator-dependent people, the dangers of institutionalisation and depersonalisation are difficult to avoid. Last but not least, offered a choice, many people would prefer to be nursed in their homes given adequate support. This is particularly the case for many people with terminal illnesses. Such care is often intensive but not necessarily continuous nor short term, as the case of AIDS demonstrates.

It is likely, given all these factors, that the number of programmes offering a hospital level of care for acutely ill people at home will increase. However, this kind of care is not without hazards. There is little margin for error in the transportation of supplies, maintenance of equipment and the provision of emergency cover. Sloppy administration, sub-standard care or faulty equipment can be fatal. If clinical safety is to be ensured, patient selection and discharge arrangements have to be carefully carried out and quality of care monitored. Not surprisingly, there are ethical issues to be resolved over the safety of procedures and professional liability, particularly where patients are carrying out complicated procedures at home. There will be little progress until professionals in both the hospital and community sectors are convinced that HCH can offer patients quality and choice and are prepared to modify their working practices accordingly. Hospital care at home means added responsibilities for the community sector in particular.

Those concerned with the cost-effectiveness of care will need to work with health care professionals in order to determine at which point, for which conditions and for which patients health care at home may be an effective way of using scarce resources.

As with other forms of non-hospital-based care there is an important caveat. Where savings have been identified for acute level care at home, a proportion derives from the substitution of family for professional caring. It is tempting for policy makers and health service managers to underestimate or even ignore the burden on patients and their carers when care is shifted to a home setting. Where intensive levels of care for people with acute — and possibly life threatening — conditions are concerned, the demands become proportionately greater. There is a dearth of research on the social, psychological and financial implications of acute home care for patients and their carers. It is possible that a major barrier to the expansion of HCH is not a lack of technology or of the availability of care but the problems of transferring responsibility for acute levels of care to the home setting.

This report explores the categories of hospital care at home likely to expand in the 1990s, describes home-based high technology care, comments on the different ways HCH may be provided and explores issues of cost-effectiveness. In conclusion, prospects for furthering hospital care at home in the UK are summarised.

# 2 | Categories of hospital care at home

'Hospital Care at Home' is shorthand for a number of quite distinct developments in the delivery of acute care.

It is perhaps not surprising that HCH is often associated with the transfer into a home setting of medical technologies for diagnosis, monitoring or treatment combined with intensive, skilled nursing care. High technology services such as oxygen therapies and the various intravenous drug and nutritional treatments account for a relatively small (although relatively expensive) proportion of the work of a district general hospital. The same applies to HCH. It has been estimated, for example (Anderson, 1986), that in the US high technology care accounts for only five per cent of patient volume in home care though for as much as 25 per cent of home care revenues. While developments in the transfer of high technology care represent the 'cutting edge' of what can be achieved in a home setting, the potential of HCH for altering the balance between home and hospital care largely rests on changes in admission and discharge practices for common conditions. Cancer, myocardial infarction, stroke, minor surgical procedures, orthopaedics, paediatric and terminal care are all areas where hospital stays can be reduced by flexible and multidisciplinary home support. Typically, high technology home care is not required, although intensive nursing is almost always needed.

For some conditions, such as stroke, hospital admission can be prevented altogether. Likewise, intervention strategies linked to discharge procedures and appropriate home support can reduce readmission rates, an increasing proportion of emergency admissions to hospital.

As one example of this, a post-discharge care attendant scheme provided for patients aged over 75 in Harrow resulted in a reduction in the readmission rate, particularly in the longer term. This benefit was greatest for those living alone and for people over 85 (Townsend et al., 1988).

At a time when hospitals are discharging patients earlier, the need to review discharge procedures and intervention strategies linked to the provision of appropriate home care can be considered a necessity and not a policy option. Because of its more demanding and dramatic nature, HCH serves to highlight issues involved in the subtle reordering of home and hospital care already underway.

This section describes three strands of HCH: prevention of hospital admission; early discharge for common conditions; and terminal care. High technology care at home, a form of early discharge, is considered separately (Section 3). These aspects of home care are clearly linked in practice and could all apply at different times to the same patient. However, they illustrate different aspects of HCH, and involve different organisational issues.

## Avoiding hospital admission

People are admitted and readmitted to acute hospital wards for a variety of reasons, not all of them linked to clinical necessity. There may be pressing social needs, such as homelessness, lack of an available carer or poor housing conditions, which render a sick person a hospital patient. Acute hospital beds may provide the only refuge in such circumstances, despite their inappropriateness and expense. Emergency readmissions may be due to inadequate hospital care, poor discharge arrangements or adverse drug reactions as well as social reasons. However, 'inappropriate' bed use may not be the result of social necessity, nor due to the lack of a practical alternative, but a consequence of clinical custom and practice. Variations in admission rates and in lengths of stay between different consultants, different districts and different countries are grist to the mill of policy makers, managers and third party insurers seeking to rationalise an expensive acute sector. In the US, the institutional bias of care, reflected in, and encouraged by, the reimbursement policies of third party insurers, has made hospital care the norm for acute illnesses.

In many cases, however, hospital admission may be prevented altogether given community-based, specialised diagnostic services combined with intensive nursing and rehabilitation care. Preventing unnecessary admissions to acute hospitals clearly depends on referral practices and admission policies of GPs and consultants and the responses of both groups to developments in HCH.

This section describes what HCH could achieve in preventing hospital admission for two of the most common causes of entry to acute medical wards, myocardial infarction and stroke. In neither case are there specific criteria for hospital admission and, in the case of stroke, there is disagreement over the value of hospital-based care. Given that a *sine qua non* of replacing hospital with

home care is the certainty that it is clinically safe to do so, all the studies described here are randomised controlled trials (RCTs).

Where a service or form of treatment is well established it is particularly difficult to conduct RCTs given the ethical problems in withholding treatment, combined with difficulties in overcoming custom and practice in clinical decision making. It is therefore not surprising that few experiments of this kind have been carried out. In each of the studies described, however, clinical outcomes did not prove a stumbling block to HCH programmes; admission practices of GPs were far more problematic.

**The case of myocardial infarction**

In one of the few examples of a RCT designed to test the relative benefits of home care and hospital admission, Mather et al., (1971) demonstrated that outcome after treatment of myocardial infarction (MI) in coronary care units showed no advantage over conservative treatment at home. Further attempts to carry out RCTs of home versus hospital management for patients with suspected myocardial infarction were carried out in Bristol (Mather et al., 1976) with a further two studies in Nottingham (Hill, Hampton and Mitchell, 1978; Rowley, Hampton and Mitchell, 1984). Randomisation proved difficult to achieve in the Bristol study, and the results were dismissed by a joint working party of the Royal College of Physicians and the British Cardiac Society as it was only 'a small and ill defined minority of patients who were randomised' (quoted in Hill, Hampton and Mitchell, 1978). Learning the lessons from the Bristol study, the first Nottingham study set out to achieve a high randomisation rate, with clear criteria for entry or exclusion. Sixty GPs participated in an experiment in which a hospital-based team attended patients with suspected MI at the GP's request. This team 'made an initial working diagnosis, provided emergency treatment, excluded unsuitable patients and randomly allocated the remainder to home or hospital care' (Hill, Hampton and Mitchell, 1978).

Seventy six per cent of suitable patients whom the team suspected of MI were randomised into the trial. The study demonstrated that, for this group, prognosis was not significantly improved by hospital admission.

The Nottingham study was concerned with patients who had already contacted their GPs. By definition, therefore, most had already survived the high risk period of the first two hours. Given these conditions, it demonstrated that 'for the majority of patients to whom a GP is called because of suspected myocardial infarction, hospital admission confers no clear advantage'. It would seem likely that the presence of a specialised team enabled GPs to feel confident about reassessing their routine admission practices for such cases. However, the authors of the study emphasise that initial management of such cases was well within the repertoire of general practice, although the use of additional special equipment such as monitors and defibrillators might be required. A subsequent study broadened the number of Nottingham GPs offered this same service of a specialised hospital team, again on the basis that GPs generally see people who are at relatively low risk. In this study, GPs were told to call the team only if they were prepared to accept home management of the case. Thus the team would not be called if the GP deemed that admission to hospital was necessary. It is perhaps not surprising, therefore, that routine admission emerged as the pattern, in particular amongst those GPs who had not participated in the previous study. They admitted 64 percent of their patients directly to hospital.

These studies hold a number of implications for the development of HCH in this area. First, they demonstrate that for a large number of people who have survived the initial high risk period for MI, care at home is as safe as care in hospital. This is a comment on current patterns in seeking medical help for this condition and does not imply that home is superior to hospital if hospital care is immediately available, and help is sought without delay. Second, they demonstrate that, taken as a whole, GPs are reluctant to change admission patterns, even where a specialised emergency team is available — a pattern likely to emerge with other potential HCH schemes. In the UK, admission and referral patterns of GPs will be a crucial determinant of how far admissions to hospital may be prevented, and it will be important to identify factors which influence GP behaviour in these circumstances and reasons for variations between them. Third, the studies demonstrate that specialised hospital teams can provide expert diagnosis in a community setting (although this was not the point of this particular exercise). An abrupt shift from hospital to home care is unlikely to be achieved without additional specialised resources being available. Fourth, these studies demonstrate, if further demonstration is needed, that there is scope for questioning routine hospital admission in the interests of patients as well as of economy.

**The case of stroke**

Stroke is the cause of one in eight deaths in the UK and the average district health authority spends at least three million pounds on stroke services each year (King's Fund Forum, 1989).

Hospital admission rates for people who have suffered a stroke vary widely across the UK and many severely disabled stroke patients are currently cared for at home.

There are no controlled trials to warrant the general use of special stroke-intensive wards and it

has been argued that the major reason for admission is nursing care for the acute phase followed by rehabilitation to maximise functional recovery (Wade and Langton-Hewer, 1983). Given divergent views on appropriate management, it is perhaps not surprising that the King's Fund Forum consensus statement on the treatment of stroke concluded that:

> *there is no clear policy at district, regional or national level regarding the appropriate planning, organisation, implementation and evaluation of services for stroke patients and their carers ... there is a striking lack of convincing data on the effectiveness of widely used medical, psychological and specific rehabilitative treatments (p. 282).*

To this long list might be added the confusion over whether or not hospital admission should be routine for stroke patients. In an attempt to assess the effects on hospital admission rates of providing a home care service, a controlled trial was carried out in Bristol in 1983 (Wade et al., 1985). General practitioners in the Frenchay district of Bristol were divided into two groups, one of which provided the control group of stroke patients. A new home care service was provided for the first six months after acute stroke as a supplement to the services already available for stroke care patients at home. The control group did not receive these supplementary home services. It was hoped that the new service would both prevent admission and encourage earlier discharge. The home care team included a district nurse, physiotherapist, occupational therapist, speech therapist and social worker. The nurse acted as team leader and hospital coordinator; clinical responsibility rested with the GP.

The results of the experiment showed no difference between the two groups in terms of mortality or functional recovery but there was a marked higher use of hospital bed days for the trial group, quite the opposite result to that expected. The authors of the study considered that this may have been due to notification bias as patients were not randomised at entry combined with the fact that the service provided was not sufficiently distinct from that already available in the community. Surprisingly, hospital staff did not take advantage of the scheme to discharge patients sooner. The authors commented that:

> *the team was not allowed to be part of any of the main hospital departments in Frenchay hospital, so that hospital staff could not integrate professionally or personally with the team. Consequently, the team was viewed as competition rather than as an additional service (p. 326).*

This was compounded by the fact that patients were admitted to a number of local hospitals so that staff were unable to become familiar with the trial.

While this study fails to demonstrate advantages of the home care service it does serve to illustrate a number of important caveats for those wishing to establish a HCH programme. The distinctive contribution of the new service was not clear to GPs nor to hospital staff with the result that it was partially ignored by the former, and viewed as competition by the latter. This underlines the importance of ensuring that new programmes are carefully introduced and integrated into existing services.

There was little incentive to modify clinical decision making and it was not clear whether GPs or their patients were committed to this form of home care.

These studies of MI and stroke illustrate the potential of specialised home care, although the emphasis is on the prevention of hospital admission rather than on the development of robust programmes for delivering HCH. Various ways of organising HCH are discussed in Section 4 of this report.

## Achieving early discharge

The concern to maximise the use of acute beds has led to critical examination of variations in lengths of hospital stay, as well as in admission and discharge procedures. Overall, the length of time patients spend in hospital has decreased dramatically over the last thirty years. There is now increased interest in the extent to which HCH provides a route for further reducing days spent as an in-patient.

A number of studies demonstrate that for specific conditions, early discharge may be achieved without detriment to patient care. For example, in the late 1970s a RCT of early discharge for inguinal hernia and varicose veins was carried out (Adler et al., 1978). This demonstrated no statistically significant differences in major post-operative complications, nor in length of convalescence between the longer and shorter length of stay for either of these two conditions. In this study, no additional domiciliary support was provided and it is still generally the case that patients are discharged on the basis that community health services are able to cope.

The emergence of hospital care at home schemes adds a new dimension to possibilities for early discharge, namely the provision of intensive home care, at a level normally associated with hospitals. This is far beyond the resources of existing domiciliary services and signifies a shift in what is considered appropriate care for home and for hospital.

Once early discharge ceases to be a gradual process, with community services absorbing increased demands, it becomes imperative to determine at which point it is safe to discharge

patients from hospital and to assess the kinds of additional support required in the community. Crucially, this involves an assessment of the degree of nursing care required.

In order to answer these questions, a number of experiments in HCH have drawn on nursing studies which critically assess the stages through which a patient in an acute hospital will pass in terms of the level and intensity of nursing care (see Gerson, 1973, and description of the St John's scheme below). The initial stage is likely to involve intensive monitoring, testing and intervention. Typically, this is followed by a period of nursing and/or rehabilitative care, which becomes less intensive if the patient makes progress. It is this latter, less intensive phase which can provide the focus for a range of early discharge schemes. While an assessment of nursing input is an important first step in deciding which conditions are candidates for early discharge schemes, the challenge in developing these services is to establish the point at which it is practical, clinically safe and feasible in terms of the deployment of staff and resources to provide care in the home setting and away from a centralised hospital base.

In response to these concerns, it is not surprising that much of the burgeoning literature on hospital care at home assesses the cost-effectiveness of particular HCH programmes. To be comprehensive, such studies need to consider clinical outcomes as well as psychological, emotional and financial effects on patients and their families.

This section is concerned with experiments in early discharge combined with intensive care at home. The first, a scheme based at St John's in Newfoundland, assessed the clinical, financial and psychosocial viability of early discharge for a range of common medical and surgical procedures. The second and third projects are each concerned with early discharge for mainly elderly patients with fractured neck of femur. Further examples of early discharge combined with home-based high technology care are described in Section 3 and a more detailed analysis of cost-effectiveness of HCH in general, and of early discharge in particular, follows in Section 5.

**The St John's scheme**

Conducting a randomised controlled trial to assess the relative benefits of early discharge and standard hospital care confronts the same difficulties as all trials set up to test practices which are already established. Clinical decisions over when to discharge are part of normal physician care. As such, they are influenced by a host of individual factors connected with the patient, the expected clinical course of the disorder and with the consultant. To conduct a trial where one group of patients receives post-operative care at home therefore requires careful preparation if ethical considerations are to be satisfied and consultant cooperation assured. Such a trial was carried out at St John's, Newfoundland in the mid-1970s (Gerson and Collins, 1976). (See Box 3.)

The St John's study contains a number of valuable lessons. First, it adapted a methodology devised to assess levels of nursing care to identify patients who could safely be cared for at home. The unsuitability of using DRGs based on purely clinical assessments for this purpose has been recognised, and it seems likely that such methodologies will be extended and developed in order to help establish a cost-effective cut off point between home and hospital care. Second, it showed that hospital days could be saved with no effect on clinical outcomes or pyschosocial functioning. Third, it demonstrated the large gap between securing agreement in principle and ensuring changes in practice. More information is needed on the reasons for the high attrition rate in this (and other) studies. This is likely to involve studies of physician decision making. Fourth, it demonstrated that, in practice, home care may serve as an adjunct and not a substitute for hospital care. It is not clear whether this is due to clinical judgement, patient pressure, habit, lack of commitment to the HCH programme — or the wish of each physician to harness all available resources for the individual patient at the expense, in this case, of experimental design. These issues run through many HCH schemes and will be referred to throughout this report.

Finally, this study demonstrated no financial benefit in earlier discharge combined with home care. It is worth pointing out that where expected savings are in the order of a few days for each condition cost savings are typically more difficult to demonstrate unless the total volume of cases is reasonably large. Many HCH schemes involve home-based high technology long term care and in such cases cost-effectiveness studies demonstrate substantial savings (see Section 5).

**Fractured neck of femur**

Increases in the number of cases of fractured neck of femur provide a clear illustration of the need for new thinking on strategies for early discharge. Hip fractures are increasing, partly as a result of the increase in elderly and very elderly people and partly as the result of an as yet poorly understood increase in age specific rates. The Royal College of Physicians (RCP) (1989) estimates that if current rates remain unchanged there will be 60,000 new cases a year by the year 2016. If, however, the increasing trend continues, the number rises to 117,000 new cases by that year. This represents an enormous toll in terms of both human suffering and of resources. Average length of stay in 1985 was 30 days and while this is only one-third of the

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## THE ST JOHN'S SCHEME

**In this study an experimental home care programme was established to provide care for selected patients only during the period they would normally have spent in hospital. The service provided, free of charge, nursing, homemaker services, physiotherapy, transportation, drugs and medical and surgical supplies. A nurse coordinator arranged these services and monitored continuity of care. The study involved three hospitals, 600 patients and lasted for over a year.**

**A great deal of care was taken in choosing the categories of patients suited to this experimental study. The main criteria were 'relatively low levels of technical nursing and clinical monitoring during the latter part of the hospital stay'. In order to establish changes in the intensity of care and monitoring a scoring system was used. This system quantified the amount of nursing effort required for each of 55 tasks in three categories — clinical monitoring, technical nursing and basic nursing. This 'level of care assessment return' originally devised by MacDonnell (1969) was used longitudinally in this study in order to follow patients through their hospital career. All wards, except for obstetrics and psychiatry, were included. This amounted to the detailed analysis of the nursing needs of over 5000 patients and provided a sound methodology for identifying conditions which might be suitable for home care.**

**At the end of this procedure, 11 surgical and two medical categories were identified as possible candidates, and only patients with one of these 13 diagnoses could be admitted to the programme. Eligible patients also had to reside in the catchment area, be free of major secondary diagnoses and have homes which met minimum standards of safety. Finally, patients had to be willing to cooperate in the programme. Participants were duly randomised. However, half the patients allocated to the experimental group were not placed on home care by their physicians which meant that three groups emerged for analysis: the experimental group with home care, an experimental group without home care and a control group. This large attrition rate occurred despite careful groundwork by the organisers of the study. For example, medical advisory committees had endorsed the study; discussions had been held with the doctors in the three hospitals concerned, and criteria for the selection of patients had been discussed. As a result of this, over 95 per cent of physicians and surgeons had agreed to participate.**

**Surprisingly, home care proved cost-effective in only five of the original 13 conditions, namely, excision and ligation of varicose veins; inguinal and femoral herniorraphy; cholecystectomy; surgery for anal and rectal fistula and abdominal hysterectomy. In these cases, an overall reduction of two days in the length of stay was achieved. There was no statistically significant difference in clinical outcome between patients treated at home and patients treated in hospital. No significant differences were found in psychosocial functioning or in rates of return to work (Gerson and Berry, 1976). With regard to the ability to perform tasks at home, for some conditions home care patients were performing a greater percentage of their normal household tasks.**

**Crucially, however, there was little difference in cost between hospital and home care. The authors of the study concluded that:**

***when equivalent levels of care for equivalent types of patients and discrete episodes of illness are compared, there is very little, if any, economic benefit to home care as opposed to hospital treatment. The only savings occur when home care is compared to adding, or if the situation warranted, closing hospital beds (Gerson and Hughes, 1976, p. 554).***

length of stay in the 1950s, it nevertheless means that people with hip fractures currently occupy 20 per cent of orthopaedic beds in England and Wales. There are thus both demographic and financial incentives to reassess the management of this condition.

A number of authorities have set up joint geriatric/orthopaedic units in order to address problems of coordination and reduce lengths of stay. However, a study carried out by the Centre for Health Economics at York found that there was no difference in the length of hospital stay between patients assigned to joint management, or to single specialty orthopaedic management as before. Neither was there any difference in long term outlook following discharge (Fordham et al., 1986). A number of studies have demonstrated that a more radical approach to the management of hip fracture is both practical and clinically feasible (see review in Pryor and Williams, 1989). This involves changes in hospital management as well as in discharge arrangements.

These new initiatives address management problems after admission, including long waiting times in casualty and delays in carrying out clinical assessments and in performing operations. Post discharge there are problems of liaison between community nurses and rehabilitation, social work and psychiatric services and in the coordination of rehabilitation services in hospital and at home. Using teams which span hospital and community has helped resolve these problems and has been successful in dramatically reducing the length of stay for hip fracture.

The management plan for hip fracture adopted by Peterborough DHA (see Box 4) has overcome many of the pitfalls identified by the RCP and others. Management is standardised under one surgeon; rehabilitation plans are produced within a few hours of admission and patients suitable for early discharge are swiftly identified. Occupational therapists visit the

patients' homes before discharge to arrange for necessary equipment. The savings in in-patient days are dramatic: taking both hospital days and home care into account, patients required treatment for 17 days on average compared with over 25 days in the control group. The fact that those unsuitable for discharge are omitted from this analysis (over 40 per cent of those admitted), and that these are the patients most likely to require extended care, means that these results cannot be generalised for the population of people with hip fractures as a whole. Nevertheless, this study clearly demonstrates that for a carefully selected group early discharge is not only feasible but also beneficial for patients in terms of more rapid rehabilitation. The Hip Fracture project has been made permanent in Peterborough DHA and a similar service has recently been set up in Pembrokeshire.

A similar concern with the speedy rehabilitation of people with hip fractures lies behind the community orthopaedic project in Essex (COPE). In this project, rehabilitation takes place at home and is carried out by a team consisting of an orthopaedic nurse, physiotherapist, occupational therapist and social worker. Each patient is assessed and a range of practical issues is considered.

> *Factors such as short term living in by a carer, arrangements for social services, meals on wheels, planning an ambulance at a suitable time for home arrival, heating, stocking the larder, provision of discharge medications, routine post-operative blood tests, anticoagulant control and many other factors were taken into account by the team before discharge (COPE report, undated, p. 3).*

All necessary alterations to the patients' homes are carried out prior to discharge. The study found that the vast majority of patients and their carers were satisfied with the new arrangements.

Although mainly concerned with elderly people, the COPE scheme also offered orthopaedic home care for children. Depending on the surgical procedures involved, the scheme has saved from three to 18 hospital days per patient, though to date no cost analysis of the total cost of COPE compared with routine rehabilitation has been carried out.

The COPE scheme did not have the advantage of being able to draw on an existing hospital at home (HaH) scheme as in Peterborough but is similar in its adoption of a team spanning hospital and community, as opposed to the more common joint orthopaedic/geriatric unit. As in Peterborough, the existence of such a team highlights general problems in the management of elderly people with hip fractures. A review assessing the level of independence at home showed that 50 per cent of patients had failed to reach their full potential when compared with those discharged from the COPE scheme.

All the conditions described above — myocardial infarction, stroke, fractured neck of femur and the medical and surgical conditions that were included in the St John's scheme — form a large proportion of NHS work. The potential for releasing hospital beds through creative schemes spanning home and hospital is therefore great.

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## THE PETERBOROUGH HIP FRACTURE PROJECT

**This project, which began in 1986, has been carried out in the context of the Peterborough Hospital at Home (HaH) scheme, which provides a hospital level of nursing care in the community (Mowat and Morgan, (1982) and see Section 4). In contrast to the combined management of hip fracture by orthopaedic and geriatric departments, Peterborough DHA created a team spanning hospital and community (Pryor et al, 1988). The hospital team consisted of a surgeon, an anaesthetist, a scrub nurse, an operating department assistant and a radiographer and the community team consisted of an occupational therapist, a physiotherapist, and nurses who were part of the HaH scheme. Team management was combined with early discharge for home rehabilitation with a policy of early mobilisation.**

**The project took advantage of the fact that only half the catchment population of orthopaedic patients was covered by HaH to divide orthopaedic patients considered suitable for early discharge into those who received conventional management and those who were discharged early. Assessment on admission included:**

***a formal Activities of Daily Living score, a record of their pre-injury living environment and the level of support required, both formal (social services) and informal (relatives and friends). Mental function was assessed... and a composite mobility score was calculated (Pryor and Williams, 1989, p. 471-2).***

**On this basis, over half the 200 patients seen during the first year were considered suitable for early discharge. Those in the experimental group were cared for by HaH and visited by the team physiotherapist and occupational therapist. Subsequent analysis showed that those discharged early spent an average of 8.2 days in hospital followed by an average of 8.7 days of home nursing. The control group spent an average of 25.5 days in hospital at far greater cost. There was no difference between the two groups in terms of ultimate recovery, but the rate of rehabilitation was faster in the early discharge group. The scheme saved almost 900 patient days.**

## Domiciliary terminal care

The third major category of HCH is domiciliary terminal care. Such care may prevent hospital

admission or enable early discharge, although its origins are quite distinct from hospital-based initiatives in these two areas. A number of HCH schemes started as services for people suffering from terminal cancer, subsequently widening their caseload (see for example, Hospitalisation à Domicile, Section 4). A large proportion of the work of the Peterborough HaH scheme meets the needs for intensive nursing care of terminally ill people. In some respects, therefore, domiciliary terminal care has paved the way in providing intensive levels of care at home. It also serves to illustrate some of the organisational dilemmas that HCH may generate.

In the UK, domiciliary terminal care may be provided by GPs and primary care teams, with or without specialist support and advice, through hospital and hospice outreach services and by free standing community-based home care teams. Hospice care has flourished in the UK since the founding of St Christopher's Hospice in 1967 (Taylor, 1983). While the image of hospice care remains the in-patient unit – and in 1987 there were 122 hospices of this kind in the UK (Hill and Oliver, 1988) – there is a wide spectrum of hospice care including clinics providing day care and pain relief, night nursing, counselling and sitting services. Home care is now an integral part of the hospice movement, the first teams being set up by St Christopher's in 1969 with help from the Cancer Relief Macmillan Fund. The support of patients in the home is the central focus with in-patient units providing short periods of intensive care along with back up support. In 1988 there were over 260 home care units, the majority of which were not attached to in-patient facilities (Goddard, 1989).

The home care orientation of the hospice movement is even more apparent in the US, where hospice has been described as a 'unique model of home care' (Bulkin and Lukashok, 1988). This is underscored by Medicare reimbursement regulations where full reimbursement for in-patient care is limited to no more than 20 per cent of the patients' total days of hospice care. Hospices are now in the mainstream of the US health care system; the Joint Commission on Accreditation of Hospitals has developed standards for the accreditation of hospice programmes and most third party payers provide benefits for hospice care.

At first sight, hospice care appears to have little in common with the variety of schemes which provide hospital levels of care at home. The hospice movement largely developed outside mainstream health services. It was not linked to a desire to improve cost-effectiveness nor was it part of the philosophy of community care which characterised the development of specialised support in the community for elderly and mentally ill people and for people with learning difficulties. In contrast, it was a reaction to poor levels of physical and emotional care provided for terminally ill people in acute hospitals. Poor pain control, unnecessary medical interventions, and inability on the part of nursing and medical staff to discuss prognoses or to respond to the emotional needs of patients and their families all fuelled a movement spearheaded by inspired reformers to provide a better quality of life — and death — for the dying patient.

Curative hospital settings with lack of privacy, impersonalised routines and hierarchical structures were considered inimical to sensitive terminal care. When the hospice movement began, there was little bereavement counselling for patients' families. Along with pain control, palliative care, and attention to the psychosocial needs of patients and their families, bereavement counselling is now a fundamental part of hospice care.

While HCH may have its ardent adherents it does not herald a movement comparable with hospice care.

This important distinction apart, however, there are many similarities between hospice and hospital care at home. For example, nursing is the primary task and both types of service may involve 24 hour nursing care. GPs and the primary health care team will be involved, home support, such as home helps and meals on wheels, may be needed and aids and equipment may have to be supplied. Specially trained staff will, ideally, be on hand to advise and support the primary care teams, patients and families. The provision of such services means that admission to acute hospitals may be prevented and length of hospital stay reduced. In the US this is reflected in the growth of alliances between hospices and home care programmes through informal arrangements, formal sharing or consolidation (Smith and Reid, 1987).

In addition, the provision of hospice care for AIDS patients has led to changes in traditional aspects of hospice care. AIDS patients are usually young, do not suffer a predictable decline, and may need periods of intensive therapy as opposed to palliative care. They also require more in-patient care than the traditional hospice patient.

All this has led to problems in reimbursing hospice care for AIDS patients in the US (Berliner, 1988). From a service delivery point of view, however, AIDS serves to emphasise the fact that the dividing line between hospice and other forms of HCH is a thin one.

Different ways of delivering hospice and other forms of terminal care in the UK provide models for providing HCH in general. As such, terminal care illustrates some of the problems and prospects of HCH.

Much terminal care is already provided by

GPs and primary health care teams. This can be successful where GPs offer a 24 hour, seven day a week service. However, standards are variable. In a comparison of patients receiving home care support from St Christopher's Hospice with a matched group who did not. Parkes (1978) obliquely stated the problems:

> *Given a confident and cooperative patient, whose family collaborate well with a willing general practitioner, skilled in the proper use of drugs, and a district nurse who is backed by adequate local services; and provided the illness does not go on so long that it exhausts the resources of the family, there is no reason why terminal care cannot be provided at home (quoted in Taylor, 1983 p. 30).*

The Peterborough HaH scheme cares for many terminally ill people by providing an enhanced district nursing service combined with patient aides. This may overcome some of the problems for primary care teams of trying to stretch existing resources to meet the medical and emotional needs of dying people and their families. GPs and primary health care teams may also use independent or hospice-attached home care teams.

An example of this is the North London Hospice Home Care Service which was set up in 1984. The service includes a part-time doctor, four full-time nurses, one full and one half-time social worker, and offers a 24 hour, seven day a week service. It is used by over 70 per cent of GPs in the two boroughs which it serves. The aims of the service are to work closely with the primary care team by providing support and advice and offering joint visits to patients. In a survey of GPs carried out two years after the inception of the service (Copperman, 1988), the majority found the service useful in relation to pain control and general support for primary care teams as well as for the patients' families.

Specialist home care may also be provided through hospital-based terminal care support teams. The first of these was established at St Thomas's Hospital in 1977 and by 1986 there were 20 in the UK (Hill and Oliver, 1988). They provide support for medical and nursing staff caring for terminally ill in-patients and out-patients, and also provide symptom relief, advice and counselling.

In addition to hospice-based teams and hospital outreach work there are also over 150 free standing community-based home care teams run by independent charities. These may or may not be linked with in-patient units. For example, the National Society for Cancer Relief has funded a number of Macmillan domiciliary care services. There is also a range of schemes intended to provide practical support for relatives caring for dying people at home, such as sitting services, help with domestic chores and bereavement counselling.

Typically, specialist domiciliary terminal care services work closely with the primary care team, acting in an advisory capacity. Commentators (see for example, Taylor, 1983) consider that it is neither politically nor practically feasible for hospice home care services to take over from primary care professionals in the care of terminally ill people.

> *The choice is between providing a first rate service to a small number of patients or accepting the constraints imposed by having to work with and through others in the interest of the long term effects of improving the care available to everyone who requires it (p. 29-30).*

A similar conclusion had been reached by the Standing Sub-Committee on Cancer (1980). It recommended an integrated system of care, emphasising the importance of cooperation between primary care, the hospital sector and the hospice movement.

The experience of providing terminal care over the last twenty years has important lessons for those attempting to establish other forms of hospital care at home. The development of hospice care outside the NHS was a direct result of the inadequacies of existing hospital and community services. This has led to problems in the relationship between independent hospices and the NHS. Ad hoc development of hospices has led to geographical variations in coverage, particularly of home care teams, and has raised questions for the NHS over future staffing requirements, revenue costs and planning of terminal care services. While it is unlikely that HCH will attract the charitable funding of the hospice movement, it may well attract substantial private investment, leading to possible dangers of piecemeal development and poor levels of integration with NHS services. The demands for a more integrated approach hold true for HCH in general.

Attempts to prove the cost-effectiveness of hospice care have encountered a number of difficulties. Non-random selection of patients by hospices and the influence of hospices themselves on hospital treatment of terminally ill people have hampered systematic evaluation.

On a more positive note, terminal care at home shows that a number of models of organising care can work successfully, although the current emphasis is on specialist teams working closely with primary care teams in an advisory capacity. This may be a suitable model for certain types of hospital care at home. Those developing HCH schemes could usefully consider how successful professional working relationships have been established in the field of domiciliary terminal care.

Finally, in its emphasis on the needs of the family, and the psychosocial needs of patients, the hospice movement has much to teach those providing any kind of intensive care in the home.

# 3 | High technology care at home

High technology care at home has been described as involving 'a large medical component, featuring extensive use of medical personnel in a home setting, into which high technology apparatus may have been introduced' (quoted in Fox 1987, p. 571). Box 5 summarises the major categories of home-based high technology care. While high technology care is usually associated with acute hospitals, a substantial amount of sophisticated care already takes place within a home setting. For example, in the UK, home therapy for haemophilia has become the treatment of choice and over three-quarters of those suffering from haemophilia keep supplies of clotting factor at home. Treatment at home offers major benefits, as little time is lost between the recognition of a bleed and self treatment by intravenous infusion which minimises the risk of pain and joint damage. It also results in increased independence and reduces disruption at work and school (The Haemophilia Society, 1986). From the point of view of those interested in extending HCH it shows how, given adequate support from specialist centres, complex care including self administration of intravenous infusion can be safely carried out at home. Home dialysis for those suffering from end-stage renal disease, again well established in the UK, illustrates the same point.

More recently, technological developments have allowed certain kinds of diagnostic and monitoring devices to be used at home. For example, portable electrocardiographs allow people to monitor arrhythmias (Brown et al., 1982), and home apnoea monitors make it possible for young babies to receive oxygen therapy at home.

Technological advances have also made it easier for people to self-administer advanced therapies. Electronic pumps for infusion therapy regulate dosages more accurately than earlier devices; single dosage packaging of infusion solutions is available; catheters for infusions have been improved and more is known about reactions to nutritional solutions. The Council on Scientific Affairs (1989) highlighted some of the advantages of therapeutic care at home:

> *Tiny computerised pumps allow cancer patients to safely control their own dosage of continuous IV or subcutaneous narcotics. Babies who use ventilators crawl around their own living rooms; older children tuck their portable ventilators under the wheelchair when they go to school (p. 1243).*

In the US, infusion therapy is the fastest growing sector of home care, with costs increasing from $1.5 billion in 1988 to $2.6 billion in 1990 (quoted in Hafkenschiel, 1990). Over the last ten to fifteen years, there have been developments in home care for intravenous antibiotic therapies, continuous intravenous chemotherapy, infusions of pain relieving drugs and intravenous and nasogastric nutritional support. Home renal dialysis for end-stage renal failure and home respirator care are both relatively well established in the UK.

The US is in the forefront of high technology home care. For example, blood transfusions are now being given in increasing numbers to stable patients at home (Koepke et al., 1988). This is of value to those with chronic and aplastic anaemia, sickle cell anaemia or thalassaemia. This service has also been provided for elderly cancer patients, terminally ill hospice patients and AIDS victims,

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## HOME-BASED HIGH TECHNOLOGY CARE

*Home parenteral nutrition*

**Nutrients are administered intravenously, usually through a catheter in a central vein**

*Home enteral nutrition*

**Nutrients are administered through nasogastric tubes**

*Drug delivery systems*

**The use of pumps for administering drugs for diabetes, cancer therapy, pain relief or blood vessel disorders**

*Intravenous antibiotics*

**The administration of antibiotics through a similar technique to home parenteral nutrition**

*Oxygen therapies*

**Oxygen concentrators, cylinders, mechanical ventilation or tracheostomies can all be managed at home**

*Renal dialysis and peritoneal dialysis*

**For people with end-stage renal disease, dialysis can be carried out through haemodialysis (removal of poisons from the blood via an artificial membrane) or through continuous ambulatory peritoneal analysis (CAPD) where a catheter allows dialysis to occur through membrane inside the abdomen. Though both can be carried out at home, CAPD is, by definition, a form of home dialysis**

despite the risk of severe transfusion reactions, estimated at five per cent of all infusions. It is not surprising to find variations between countries in the adoption of high technology care at home given the many factors influencing the diffusion of new medical techniques. Reimbursement policies, health care priorities, commercial interests and professional zeal all play their part. However, caring for acutely ill people at home, and especially where sophisticated levels of care are involved, can place great strains on patients, carers and families. Mistakes can be life threatening. For this reason, discharge arrangements, good communications and emergency cover are essential. In addition, home-based high technology care is most appropriate where hospital admission would be required for the sole purpose of receiving the therapy in question. Multiple pathology is a contraindication for high technology care at home.

Despite these caveats, high technology home care is increasing in those health systems able to guarantee accessible and immediate emergency care.

This section describes the four major high technology home therapies: intravenous drug therapies, treatment for end-stage renal disease, nutritional and oxygen therapies.

## Intravenous drug therapies

Intravenous drug therapies include the administration of antibiotics, cancer chemotherapy and drugs for pain relief. There have been major improvements in drug delivery systems including new pumps that deliver measured doses of drugs. Thus, for example, chemotherapy can be administered continuously via a miniature infusion pump, allowing people to remain at home and lead a relatively normal life during treatment. Home antibiotic therapy is one of the better established forms of home intravenous drug treatment and a more detailed description follows.

**Home antibiotic therapy**

Home antibiotic therapy has been available since the mid-1960s and employs similar techniques to those used in infusion of clotting factor and parenteral nutrition. It can be used for a range of conditions including osteomyelitis, cystic fibrosis, pneumonia, septic arthritis and infective endocarditis. While patients may require over a month of intravenous antibiotic therapy, they may feel well and regain mobility well before the treatment is completed. These are good candidates for home care. Various home care programmes in the US have demonstrated that antibiotic therapy at home is both clinically acceptable and resource efficient (Kind et al., 1979; Stiver et al., 1982; Harris et al., 1986; Donati et al., 1987). Savings can be dramatic. A careful cost analysis carried out by Chamberlain et al., (1988), on ten study patients showed total savings of over $40,000. All the studies found that the treatment was acceptable to patients and that there were no adverse clinical effects. Harris et al., (1986) showed for example that 30 per cent of patients on home antibiotic therapy were able to resume their jobs. One example of the successful use of this treatment is in home treatment for cystic fibrosis.

Out-patient antibiotic intravenous therapy for cystic fibrosis has been available in the US since the early 1970s (Donati et al., 1987), and home treatment is increasingly used to minimise extensive disruption to the home and school life of children. In the UK, there has been reluctance to use intravenous antibiotics in these cases, partly due to the unpleasantness of the treatment and partly due to a 'pessimistic and defeatist attitude about cystic fibrosis therapy in general' (David, 1989). However, the introduction of less toxic antibiotics has increased the acceptability of this treatment. Pressure has come from parents to carry out the administration of drugs at home, and this is of great benefit to children who may require antibiotics for a period of 14 days every three months. In addition, physiotherapy, which needs to be given on waking and on going to bed does not square with the routines of hospital physiotherapy departments. In short, given careful selection of patients, home care is more appropriate. David (1989) comments on the value of a liaison cystic fibrosis nurse in such circumstances who can 'monitor progress and compliance in the home and provide important support to the parents and feedback to the hospital'.

Home intravenous antibiotic therapy in general is more widespread in the US. Programmes typically involve a project team which may include an infectious disease specialist, nurses with expertise in intravenous catheter insertion, clinical pharmacists and social workers. Pharmacists are often involved in both the development and administration of these projects. As with other forms of home-based high technology care described below, patients are carefully screened before being accepted on to a home care programme where treatment may be administered by hospital or home care nurses. These nurses undergo a period of specialist training and will monitor the patient and change the intravenous cannula. In some cases, while the patient has 24 hour emergency cover, home care is not provided and the patient has to pay regular visits to the pharmacy and to the primary physician or out-patient department. Whatever the system, a rigorous training programme has to be carried out while the patient is still hospitalised. This includes

training in aseptic technique and in recognising possible drug reactions, as well as information on how intravenous systems work. Often, the patient is provided with a typewritten explanation of the therapy as well as who to contact in case of emergency. As a wide range of illnesses may be prescribed antibiotic therapy, this is an area of HCH which is ripe for expansion in the UK.

## Home treatment for end-stage renal disease

There are three treatment options available for people suffering from end-stage renal disease (ESRD). First, maintenance dialysis can be carried out at home, in hospital or in specialised centres. An effective alternative to haemodialysis is renal transplantation, a technique which offers the best quality of life for suitable patients and which is used in roughly half the cases of ESRD in the UK. Third, is peritoneal dialysis, which involves the insertion of a catheter into the abdominal cavity. Since the late 1970s, a slow and continuous ambulatory form of peritoneal dialysis (CAPD) has become popular. This is, by definition, a home dialysis technique and it has greatly increased the numbers of patients in the UK accepted for home dialysis (Williams et al., 1989). CAPD is particularly suitable for younger, highly motivated people as a preparation for transplantation. It is also useful where vascular access is a problem. One study estimated that treatment by CAPD was under half the cost of hospital or home dialysis (Lameire, 1985).

The UK has a poor record in terms of facilities for patients suffering from end-stage renal failure. The emphasis on transplantation, CAPD and home dialysis is unusual and in the rest of Europe the majority of patients still receive dialysis in specialised centres. The UK also has a poor record in terms of negative selection of older patients and of those with multiple pathologies (Halper, 1989). The proportion of people starting treatment at 60 years of age or over is lower in the UK than in other West European countries with the exception of Ireland (Ludbrook, 1985). Likewise, the UK accepts fewer diabetic patients for dialysis. These are, of course, the people least likely to be suitable for home care.

It has been suggested that in countries where there are better facilities for dialysis, the urgency to adopt new techniques for home dialysis is less. For example, in the US, 81.9 per cent of patients were dialysed of whom 19.6 per cent received treatment at home and 80.4 per cent in hospitals (1985 figures). In the UK, only 17.4 per cent of patients were on hospital dialysis (1983 figures) (Halper, 1985). One US analyst commented that an emphasis on non-hospital-based therapies was 'simultaneously an escape from the low number of dialysis centres and also a rationing mechanism, since only the 'best' of the terminally ill ESRD patients do well at home' (quoted in Halper, 1989 p. 27). In other words, selection of patients for home dialysis and transplantation is more restrictive than long term hospital treatment, the most costly treatment option.

The complexities surrounding treatment choices for renal failure, combined with different approaches to what is considered suitable treatment in other countries, suggest that an emphasis on home care may be as much the result of failure to provide adequate hospital facilities as of success in developing appropriate home technologies. It underlines the point that there will always be a significant number of people for whom home care is not an option, whether this is due to clinical factors, poor living conditions, lack of support, or inability to carry out the procedures involved. One of the dangers of the extension of the often cheaper option of home care is that once home care is established as an option, hospitals may prove resistant to providing in-patient care. Treatment for end-stage renal disease illustrates that ethical dilemmas over who should receive treatment are closely linked to whether treatment is offered at home or in hospital.

## Nutritional therapies

For people who are unable to eat, nutrients can be made available through the blood supply or directly into the stomach through tubes. Total parenteral nutrition, a technique developed in the late 1960s, involves placing a catheter, usually into a central vein, thus directly infusing the blood supply with nutrients. This is essential for patients who are unable to absorb nutrients and fluids due to colon cancer or other gastrointestinal disorders. For patients unable to take in food by mouth, enteral feeding is provided through nasogastric tubes or through gastrostomies and jejunostomies (artificial openings in the abdomen and small intestine). Patients suffering from cancers of the head and neck, cerebrovascular accidents, neuromuscular disorders or from chronic diseases, where nutritional intake is impaired, benefit from enteral feeding techniques. Since the 1970s there has been widespread application of enteral nutrition due to advances in nutritional science and the development of improved feeding tubes and reliable enteral pumps. There is also increased awareness that malnutrition may be a problem in the management of patients with medical and surgical disorders and enteral and parenteral nutrition are now widely used, although hospitals and districts vary widely in their application of nutritional support (Payne-James and Silk, 1990).

Patients requiring nutritional support may, in certain circumstances, be treated at home.

Home parenteral nutrition (HPN) has been made possible by developments such as the long term in-dwelling silastic catheter and has been demonstrated as cost-effective (Detsky et al., 1986). Typically, patients infuse solutions during a ten to twelve hour period at night. Treatment can be short-term or life-long. If this technique is to be carried out at home, a training programme has to be established for patients and carers, a means of delivering and storing nutrients has to be organised and a structure for longer term monitoring has to be in place. A register of patients receiving HPN in the UK and Eire was set up in 1977 and over the ten years from 1977 to 1986, 200 patients were registered, with the majority being treated for Crohn's disease and few requiring long-term treatment (Mughal and Irving, 1986). HPN is organised through hospitals and a home visit is carried out to ensure that strict hygiene is observed and that there is sufficient refrigerator space to store nutrients. Training takes place in hospital and most centres provide open access for patients with HPN-related problems. In the US, it is the service most in demand in the infusion therapies market.

Home enteral nutrition (HEN) can be applied to a wider range of patients than TPN; it is easier to administer and less costly. Tubes can be changed by patients, carers or community nurses. Although there is no register of patients on HEN a survey of district general hospitals carried out in 1986 revealed that over 800 patients were being fed enterally at home (Parenteral and Enteral Nutrition Group, British Dietetic Association, 1986). While there is variation between districts in the UK in the adoption of HEN and its use is generally less well documented than HPN, it is far less common than in the USA where there are almost 8000 people receiving HEN (1987 figures). The vast majority are over 65, and the average length of therapy for a majority of patients is seven to 29 days (Nutritional Support Services Survey, 1987). Hospital costs and financing arrangements have meant that it is considered expensive to use hospitals solely to provide nutritional support. It is not surprising therefore that home nutritional therapy represents one of the most rapidly growing segments of home care with projected growth rates of 25 to 30 per cent annually. Home enteral feeding is estimated as having a growth rate of 27 per cent.

HPN and HEN are examples of successful hospital care at home. For example, the UK register shows that half of those receiving HPN were able to work full time. However, there are also real risks including catheter-related sepsis, thrombosis and blockage of tubes. Adequate safeguards are therefore essential. In the US, in 1984, the Health Care Financing Administration produced guidelines on home enteral and home parenteral nutrition and the American Society for Parenteral and Enteral Nutrition published standards reflecting minimum acceptable levels of care. In the UK, there are an estimated 60,000 people receiving nasogastric feeding in hospital, and as home care for a proportion of patients is both practically and clinically feasible, it seems likely that this aspect of home care will expand. The Parenteral and Enteral Nutrition group of the British Dietetic Association (1986) argues that UK guidelines should be evolved as a matter of urgency.

> *These guidelines should involve criteria for the selection of those individuals suitable for home enteral feeding, clarification of each involved professional's role and an agreed financial accountability with respect to supply of disposable equipment (p. 9).*

The organisation of nutritional therapy at home illustrates a number of themes which are important in the HCH debate.

- Teamwork is essential. In the US, nutritional support teams are well established and typically consist of nurses, clinicians, pharmacists and dietitians. In contrast, a recent survey of nutritional support practices in UK hospitals showed that only one-quarter of hospitals or districts had a multidisciplinary team to advise on clinical practice. While HPN falls under the remit of medical clinicians, HEN is seen as the province of the hospital dietitian (Payne-James and Silk, 1990). Commenting on the relative lack of home nutritional support in the UK, the British Medical Journal surmised that 'this is possibly due to the absence of the need to pay hospital fees, which is a powerful stimulus in other countries to return home. Medical inertia, however, and problems with organisation and funding have contributed' (Anon, 1980) (p. 1407).
- Patients likely to do well on HPN are those with a primary intestinal disorder as opposed to those where intestinal failure is a manifestation of a systemic disorder. As in many forms of high technology care at home, the more specific the problem the better the outlook for successful home care. While home parenteral therapy can result in major complications, catheter-related sepsis being the most common, this risk is not confined to home care.
- HPN and HEN have been the focus of extensive commercial involvement. In the US, companies marketing nutritional support products have become involved in assessing, educating and treating patients and in monitoring the quality of care. A survey of hospitals in the US (with a 65 per cent response rate) showed that 78 per cent used home feeding companies to train and monitor patients (Reitz et al., 1988).

6

## THE HAMMERSMITH PROJECT

**Developments in technology have contributed to an increase in survival following neonatal respiratory distress syndrome. This means that large numbers of babies require prolonged hospitalisation for oxygen therapy. Various projects have demonstrated (Donn, 1982) that these babies can be returned home once stable, if parents are instructed in techniques of mucus extraction and cardiopulmonary resuscitation and are able to handle the oxygen equipment. A project based at Hammersmith hospital in the UK has been successful in achieving home care for these babies.**

**This project emerged out of concern over the damage caused to babies and their families through prolonged hospitalisation:**

***follow up studies have shown growth and development to be delayed, a high incidence of hospital-acquired infection, lack of maternal bonding and considerable financial cost (Sleath, 1989 p. 31).***

**A home care service was set up for these babies. A teaching programme began in the hospital where the mother spent up to a week caring totally for her baby. During this time, a training programme was carried out with both parents, if possible, so that they became competent at changing the nasal catheter, maintaining the oxygen supply, using the apnoea monitor and recognising the clinical signs of oxygen deprivation. The parents were accompanied home on discharge and the procedures rehearsed again. Each baby was visited, supervised and monitored by a hospital neonatal nurse experienced in hospital therapy and preterm lung disease. Oxygen was monitored through a sensor attached to the hand or foot (a pulse oximeter) and applied through a nasal catheter.**

**All the 16 children involved in this project survived without major problems, and parents were prepared to accept the responsibilities involved in order to be with their babies. The Hammersmith initiative illustrates benefits of HCH programmes for young babies requiring oxygen therapy.**

- The expansion of high technology home care is not without drawbacks. One US commentator pointed out that:

  *In 1980, a home patient was still unusual and received a good deal of attention and in-hospital instruction... Today, the patient is no longer a rarity and there is frequently less in-hospital time for learning and adjustment to the procedures and apparatus (Heaphey et al., 1987 p. 181).*

Familiarity with home-based high technology care on the part of hospital staff may dull awareness of the emotional and psychosocial impact on patients, carers and families of taking responsibility for this level of acute care. This applies to every area of high technology care at home.

## Oxygen therapies

The administration of oxygen is required for a wide range of conditions including lung diseases, respiratory failure due to skeletal or neuromuscular disorders and spinal injuries.

The provision of long term oxygen therapy at home through a cylinder, liquid oxygen or the oxygen concentrator is a well established way of alleviating chronic obstructive airways disease and chronic hypoxaemia. Oxygen can be prescribed by GPs (in consultation with a chest physician) and delivered by local pharmacists. The oxygen concentrator is the most convenient and cost-effective method of giving long term domiciliary oxygen (Walshaw et al., 1988). More recently, a number of studies have demonstrated that babies requiring oxygen therapy can be discharged early from hospital and treated at home.

### Mechanical ventilation at home

Also well established is mechanical ventilation at home for respiratory failure due to skeletal or neuromuscular diseases or as a result of injury to the spinal cord. While the development of home mechanical ventilation originated with the care of polio sufferers who became dependent on ventilation after the polio epidemics of the 1940s and 1950s, medical progress has created a second generation of patients in need of long term mechanical ventilation. In the US, for example, there are between seven and eight thousand new survivors of traumatic spinal cord injury each year, many of whom become dependent on a ventilator (Goldberg, 1983). Continuous mechanical ventilation can be provided through a permanent tracheostomy. For those requiring intermittent help with breathing, negative pressure can be imposed via a tank ventilator, cuirass or air tight jacket applied to the thoraco-abdominal wall. More recently — and this has increased the possibilities for domiciliary ventilation — a technique has been developed where intermittent positive pressure ventilation can be delivered non-invasively through a nasal mask (Branthwaite, 1989). This provides an alternative for those who require intermittent ventilatory assistance, usually at night.

A retrospective study of over 50 patients using mechanical ventilation at home showed that domiciliary ventilation was successful in maintaining well-being for many years where respiratory failure was secondary to skeletal or neuromuscular disease (Sawicka et al., 1988). Currently, about 500 patients in the UK use mechanical ventilation at home.

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## THE RESPONAUT PROGRAMME

**The responaut programme, established at St Thomas's Hospital, London, in 1965, was a pioneering service for polio survivors enabling them to receive mechanical ventilation at home. The term was coined by the Responauts themselves, representing the voyage into the unknown of ventilator-dependent, severely physically disabled people living independently. This programme was the result of collaboration between polio victims, their families, government agencies and health care professionals.**

**As well as providing comprehensive care in hospital, it continues to provide home care and home maintenance services as well as 24 hour emergency technical cover for ventilators. Responauts are cared for by care attendants who provide flexible, personal, domestic and social care as required and directed by clients (Goldberg, 1984; Fiedler, 1988).**

In France too, there is more than 25 years of experience in providing home care for people with chronic respiratory deficiency. Twenty eight regional associations serve over 50,000 people with respiratory problems of whom 12,000 receive respirator care for 12 to 24 hours each day, and of whom 1,200 require prolonged ventilator assistance (Goldberg, 1986). These programmes provide equipment, support and comprehensive surveillance. In contrast, in the US, services are fragmented and funding for home care is often determined on the basis of individual cases. Reimbursement legislation does not provide any financial incentives for mechanical ventilation at home, though in some States ventilator-dependent children may be cared for at home without losing Medicaid benefits.

Care at home is successful for ventilator-dependent children. A study of six families was carried out in Massachusetts in 1980. On discharge, parents' skills included 'gastrostomy feeding, tracheostomy care, chest physical therapy, cardiopulmonary resuscitation and teaching and supervision of nurses and other personnel'(Burr, 1983). This study showed home care costs to be 50 to 90 per cent lower than hospital costs. In the US, the Surgeon General brought the issue of developing programmes for ventilator-dependent children to national prominence as a case example of children with special needs. Projects were established to create and evaluate home care models for these children (Goldberg, 1990). An evaluation of these projects found that family caregivers thought that the child's 'functional and developmental status and quality of life were more positive overall at home than when the child was hospitalised' (Aday et al., 1989).

Mechanical ventilation is illustrative of the issues surrounding technology-assisted people as a whole. Although patients are few in number they are highly visible because of the time they spend in hospital intensive care units and because of the harmful effects of institutionalisation. Many studies demonstrate that, with adequate safeguards and support, home care is possible. However, these are vulnerable people. As Goldberg (1983) points out: 'one should remember that the ventilator-dependent person, even when stable, can still be considered a candidate for intensive care'. There is no margin for error either in the equipment or in the level and consistency of support required. He argues that:

> *if we can design programmes to appropriately meet the needs of the ventilator-dependent person and family we will have gone a long way to design workable solutions that can be studied as models for all currently developing programmes embracing the concept of care at home (p. 365).*

Such programmes will need to take account of the strains and restrictions on family life as well as the heavy financial burdens such a level of care may impose. For all these reasons, domiciliary mechanical ventilation forms a prototype of HCH.

# 4 | Organising hospital care at home

There are many ways of organising hospital care at home. In countries such as the UK, where domiciliary care is well established, there is the option of extending community health services, providing specialist input where necessary. Inevitably, however, HCH programmes directed towards early discharge largely originate in hospital departments as there are many financial incentives for hospitals to become involved in such schemes. In the US, the introduction of prospective payment systems has encouraged hospitals to promote early discharge, and over 70 per cent of US hospitals participate in home care either through outreach services, joint ventures or through contracts with independent home care agencies. This expansion in HCH has been made possible through modifications in reimbursement arrangements, which had traditionally favoured hospital rather than home care. For example, about 95 per cent of the Blue Cross and Blue Shield plans now pay for home antibiotic therapy, 91 per cent cover home parenteral nutrition and 93 per cent cover chemotherapy (Anderson, 1986). While specific HCH programmes may be initiated by hospitals and community services, sponsorship by private companies and government agencies has set the context for the expansion of HCH. Free-standing 'hospitals without walls', as in the New Brunswick Extra-Mural Hospital, illustrate how a government-funded HCH agency may be successfully integrated into a comprehensive health care system. A more recent development is the involvement of companies providing nutrient solutions, appliances and the like in providing instruction to patients receiving HCH. Such companies may provide a range of monitoring and follow-up services. To some extent, therefore, the directions in which HCH develops are likely to be influenced by the commercial potential of the treatment offered.

There are clear and inevitable correspondences between HCH and the organisation and financing of the wider health care system, particularly in the balance of commercial and state involvement and in the extent to which existing domiciliary services are able to provide sophisticated levels of home care. Whatever the arrangements, however, means have to be found of spanning hospital and home care in relation to discharge arrangements, clinical responsibility, monitoring and emergency cover. In order to shed some light on the many ways of organising HCH, this section describes a number of well-established models, drawing on experience in the USA, UK, Canada and France.

## Hospital-based programmes

Hospitals often take the initiative in establishing teams which span hospital and community and which are designed to provide intensive nursing care and rehabilitation at home combined with easy access to hospital staff and facilities. The COPE and Peterborough schemes described in Section 2 provide examples of multidisciplinary hospital-based outreach teams which facilitate speedy management of the patient in hospital and early discharge into the community. In the UK, relationships between community health staff and specialist staff employed by hospitals and often treating the same patients, can pose problems. Likewise, in the US, the changeover from hospital-based services to home care agencies needs to be carefully managed. A number of studies (see, for example, Gerson et al., 1976) have identified the important role of the hospital liaison nurse in communicating between hospital and home care agency.

An increasingly common way of organising home health care in general in the US is the hospital-based home health agency. This is defined by the Health Care Financing Administration as an agency that is an integrated department of a hospital, thereby remaining under its fiscal and administrative control. There are a number of advantages of this approach. Unlike free standing private home health agencies, hospital-based agencies are subject to all the regulations of the parent hospitals. This means that they must meet all those standards laid down by the Joint Commission on the Accreditation of Hospitals as well as state licensure requirements and criteria for Medicare certification necessary for all home health agencies. In this way, quality control is equivalent to that guaranteed in hospitals. A further advantage is that continuity of care between home and hospital is easier to achieve. Commentators argue that:

> *because of its accessibility to the hospital staff, the hospital-based home health agency is in a good position to help the hospital achieve the greatest possible continuity between acute and home care (Frasca and Christy, 1986 p. 167).*

There is easy access to hospital resources, facilities and staff expertise and hospital-based agencies are in a good position to make mutually beneficial arrangements with suppliers of equipment and pharmaceuticals. Records are consistent and continuity of treatment by the same physician is feasible if readmission proves necessary. Such continuity is clearly important in a system where reimbursement changes mean that patients are being discharged 'quicker and sicker' into the community. New posts, such as hospital-based home health coordinators, similar to hospital liaison nurses, are being created in order to facilitate discharge planning through providing a link between hospital and community staff. It is also argued that integrated agencies promote the financial health of the parent hospital through conveying a positive image which helps to attract patients.

Despite certain reimbursement complexities, hospital-based agencies accounted for 14 per cent of all Medicare-certified agencies in 1984. More recently, however, low profit margins and increased exposure to liability have halted this expansion (Powills, 1989). An example of a successful hospital-based agency is the South Hills System/Home Health Agency (SHHS/HHA) in Pittsburgh (see Box 8).

To the UK reader, the SHHS/HHA is reminiscent of NHS community health services. A wide range of professional staff, organised on a geographical basis, looks after patients discharged from a number of hospitals. There is, of course, the important distinction that case loads derive from hospital patients and not a defined geographical population and the major organisational difference that the hospital provides the administrative and professional base. The latter is an advantage in HCH as it leads to close links between the hospital and the home care department. This particular agency appears to have successfully bridged the gap between home and hospital care.

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## SOUTH HILLS HEALTH SYSTEM/HOME HEALTH AGENCY

**This is the largest multi-hospital-based home health agency in the US. Established in Pittsburgh in 1963, the South Hills Health System/Home Health Agency (SHHS/HHA) serves nine hospitals treating an average of 3000 patients each day (see Frasca and Christy, 1986, for full account). It employs over 300 staff: nurses (covering psychiatric/ mental health, paediatric care, intravenous chemotherapy, antibiotic therapy and total parenteral nutrition); physiotherapy; occupational therapy; speech therapy; respiratory therapy; social work and home health aide services; health education; diagnostic support services and nutritional advice. It can provide high technology care at home including the care of people on life-support machines. The size of this agency allows it to directly employ 95 per cent of its service providers and services are planned on a geographical basis. The SHHS/HHA intake team helps to develop discharge plans and to coordinate services, making sure that equipment is available and that the appropriate staff are galvanised. They also monitor changes in the patient's condition, amending care plans if necessary. A member of the intake team attends discharge planning rounds on each nursing unit and visits the patient at home within 48 hours of discharge.**

**There is a coordinated, interdisciplinary approach to team management. It has been argued (Frasca and Christy, 1986) that the familiarity of hospital physicians with the scheme makes them confident to refer complex cases to home care and that the home care department 'incorporates and extends hospital services into a comprehensive and coordinated package of home care services'.**

## Extra-mural hospitals

The term 'extra-mural hospital' was coined by the Auckland Hospital Board, the first authority to design and implement hospital care in the home via a free standing hospital agency, the 'hospital without walls'. This idea inspired a number of further experiments (Ferguson, 1984; Levine, 1986) of which the best known is the New Brunswick Extra-Mural Hospital (see Box 9).

This example of an extra-mural hospital raises a number of important issues. Different professional services are moulded into one functional unit, providing comprehensive community care on a local basis. While this bears certain similarities to the UK, particularly since the decentralisation of community units, there are major differences both in referral practices and in the range of services routinely offered. Physicians have to apply for admitting privileges and continue to bear responsibility for their patients. The decision whether to accept a patient rests with the unit coordinator of the local service delivery unit who is responsible for the

> *allocation of staff, the decision to accept or reject patients, the quality of care, control of her budget, supplies, continuing education and so on. She is also [the] principal channel of communication with the local authority and local physician and is a vital link in ... public relations (Ferguson, 1984 p. 22).*

In the UK, there is an automatic right of referral from hospital to GP and community services. This can, however, create difficulties for those services in controlling workloads, quality and costs. It also limits the possibility of guaranteeing intensive levels of nursing support as this would place too

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## NEW BRUNSWICK EXTRA-MURAL HOSPITAL

**This agency was established by the government of New Brunswick in 1981. Although it has the legal status of a hospital, is directly financed by the government and operates under the Public Hospitals Act, it is not based within an active treatment centre, and does not operate a hospital outreach service. Instead, it is a free standing provider of hospital levels of care in the home, offering a comprehensive programme of care through a range of professional and support services, including dietitians, physiotherapists and respiratory therapists. Terminal care, rehabilitation and acute services are provided. No physicians are employed by the Extra-Mural Hospital; instead they must apply to admit patients who then remain under their care. Currently, about half the patients are admitted from active treatment hospitals. The Extra-Mural Hospital serves about half the population of New Brunswick and has between 900 and 1000 patients under its care each day (Ferguson, 1987). Services are administered on a geographical basis from local service delivery units, each managed by a unit coordinator. As the service expands, so more local service delivery units are created.**

**This scheme was established as an appropriate response to the pressures facing the health services in New Brunswick, but common to all health care systems in developed countries: the ageing of the population; the need for long term and continuing care; the trend away from short term episodes of acute illness and the high costs of building new hospitals.**

**The aims of the service are to avoid admission where possible, accelerate discharge, relieve pressure on nursing home beds, provide care at home for disabled and chronically ill people and care at home for terminally ill people. The initial emphasis has been on caring for those who would otherwise occupy a bed in an acute hospital through a HCH service although the intention is to provide more assessment and rehabilitation services for elderly people as the service expands.**

**The Extra-Mural Hospital provides a wide range of high technology care at home, including intravenous antibiotic therapy, home ventilation, and intravenous nutrition as well as diagnostic services including home electrocardiographs. The aim is to 'explore and expand the limits — the safe limits — of care outside institutions' (Ferguson, 1984).**

great a demand on an already hard pressed service. By granting community services the rights and duties of hospitals, New Brunswick has created an institution of equal status and negotiating rights. In addition, as the New Brunswick Extra-Mural Hospital arose out of a need to reduce the use of acute beds, the services offered are correspondingly more specialised than those typically offered by district nursing in the UK. It is ironic that such services, which led the way in the provision of domiciliary care, should now lag behind in the provision of hospital levels of care at home.

Financial savings were not the prime motivation for this scheme. However, an evaluation of hospital utilisation patterns in areas with and without local service delivery units (Wynn et al., 1989), showed that the Extra-Mural Hospital did result in savings of hospital days.

## Extending community health services

There are a number of HCH schemes in the UK which consist of extended primary and community health services. Given that these services are already well developed it seems sensible to further expand their role. For example, in Seaton, Devon, an area with an above average number of elderly people, funds earmarked for a proposed hospital were channelled to providing care for highly dependent people at home. Carcinoma, cardiovascular and cerebrovascular diseases are the main conditions cared for and the average duration within the scheme is about 15 days. The scheme uses a balance of contract and bank staff as well as locally-based nurses. The Peterborough Hospital at Home scheme (and associated projects) is the best known example in the UK of adapting existing NHS community health services to encompass the more intensive levels of care required for HCH (see Box 10).

The Peterborough Hospital at Home scheme illustrates some of problems and the potential of intensive care at home in the UK.

- It illustrates that much hospital-level nursing care can be carried out by district nurses and that GPs, patients and their families and district nurses themselves are satisfied with this arrangement. Although the nurses cared for severely ill and handicapped people, it is not clear how far the HaH scheme addresses some of the high technology challenges, or which additional skills are available to HaH for example in respirator care, paediatric care, orthopaedic care or in the provision of intravenous therapies.
- The scheme has closer links with GPs than with hospital consultants. This is reflected in the fact that the bulk of referrals are from GPs and that the scheme has made relatively little impact on early post-operative discharge. Hospital-based discharge planning still lies outside the province

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# THE PETERBOROUGH HOSPITAL AT HOME SCHEME

**This scheme began in November, 1978, as an experiment in part of Peterborough; it now covers the whole of the district and receives funding from the District Health Authority. The scheme is open to everyone except midwifery and psychiatric patients and the aim is to treat at home patients who would otherwise be occupying hospital beds, either through preventing admission or through early discharge. It was recognised that, in addition to nursing care, many people also require homemaker services and basic care. In order to meet this need, the Hospital at Home (HaH) scheme created 'patient aides', modelled on the French home care nursing aides — a cross between nursing auxiliaries and home helps. They carry out a wide range of tasks, including bathing, domestic help, meals and bed-making (Mowat and Morgan, 1982).**

**When the project began, admission was subject to the following provisos (Anand and Pryor, 1989)**

- **in-patient treatment was not stipulated by a medical practitioner**
- **the assessor and coordinator of the scheme agreed to the patient's suitability**
- **patient and family wished for domiciliary care in preference to hospital admission**

**Medical responsibility rested with the GP and patients could be referred to the service via their GP or hospital consultant, given that the GP accepted medical responsibility. Twenty four hour nursing care was available and once a patient was accepted on to the scheme, a rota of care was prepared, and a copy given to the patient and/or family.**

**The history of the scheme falls into two phases. Initially, the scheme directly employed nurses and patients' aides for the purposes of the project which was thus quite separate from existing community health services. In addition, a part-time physiotherapist, occupational therapist and social worker were attached to the team. Decisions over admission lay in the hands of the assessor of the scheme. This initial scheme did not work well. Mowat and Morgan (1982) describe the problems:**

***It proved difficult for the general practitioner to liaise with the Hospital at Home nurses, and the latter did not have enough to do ... Many of the attached district nurses objected to having what they regarded as their own patients looked after by relatively unknown nurses from the scheme. Admission was too cumbersome ... We were not incorporating the excellent domiciliary care service that already exists in the British National Health Service... (p. 641).***

**The Peterborough scheme had been closely modelled on 'Santé Service Bayonne' (see below) and the failure of this initial model illustrates the dangers of transplanting a model of HCH successful in one country into another with very different health care traditions.**

**A Mark II version began in 1980. (For a history of the Mark I and Mark II projects see Knowelden et al., 1988). The HCH scheme was integrated into the primary health care team and the service was provided by community nurses with additional help from a bank of nurses and patients' aides. The overall management of the scheme was placed under the Director of Community Nursing.**

**This has overcome the original difficulties, and the service now admits up to 400 patients a year. A wide variety of patients has been nursed by the HaH service, the majority suffering from strokes and cancer. From 1986, when the orthopaedic department drew on the HaH scheme to facilitate early discharge, the scheme has included those discharged early after hip fracture and elective hip and knee replacement. In addition, children on traction for congenital dislocation of the hip and fractured femur have been successfully nursed at home (Anand and Pryor, 1989). Nevertheless, care of elderly people with terminal illnesses still dominates the scheme. For example, a retrospective study of 1983 records (Knowelden et al., 1988) showed that HAH was primarily concerned with the care of 'elderly cancer patients with very high fatality, 80 per cent, and relatively short duration of stay'. A further prospective study showed that HaH cancer patients were more severely handicapped on admission than hospital patients, underlining the capacity of HaH to care for such patients as well as the tendency for the service to be largely concerned with terminal care.**

of the Hospital at Home scheme and this distinguishes this UK version from many of the US models. There is, however, one notable exception to this, the project for early post-operative discharge for elderly patients with fractured neck of femur (Section 2). In its first year of operation, 68 hip fracture patients were discharged early to the HaH scheme. It is likely that the contribution of HaH to early discharge could be extended, given closer links between hospital consultants and the community-based service. Involvement of a representative of the HaH scheme in discharge planning would facilitate this process.

- The larger, Mark II version of the scheme underlined the fact that earlier versions of the scheme were too small. A service needs to be well known and widely available for any significant modification to occur in discharge practices of hospital consultants.

- Attempts to assess the cost-effectiveness of this scheme illustrate some of the complexities involved in evaluating HCH. A detailed evaluation carried out by the Medical Care Research Unit of the University of Sheffield Medical School (Knowelden et al., 1988) showed that while HaH was cheaper than acute hospital

care, this was not the only alternative for many of the patients on the scheme. Hospice care, geriatric beds, convalescent care, rehabilitation units and GP units were other options. In particular, the authors point out that:

> *to some extent, the availability of HaH would, it was thought, encourage practitioners and nurses to seek augmented care for their patients treated at home, without any immediate intention of seeking hospital admission if HaH could not accept them (p. 3).*

A retrospective study of 1983 records showed that there was considerable overlap between hospital, HaH and care given at home by district nurses. Subsequent attempts to randomly allocate patients to the HaH scheme or to hospital bore this out. GPs were reluctant to implement the allocation procedure basic to a controlled trial, and were in any event loath to deprive patients of a home care service appropriate to their needs. From the point of view of cost-effectiveness, post-operative care gave the clearest savings with HaH costing only half as much as hospital care of matched patients. Outcomes were similar and the service was acceptable to patients. In contrast, the daily costs for cancer patients were the same for HaH and hospital patients.

The Peterborough scheme is highly valued by professionals, patients and their families. In a brochure describing the scheme one user wrote:

> *I needed traction but wanted to keep breast-feeding my baby; Hospital at Home allowed me to do that and stay close to my other child. It also meant that my husband could continue to work. I don't know how we would have managed without it.*

District nurses are able to use their expertise to the full and GPs are provided with an alternative to hospital admission.

This scheme demonstrates the importance of providing enhanced domiciliary services and terminal care at home as well as showing that district nursing is capable of taking on the additional demands of caring for severely ill and handicapped people in their own homes. It is perhaps inevitable that where a HCH service is integrated into primary care, rather than into hospital discharge procedures, the end result is a much valued enhancement of those primary care services. Savings for the hospital sector are negligible, and the small proportion of cases in any particular diagnosis cared for in the HaH scheme means that at the current level of operation, there can be no savings made in hospital nursing staff or hospital building programmes. As it is largely used as a terminal care service, its cost-effectiveness would need to be assessed in comparison with the various kinds of home hospice care.

The Peterborough scheme takes its cue from the enhancement of existing domiciliary services rather than from the desire to change the balance between home and hospital care. Nevertheless, it provides a structure for the latter and its future course depends on the health care priorities of Peterborough Health District.

## Independent home health agencies

Independent home health agencies may be profit-making or non-profit-making. The provision of home health care through such organisations is a common feature of countries with pluralist health provision. In the US, for example, there are over 5,800 Medicare-certified home care agencies. Traditionally, these provided a safety net for Medicare patients not ill enough to stay in hospital, but too sick to be left without any medical care. However, a number of these offer specialised clinical services for paediatric, oncology, post-surgical and rehabilitation patients. For example, Home Health Affiliates in Houston, an independent profit-making agency, provides specialised staff and equipment normally found in hospitals and long term care facilities. For this reason, it compares its costs with medical institutions rather than with home care agencies, claiming savings of between 30 and 70 per cent over hospital care (Anon., 1985).

More influential in the development of HCH in the UK have been the non-profit-making schemes which have successfully operated in France since the early 1960s. Called 'Hospitalisation à Domicile', they began as a way of allowing terminally ill cancer patients to die at home. Subsequently, their remit widened and the larger schemes such as the one at Bayonne (see Box 11) care mainly for sufferers from cerebrovascular disease. These home care services are independent entities organised on a geographical basis. In practice, they have formed agreements with specific hospitals or form administrative units within hospitals. Each signs a contract with the Social Security Administration which lays down standards and costs. Admission to the schemes is dependent on the patient having been hospitalised. One of the best known French schemes is the Santé Service Bayonne et Région (SSB).

The French schemes are quite different from the organisation of community health services in the UK, hence the difficulties in adopting this model experienced by the Peterborough team. Admission into the scheme is within the jurisdiction of the agency and not the right of either the GP or hospital consultant. As in the New Brunswick Extra-Mural Hospital, home care is provided by an autonomous agency which has its own relationship to funding bodies and which

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## SANTE SERVICE BAYONNE ET REGION

**This is the service that inspired the Peterborough HaH scheme. It started in 1961 as a home nursing scheme for cancer sufferers (see Morris, 1983, for full account). Gradually, the care of elderly and physically handicapped people was included. By 1981, SSB managed a case load of 1,500 people and was able to support up to 360 patients at one time.**

**Nurses, nursing aides, physiotherapists, social workers and a medical director are directly employed; medical responsibility rests with the GP. In France, the nursing aide provides general patient care, including bed baths, and may acquire a nationally recognised diploma.**

**Two levels of care are provided by SSB. 'Hospitalisation à domicile' is for patients requiring skilled nursing care several times a day. Home care, which represents the majority of places, is less intensive.**

**Unlike many 'Hospitalisation à Domicile' schemes, SSB has a policy of open entry, and the bulk of referrals are from patients' families and friends, and family doctors; only one in eight referrals comes directly from hospitals. Suitability of the home and need for any special equipment are assessed by SSB staff. The Social Security Administration guarantees income for a certain number of patients and eligibility has to be demonstrated by the agency.**

operates within its own sets of guidelines. It is not a taken for granted resource for the hospital sector. Neither does it operate in parallel with a well developed community nursing service with the inevitable role conflicts and boundary disputes so well illustrated in the initial Peterborough scheme. Of particular interest is the intensive level of care offered by the 'Hospitalisation à Domicile' and the conditions routinely treated. This service developed from providing solely terminal care to a wider HCH scheme. It is possible that Peterborough will follow the same path.

## The specialist resource

Just as hospital care is highly specialised, so high technology care at home requires specialist skills and sophisticated equipment. Certain kinds of paediatric, orthopaedic, respirator, stoma, and cancer care may involve training over and above that for district nursing. Providing expertise for a wide range of high technology care can pose problems for community health services and home care agencies, particularly if they are small and independent. There may be too few cases to warrant a specialist nurse. In the same way, a local hospital or health authority may lack expertise in the management of the rare ventilator-dependent person. The provision and maintenance of sophisticated equipment and the regular provision of supplies of drugs or nutrients add to the complexity of home care. Depending on the condition under consideration, there are a number of different solutions.

At a local level, specialist hospital-based nurses may carry out their work in the community. In the Hammersmith project, described in Section 3, a hospital-based neonatal nurse was responsible for training parents to provide oxygen therapy for their young baby and for monitoring progress. This nurse could be contacted at any time and the service continues as part of the neonatal unit (Sleath, 1989). Paediatric community nurses are now widespread in the UK; some specialise in particular conditions, such as cystic fibrosis and others provide a wide spectrum of care. In the same way, stoma care nurses can provide continuity of care between home and hospital and back up expertise for the primary care team. In their report on this issue the Royal College of Physicians (1986) proposed trained stoma care nurses operating from a stoma care centre with a designated consultant in charge. While stoma care is not representative of the shift from hospital to home care, the model of specialist hospital nurses working in the community is one with obvious potential for the provision of hospital care at home. Orthopaedic, paediatric and respirator care and the care of people with AIDS raise similar issues.

An alternative model is one where independent specialist staff work in partnership with community and hospital staff. In the UK, for example, Macmillan nurses illustrate how such an approach can be successful.

Macmillan nurses provide a direct service to cancer patients taking their skills in pain relief, symptom control and emotional support into patients' homes. Cancer Relief Macmillan Fund provides pump priming for nurses who work as an integral part of the health service in community-based teams (the majority), hospitals, or hospices. It also provides special training for paediatric oncology nurses, who provide home care for children with advanced cancer, and for nurses specialising in specific cancers. Regional advisors in palliative care have been created in order to plan and coordinate all cancer services within a health region.

An alternative approach involves the training of community nursing staff. For example, short courses in stoma care are provided for community nurses and health visitors. The rarity of certain conditions means that a flexible approach to such training is needed.

More recent is the involvement of appliance manufacturers and commercial firms producing nutrients, for example, in providing and

monitoring care. This is particularly marked in the US where many hospitals contract with such firms to provide home care or enter joint ventures with particular companies.

## A nation-wide approach

For certain conditions a local approach may be unsatisfactory and national, regional or state solutions have to be found. For rare conditions, in particular, service planning, evaluation and monitoring may need to be carried out at a national level. Establishing a register and involving professionals and users in the development of guidelines for achieving high quality care are useful first steps. For example, the American Academy of Paediatrics' Ad Hoc Task Force on Home Care of Chronically Ill Infants and Children (1984) has outlined minimal requirements for a comprehensive discharge plan for chronically ill children, and in the UK a national register of people receiving Home Parenteral Nutrition (HPN) has been established. A national approach towards HCH is not the norm, however. In the US, for example, there are few treatment options for people requiring respirator care, no established funding mechanisms and no coordination at national level. Commenting on this, Goldberg (1986) points out that 'We do not know how many of these patients exist, where they are, who is caring for them and at what cost'. In the UK, too, the lack of a national approach has been recognised and there have been appeals for a more coordinated response for oxygen therapy and mechanical ventilation in order to provide equal access to such services (Branthwaite, 1989). The French system of home care programmes for ventilator-assisted people shows what can be achieved through regional associations and a national coordinating body (see Box 12).

There are similarities between the national system in place in France and the tradition of voluntary associations in the UK. In particular, consumer involvement in the regional associations ensures their relevance and serves to highlight the needs of this particular group of people. Clearly, not all HCH is suitable for this kind of organisation. However, where therapy may be required over many years and where it is important to keep the needs of a particular group in the mind of the public, such an organisation may combine the support functions of a self help group, the quality control exercised by a national standard setting body and the essential practical functions of equipment purchase and maintenance.

This section has demonstrated that organisational models for delivering HCH are in place. The further development of this service depends on the extent to which it is viewed as a cost-effective alternative to acute in-patient care.

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### HOME VENTILATOR CARE IN FRANCE

**Like the British Responaut programme, the French system emerged from efforts to help polio survivors (Goldberg, 1989). Two regional associations, Association d'Entraide des Polios et Handicapés, and Association de la Région de Lyon pour la Lutte contre la Poliomyélite, eventually expanded to include support for ventilator-assisted people in general and these models were adopted by other regional associations.**

**Their work includes equipment maintenance as well as training in self care and the development of models for community living. Working closely with regional medical centres and grass roots organisations these regional associations involve patients as well as physicians, and have now expanded to include professionals, consumers, reimbursement agencies and government authorities. Each regional association has a general assembly for involved people and organisations. There are 28 such regional associations in France providing support to over 10,000 people requiring oxygen therapy, of whom 1,200 are dependent on ventilators. These regional associations, together with reimbursement agencies, health-related organisations, government authorities and scientific societies have set up a national organisation, ANTADIR (Association Nationale Pour le Traitement à Domicile de l'Insufficance Réspiratoire Chronique). This organisation collates statistics from the regional associations, compiling them into a national picture of all people requiring oxygen and/or mechanical ventilation in the home. Each region receives feedback on the quality of its services and advice on service provision. The national organisation supports studies and national investigations useful for forming health policy in this area and sets national guidelines. It has an important practical role in the bulk purchase of equipment. Finally, it conducts negotiations with government authorities and reimbursement agencies. The quality assurance gained by this integrated and coordinated approach provides lessons for intensive home care in general.**

# Establishing a cost-effective service

# 5

The current balance of home and hospital care is a product of the historical influences which resulted in hospital-centred health care, reinforced by current custom and practice in admission and discharge procedures and the policies of health care funders. Cost-effectiveness studies have played little part in influencing the patterns of health service delivery. Now that the growing cost of hospitals is an issue, the search for cost-effective alternatives to acute hospital care has intensified.

Replacing certain kinds of hospital care with home care is often assumed to cut costs through reducing the need for hospital admission, promoting earlier discharge and, in the longer term, avoiding the capital costs of building new hospitals. Cost containment, though, is not the sole rationale for reassessing the balance between home and hospital care. The New Brunswick Extra-Mural Hospital, for example, was established as a more appropriate response to Canada's health service needs than the construction of new hospitals and there was little expectation that it would save money in the short term. Nevertheless, the future development of HCH is likely to be influenced by an assessment of the costs and benefits of specific programmes.

This section identifies the first steps in setting up feasible and cost-effective HCH programmes; reviews difficulties in evaluating the success or otherwise of these; and briefly describes some examples of cost-effective HCH schemes.

## First steps

Assessing the cost-effectiveness of HCH is in its early stages. Further research is needed to identify for which conditions and groups of patients HCH is clinically safe and organisationally feasible. However, there are a number of preconditions for setting up an effective service: choosing suitable conditions; selecting suitable patients; implementing a programme to prepare and instruct patients; identifying the acceptability of the programme to service providers and service users; and establishing efficient management procedures pre- and post-discharge.

### Choice of conditions

Great care has to be exercised in the choice of conditions for HCH. In the St John's scheme described in Section 2, only conditions which required low levels of technical, nursing and clinical monitoring during the latter part of the hospital stay were included. Quantifying different levels of need throughout a hospital stay is a first step to identifying conditions suitable for early discharge. It does not in itself guarantee that the substitution of home care for hospital care will be cost-effective, as the St John's scheme also demonstrated.

### Patient selection

Developing criteria for patient selection is the second step in establishing a HCH programme. The choice of criteria depends on the diagnosis and on the extent to which patients and carers have to undertake complex treatment. In the Peterborough scheme for early discharge of elderly people with hip fractures, the team used as a screening device the mental function of the patient, pre-injury levels of mobility inside and outside the home and the extent of support required. On this basis, over half the patients seen during the first year were considered suitable for early discharge. High technology care requires a different approach. For example, in home intravenous antibiotic therapy (see Stiver, 1982), the patient should be clinically stable, with all signs and symptoms of the infection controlled. The patient and family should understand the necessity for continuing with the treatment and agree with the treatment plan. The patient will also need ready venous access and the manual dexterity to carry out infusion procedures. The home should have amenities such as a telephone and refrigerator.

More difficult to gauge is the likely response of a patient to the responsibility of carrying out home treatment. Corby (1986) outlines some necessary characteristics:

> *The patient's degree of emotional stability, compliance, coping mechanisms, family support system, and any history of substance abuse are important concerns. So is individual ability and motivation to learn as well as ... willingness to participate (p. 53).*

It is clearly difficult for patients to predict how they will cope. Sensitive assessment by professionals in consultation with patients and their families is therefore essential.

### Instruction for home care

Careful instruction is essential for patients who may be carrying out procedures normally undertaken in hospital or who need to operate

sophisticated equipment. In her description of a home antibiotic therapy programme Corby (1986) describes the extensive training schedule carried out with patients. Training is standardised, an audiovisual programme is shown and an instruction manual is available for the use of patients, families and professionals. This manual includes an emergency plan as well as a calendar to schedule administration times, laboratory work and physician appointments. Before discharge, patients need to be familiar with aseptic techniques, care of catheter sites and possible side effects. In particular, they need to know how and when to seek emergency aid. In order to reinforce this training, a nurse visits at the time of the first injection.

**Assessing acceptability**

Assessing the acceptability of HCH means taking account of the views of patients, their families and carers, and professionals in the hospital and community sectors. In a study of early discharge for hernia and varicose veins, Adler et al., (1978) point out:

> *the patient's degree of satisfaction with the care ... received is an inherent part of good medical care...if the patients and providers disliked the policy strongly enough, it would no more be possible to implement it than it would if the number of complications were unacceptably high (p. 140).*

Overall acceptability can be difficult to determine. What conclusions are to be drawn, for example, when patients favour early discharge and their families are less enthusiastic, or when managers promote earlier discharge against the wishes of patients or health care providers? Hospital care at home can impose great burdens on families. In their evaluation of the care of ventilator-dependent children at home, Aday et al., (1989) showed that while families were positive about having their child at home, they expressed concern about:

> *feeling tied down to the home because of the care demands; the burden of responsibility for the child's care; the constraints on their privacy and the tension between the authority of home nurses and parents (p. 144).*

While certain conditions and treatments emerge as suitable for HCH from a clinical and organisational point of view, much still depends on the preferences of individual patients and their families, the availability of suitable carers and the standard of home comfort.

**Managing HCH**

Prior to discharge, the HCH service needs to coordinate the delivery of equipment, supplies or aids as well as arranging the programme of professional visits. Participation in hospital discharge planning is a feature of many such programmes. This enables the HCH team to develop their home care plan and promotes good working relationships between the hospital and community sectors. Post-discharge, periodic reviews of care arrangements are necessary and the effects of HCH on patients and their families should be assessed. Care in the choice of conditions and patients combined with effective management are preconditions (but not guarantees) for devising financially viable alternatives to acute hospital care. However, whether or not intensive levels of HCH can deliver equivalent or improved outcomes for the same costs can only be assessed through carrying out separate cost-effectiveness studies for each condition.

## Assessing cost-effectiveness: methodological pitfalls

Rigorous assessment of the cost-effectiveness of home care is a mammoth task demanding classic experimental design, with randomisation of the study population into an experimental study group and control group.

- Groups should be similar on enrolment into the study if selection bias is to be avoided.
- All study participants should be followed up.
- Each decision maker needs to adhere to agreed study protocols if attrition rates are not to bias results.
- There should be independent reporting of results if objectivity is to be approximated.

A comprehensive study would also involve analysis of both direct and indirect costs for all concerned: patients; their families and carers as well as health and local authority services; national funding bodies and the community at large. This involves decisions over how non-monetary costs and benefits are to be measured, whether capital costs are to be included for both home and hospital care and, if so, how this is to be done. A meaningful analysis of the effective use of resources would also involve 'measurements of mortality, morbidity, disability, discontent, and discomfort, together with their economic, social and psychological effects' (King Edward's Hospital Fund for London, 1973).

Few studies achieve this degree of comprehensiveness and methodological rigour. Typically, studies are poorly designed, bedevilled by incomplete cost analysis, poor randomisation, high attrition rates and non independent reporting of results.

There is no standard definition of the level of care required for a programme to be considered as

providing HCH. There is also great variety in the ways intensive care at home is organised and in the extent to which existing community and volunteer services are drawn upon. Variations in research design and inadequate cost analysis combined with study populations needing different kinds of home care means that it is difficult to make general observations on the basis of any single study or to validate results through comparing studies. Typically, the following problems emerge.

**Lack of experimental research design**

In a critical and systematic review of the effects of home care on patient outcomes and costs of care, Hedrick and Inui (1986) assessed selected home care programmes according to explicit methodological criteria. They comment that early studies in this area were methodologically unsophisticated, presenting isolated case studies or outcome data which simply represented the opinions of those responsible for delivering services. An earlier review of the cost-effectiveness of home care (Hammond, 1979) bears this out: the majority of studies are based on service programmes, not research studies, and rely on assessments by attending physicians of hospital days saved through provision of a particular programme. In addition, the costs analysed are those of the organisation funding the research, mainly third party underwriters. This means that costs to patients and their families are largely ignored.

Hedrick and Inui isolated twelve relatively homogeneous home care programmes for chronically ill people where an experimental or quasi-experimental research design was adopted. A combination of a small number of studies, small sample sizes and differences between studies in subjects and methods meant that they could draw few uncontested conclusions. They describe 'substantial problems in all areas including subject selection, attrition and assessment and in the reporting of methods, analyses and results'.

The few observations made, however, signal caution for adherents of HCH: while home care programmes did not affect mortality rates nor the use of nursing home placements, there was evidence that they increased the utilisation of out-patient services. In some cases home care led to increased costs.

It is worth emphasising that the majority of studies they reviewed referred to care for elderly people. Quality of research design was the main criterion for inclusion in this review. This limits its usefulness in determining the cost-effectiveness of intensive levels of care at home for specific conditions. For example, it is not feasible to establish large study populations for assessing the cost-effectiveness of home care for ventilator-dependent people. Hedrick and Inui's findings are therefore not a comment on the cost-effectiveness of specific kinds of home care.

**Selection bias and attrition rates**

Even where attempts are made to conform to experimental design, studies on HCH are beleaguered by problems arising from bias in the selection of patients for experimental and control groups and from high drop out rates once the study groups have been established. Problems in selection bias can occur both before and after randomisation and the withdrawal of eligible subjects during the course of the study inevitably reduces the extent to which findings can be generalised. There are numerous examples of these problems in the HCH literature. Attempts to establish an experimental design for the evaluation of the Peterborough Hospital at Home scheme (Knowelden et al., 1988) were abandoned after the pilot study as GPs were not prepared to refer patients requiring terminal care to hospital wards. This led to the experimental design being replaced by observational methods. Likewise, when an experimental study demonstrated no advantage in terms of hospital days saved despite the provision of a specialised home care service for stroke patients, the authors speculate that this was due to inadequate randomisation at entry:

> *The principle of randomisation at entry was widely misunderstood and was unpopular with GPs, who needed to know their patient's group when first seen. Any procedures dependent on telephoning a randomisation centre to discover a patient's group or upon such criteria as the date or day of stroke were impractical and open to hidden bias from manipulation (Wade et al., 1985 p. 325).*

While the comparison by Gerson et al., (1976) of home and hospital aftercare for selected surgical procedures was successful in randomly allocating eligible patients, its predictive strength was weakened by high attrition rates. Even though every attempt was made to inform participating physicians of the aims of the study and their cooperation had been assured, the authors found that 'slightly over half the patients randomly assigned to the experimental group were discharged from hospital without requisition for home services; that is, they stayed in hospital as long as the control group'. This meant that three groups emerged for analysis: the experimental group which received services, those assigned to the experimental group but who were not referred to home care and those assigned to the control group.

A number of hospital-based UK studies have successfully randomised patients. In the Peterborough study of early discharge for

fractured neck of femur for suitable patients, early discharge was dependent on whether their address fell within the catchment area of the Peterborough Hospital at Home scheme. Subsequent analysis confirmed that randomisation by address produced comparable groups (Pryor and Williams, 1989).

Problems in implementing experimental design are perhaps inevitable where a study may be seen as impinging on established clinical practice or where clinicians are expected to prevent access to suitable services which are known to their patients. In the UK, this is particularly problematic with studies which depend on randomisation by GPs and may reflect the more personal relationship between family doctors and their patients. In any event, many studies have adopted alternative approaches to assessing the viability of home care. For example, quasi-experimental designs allow comparison between a group of people receiving intensive levels of care in the home and those not receiving such services. In an attempt to gauge the effects of the New Brunswick Extra-Mural Hospital on hospital use, an analysis was carried out of hospital utilisation rates for sites where an extra-mural hospital unit was in operation and paired sites without this home care facility (Wynn et al., 1989). In an evaluation of the Peterborough Hospital at Home scheme, retrospective and prospective studies of the care HaH patients received were compared for patients with similar diagnoses cared for in hospital or by the district nursing service. Comparison of matched groups has its advantages; it creates minimum disturbances for staff and obviates problems of randomisation — and attrition — to some extent at least.

## Assessing total costs

All studies of the cost-effectiveness of home care involve decisions, either implicit or explicit, about which costs to include and how these costs are to be measured. In relation to fixed costs, for example, there are decisions over whether to include capital expenditure and to what extent economies of scale should be taken into account. Individual hospital costs vary according to diagnosis, treatment, level of care and length of stay. Costs are generally higher in the initial period of a hospital stay — a point that has to be considered in any comparison of home and hospital care. Home care may also include out-patient visits and there are inevitably extra costs for families and carers. A number of early studies (see Adler et al., 1978, for example) attempted to itemise and measure costs and benefits of home care for hospitals, the various home care services, patients, their families and society at large. More common than this comprehensive and disinterested approach is research funded by third party insurers eager to identify differences in cost between home and hospital care. Such studies often fail to emphasise monetary and non-monetary costs for patients, carers and families and it is no accident that organisational costs have been far more thoroughly documented than the latter. Many research studies fall in between these two approaches analysing some costs and not others. Comparability of studies is further reduced by a lack of standardisation in measuring service costs. For example, home care programmes managed by commercial companies are more expensive than those organised by hospital-based support teams.

Most studies take account of clinical outcomes such as mortality, physical functioning, recurrence rates, complication rates and length of convalescence. Associated measures such as use of casualty, readmission to acute hospitals, and nursing home placement may also be included. More rarely, pyschosocial aspects are studied. These might include the degree of satisfaction with care, quality of life, the extent to which people feel able to undertake the often complex procedures required, the effects on carers, as well as better established measures of depression and social functioning. An analysis of outcomes is complex not just because there are few standard measures but also because account has to be taken of patient characteristics shown to differentially influence the effectiveness of treatment. The more outcome measures analysed the more difficult it becomes to assess overall effectiveness of home or hospital care unless one dominates the other across all measures.

Implementing an experimental design and carrying out comprehensive cost analyses present substantial methodological hurdles. An enduring issue, however, is that costs and benefits fall disproportionately on different groups, a fact which may be masked by certain non-organisational costs being omitted from the analysis altogether. For example, in their evaluation of the Peterborough Hospital at Home scheme, Knowelden et al., (1988) claim that the

> *costs imposed on carers of HaH patients were omitted because they could not have been admitted unless the carer was willing, and to some extent the carer enjoyed a benefit from the patient remaining at home (p. 35).*

In a study of families with children on respirators, Aday et al., (1989) found that four of the ten families included indicated that out of pocket expenditures in caring for their child were a serious financial problem. In these cases, families had to pay a proportion of home care, while insurance companies had paid for all hospital expenses. In her review of hospice care Goddard (1989) points out that 'the results of the major

American study of hospice care show that without the help of family and friends, hospice care could not achieve any savings over non-hospital care at all'.

The substitution of family nursing for professional nursing is a major source of cost savings in HCH.

These analyses signal caution in the wholesale acceptance of the economic virtues of changing the balance between home and hospital care. However, this negative economic balance sheet is partly a result of very different diagnostic groups, services and interventions being grouped together because they have home care in common. Comparing studies is therefore extremely difficult and problems of individual design are compounded. Singly, and in combination, the age of the population, the extent of multiple pathology, the duration and level of care, and the extent of existing domiciliary services affect the cost-effectiveness of home care. For example, the bulk of studies referred to by Hedrick and Inui concern care for elderly people, and, to take an extreme example, extended home care for elderly people who may be suffering from multiple pathology is a very different challenge from infusion therapy for a specific complaint where treatment is short-term and largely predictable. While home care may be cheaper on a daily basis, it may also be more protracted. Thus, the US National Hospice Study showed cheaper rates per day, but as patients spent an average of ten days longer receiving home care, savings for insurers were not substantial (quoted in Goddard, 1989). The following section indicates areas where intensive levels of home care appear a cost-effective alternative to hospital care and comments on some of the dangers of drawing general conclusions from specific studies.

## Cost-effective home care

### Minor surgical procedures

The fact that minor surgical procedures are so common means that savings of just a few hospital days in each case can amount to substantial savings over time. Two studies carried out in the 1970s, one in the UK and one in Canada, reached very different conclusions over the cost-effectiveness of reducing the length of stay for such procedures. In the Canadian study, Gerson et al. (1976) identified just five procedures where hospital days were reduced through early discharge, backed up by a home care team specially set up for the project. The UK study carried out by Adler and colleagues (1978) was concerned with early discharge to existing community services for two conditions, inguinal hernia and varicose veins. These categories were also included in Gerson's study. Both studies adopted an experimental design with patients randomly allocated to an experimental early discharge group or hospital treatment group. For all the five conditions where the study by Gerson et al., found that hospital days could be reduced there was no significant difference in cost between home and hospital treatment.

A quite different conclusion emerged from the study by Adler et al., of two of the same conditions. The total cost of care of the patients in the early discharge group was estimated at two-thirds of the total cost of patients who stayed in hospital for the normal length of time. It was also estimated that if all similar cases were cared for in this way, savings of over six million pounds would be achieved (1976 prices). The authors point out that contraindications, private patients and other factors would reduce this estimate through reducing the NHS population eligible for shorter stay after surgery. However, the savings remain substantial.

Two factors emerge to explain this difference. In the Canadian study, the median length of stay for varicose veins and hernia was four days for the short stay group. Carried out over a similar period, the Adler study randomly allocated patients into two lengths of hospital stay — 48 hours and six to seven days. In other words, early discharge was achieved two days earlier than the median value for length of stay in the Canadian study. A second important factor is that the Adler study did not set up a new home care team but used the existing GP, home help and district nursing service. When they assessed attitudes of community staff they found that 65 per cent of GPs found the study had no effect on their workload and that 92 per cent of district nurses did not consider their work pattern to have changed. These two studies illustrate different assumptions about what early discharge means. In addition, they illustrate the benefits of having a well established and well respected domiciliary nursing system in place, a likely explanation for the willingness of hospital doctors to discharge patients at an earlier stage. In the Canadian study, added costs of setting up a home care service were compounded by the fact that over half the patients in the experimental group were not referred to this service, possibly reflecting caution on the part of hospital physicians.

### High technology care at home

In a review of the cost-effectiveness of health technology at home, Hermesse (1985) outlines four factors to be assessed in order to attain a good cost-effectiveness ratio on a single case basis. The first is the lack of multiple pathology. He argues that any illness requiring a continuous professional presence is probably managed at a lower cost in

hospital. Other studies have demonstrated that on clinical measures too, multiple pathology is a contraindication for hospital levels of care at home. The second factor is the presence of non-professional help since most of the cost savings in implementing health technology at home come from reducing the cost of professional attendants. Third, is the feasibility of the training programme. A too complex training procedure, or an unsuitable home environment makes the hospital setting more advantageous. Finally, he makes the point that there should be a favourable relationship between the utilisation rate and size of the investment in the advanced health technology.

In practice, most cost-effectiveness studies on high technology care at home focus on respirator care and the various intravenous therapies. A bibliography of home care technologies (Leenders and Marke, 1985) provides examples of savings of between 15 and 30 per cent for home parenteral nutrition and of between 50 and 90 per cent for home care for respiratory failure. Studies of home intravenous antibiotic therapy demonstrate that home therapy is less than one-third of the cost of hospital care.

The majority of studies do not analyse costs to the patient of home care; those that do, such as Aday et al., show that the substitution of parental for professional nursing is a substantial component of these savings. However, the studies are consistent. When treatment is for a specific condition with a relatively predictable prognosis home care is cheaper. These studies also show high technology home care to be organisationally feasible and clinically safe.

## Home care and total health care costs

Of major concern to those responsible for financing health care is the issue of whether the creation of new types of home health care, such as HCH, increases the cost of total health care by increasing overall utilisation. It is feared that the provision of new services will expose previously unmet needs and result in increased demands. For example, when the Kaiser Health Plan, a Health Maintenance Organisation, added extended care and home health care to its benefits, the cost savings achieved through a reduction in in-patient hospital services were not fully offset by the costs of providing additional benefits (Hammond, 1979). The difficulty of controlling and monitoring the costs of home care is one reason for the institutionally-biased system of health care in the US and is reflected in the reluctance of third party insurers to include intensive levels of care at home as part of their reimbursement packages.

In his review of the cost-effectiveness of home care, Hammond (1979) points out that most US studies are funded by third party underwriters, including government agencies such as Medicare and Medicaid. The crucial question from this perspective is whether an increase in home care is accompanied by reductions in the use of other forms of care. His review suggests that, from the point of view of third party providers, this is unlikely to be the case where home care is designed to reduce hospital admissions. In contrast, home health care is cheaper than extended hospitalisation. Similar concerns are manifest in the recent evaluations of the Peterborough HaH scheme.

Studies attempting to evaluate HCH often experience difficulties in assessing the extent to which such care is a true substitute for hospital care. Home care may be a substitute for acute hospital care; it may also be a substitute for home or in-patient hospice care, nursing home placement, care in geriatric units or no care at all. The evaluation of the Peterborough Hospital at Home scheme demonstrated that some patients, although benefitting from HaH, would have continued to be nursed at home if they had not been admitted. There was considerable overlap in age and outcome between patients in hospital or in the care of the district nursing service suffering from the same conditions as the HaH patients. In any event, the authors argue that the proportion of patients treated by the HaH was so small that there could be little effect on the demand for conventional care. In addition, they point out that the small scale of HaH activities provided no opportunity for saving on costs of new buildings. Clearly, savings for hospitals are minimal unless reduced throughput results in whole wards being closed with a corresponding reduction in fixed costs such as lighting and heating.

An assessment of the costs of intensive care at home and its effect on total health care costs needs to take account of service options other than home or acute hospital care, the level of home care activity required in order for real savings to be made in the acute sector and the extent to which services draw on or supplement existing community provision. All of this is more feasible for conditions which are new to home care and which require a level of intervention associated with, and previously largely available only in, acute hospitals.

This analysis of cost-effectiveness studies leads to a number of conclusions on HCH. First, there is no one answer to the question of whether it is cheaper for the health care system, although, by definition, it is unlikely to be cheaper for service users. The more specific and predictable the condition, and the more manageable the

technology, then the more cost-effective home care is likely to be. This is well illustrated in the studies on high technology care at home and there is room for rapid expansion in this area in the UK. More difficult to assess are the cost implications of early discharge programmes. It is clear that conditions suitable for early discharge have to be carefully chosen and eligible patients selected. Where a range of services is to be provided, particular care is needed to assess the eligibility of service users for each component part of the home care programme if multi-service programmes are to be cost-effective. There is need for further research into the appropriate mix of skilled and other help for people receiving care at home. Where there are sophisticated systems for delivering home care, such as in the UK, early discharge programmes are likely to be both more acceptable to hospital staff, and easier to run. Much of the US literature is arguing for a level of home care service which is a taken for granted component of the UK health care system. Success in preventing hospital admission is particularly difficult to assess as this is the area where selection bias is most likely to occur. If HCH services are made available they are likely to uncover unmet needs and lead to an overall increase in service utilisation. The greater the gaps in the provision of home care, the more expensive HCH services are likely to prove. While one of the aims of a comprehensive policy is to uncover and meet the needs for health care, typically the context of cost-effectiveness studies is cost-containment and an increase in utilisation therefore becomes interpreted as a negative consequence of providing more home care services. As the Peterborough study shows, however, the provision of intensive levels of care at home provides few cost savings but a substantial improvement in the quality of services and in choice for service users.

While cost-effectiveness studies are likely to exert more influence on policy development as resources are spread more thinly, the relative cost of providing HCH is but one piece of the jigsaw. For example, acceptability of the service to patient and carers, availability of the right kind of staff and domestic support, the appropriate level of organisation, the will of professionals and the general policy climate are all important. Advances in technology are influential, but as Creese and Fielden (1977) pointed out, in their early study of Responauts, 'the main obstacle to responauts leaving hospital and living reasonably securely — in a medical and social sense — in their own home, was the difficulty in obtaining suitable attendants'.

# 6 Conclusions

The arguments for providing hospital care at home are persuasive. Given careful selection of patients and effective home monitoring, HCH can be safe, financially viable and acceptable to patients and health care providers. Despite a number of successful initiatives, HCH has not yet taken off in the UK, in contrast with the US, where commercial interests have ensured that sophisticated home care is now an expanding sector of the US health care market.

## HCH set to expand

The current policy climate in the UK seems set to change this pattern. Working for Patients (Department of Health, 1989) establishes two 'purchasers' of health care: district health authorities and GPs who have elected to become budget holders. They are expected to obtain value for money in their choice of service providers and to explore the contribution of both the public and private sectors to this end. Given the costs of running high technology acute hospitals, one can foresee an expansion in home care provision where this provides a cost-effective alternative to in-patient care. Schemes may originate in existing domiciliary services (and the conversion of some community health service units into self governing trusts may facilitate this) or in the private sector. UK business enterprises may seek to emulate the successful incursion of US suppliers into health care delivery, and there may be an expansion in independent home care agencies. As it is government policy to encourage joint ventures between health and local authorities and the private sector, a wide variety of organisational arrangements is possible.

It is also feasible that self governing trusts set up their own schemes along the lines of the US hospital-based home health agencies, although the more dispersed the patient population, the more difficult such schemes would be to administer. Such schemes would be an extension of current hospital outreach work and would have the advantage, from the perspective of the acute sector, of retaining scarce resources. A further spur to the increased involvement of hospitals in this area is the change in the way capital assets are to be charged. In order to promote fair competition between private and NHS hospitals, health authorities and NHS Hospital Trusts will now have to pay for the use of their capital assets. This will increase the pressure to maximise the use of existing beds and to seek feasible alternatives to acute hospital care.

For those GPs who have chosen to work within practice budgets, there may be some flexibility in the extent to which they choose to provide a hospital level of care, reflected in the payments made to hospitals on a case by case basis. Preventing unnecessary hospital admission is likely to be a priority for budget holders, and there is no legal obstacle to GPs developing their own HCH schemes and employing extra nursing staff for this purpose. Whether resources will be available and whether such additional responsibilities would be welcomed given the commitments of the revised GP contract is another question.

## Nursing in prominence

Whatever the origin of HCH schemes, the key question is how an intensive level of domiciliary nursing care is to be provided. Most early discharge schemes simply reflect the fact that nursing and rehabilitation care are the main reasons for staying in hospital once the intensive investigative and interventionist stages are over. In countries where HCH is better established than in the UK, nurses play a key role in its organisation and management. In the US, for example, while home care plans are certified by doctors, they are typically developed and implemented by nurses. In the UK, the Peterborough example demonstrates that community nursing services are able to offer acute care at home given adequate resources and a new, independent approach to the management of domiciliary care. If acutely ill people are to be referred to a community nursing service, that service has to be able to guarantee effective cover. This implies a high degree of control over cases to be admitted and a different relationship between community and hospital sectors to that which currently obtains in the UK. For example, as described in Section 4, physicians have to apply for patients to be admitted to the New Brunswick Extra-Mural Hospital. There is therefore less danger of acutely ill patients being 'dumped' in the community without adequate discharge and home care arrangements — a constant concern where an extension of care within the community is proposed.

## Challenges for professionals and organisational demands

While the policy climate is favourable to the expansion of HCH, this report has highlighted some of the professional and organisational tensions that changes in the balance of home and hospital care could easily generate. At the most basic level, whether acute care takes place at home depends on the extent to which GPs routinely admit patients with certain conditions to hospital and on the discharge practice of hospital consultants. Without changes in each of these areas there will be little scope for the expansion of HCH. A number of case studies highlighted in this report show that clinical decision making related to admission and discharge is not fully understood, with GPs sometimes admitting patients to hospital where there is little benefit in doing so, and consultants not modifying their discharge procedures even where a proven HCH service is available. Commenting on the reluctance of US physicians to become involved in home care, Fox et al., (1987) write:

> *Physicians are cautious about home care because patients are fragile, therapeutic devices are often defective or unproven and personnel are unknown to them... Hospitals, although not free from risk, have carefully selected and certified personnel procedures for ensuring safety and cleanliness and systematic back up (p. 566).*

This justifiable stance is more likely to be modified where specialist resources are available in the community and where there is confidence among GPs and consultants in a specialised HCH service. Where policy thrust is not matched by professional zeal, the onus will be on managers and planners to disseminate information on successful schemes.

HCH is also likely to focus professional concerns amongst district nurses over the degree of specialised training and the range of activities which should be part of their role. Currently, district nurses find themselves pulled away from specialised care. On the one hand, the workload from general practice is increasing, partly as a result of changes in the GP contract, and partly as a result of the continuing trend towards earlier discharge and day cases. On the other, specialised nursing care is increasingly carried out by hospital nurses working in the community. A recent report from the District Nursing Association (Mackenzie, 1989) is ambivalent about the development of the role of the specialised nurse in the community:

> *At best this development will provide the district nurse with a reservoir of expertise to be used as a resource for enhancing patient care. At worst it will fragment the care of patients and undermine the role of the district nurse and other community nurses (p. 18).*

The pressures on district nursing are further increased by the fact that numbers of district nurses have fallen back to the levels of 10 years ago. While HCH could provide an opportunity for the expansion of a more specialised district nursing service, staffing and finance problems will need to be addressed.

At the other end of the spectrum, HCH also requires the development of new and less specialised posts in the community. A common feature of HCH schemes is the creation of new posts such as Peterborough's 'patient aides'. These posts reflect the extensive homemaking and caring functions that may be required in the home when a person is acutely ill. The relevance of such posts is now accepted by the nursing profession and Project 2000 approves the establishment of a helper grade to assist qualified nurses. Arguably, social care of this kind should fall under local authority provision and it is not clear how posts connected with the implementation of acute hospital care at home will be funded.

In addition to these new posts and if the UK follows the US experience, HCH will mean that increasing numbers of hospital-based professionals will become more involved in the community and, more significantly, that business interests will attempt to become involved in health care delivery. As technology-related services move to a primary care environment, the distinction between primary and secondary care will become less clear. In summary, therefore, the emergence of HCH will expose uncertainties about the degree of specialisation that can be incorporated in primary care, in particular in relation to the role of the district nurse, and it will raise questions over the relationships between established patterns of service and new posts and business interests.

Attempts to establish schemes are also likely to encounter some familiar organisational problems in UK health care. A crucial factor in the success of a HCH service is a clear structure for managing and monitoring care that spans home and hospital. For HCH schemes to be successful, discharge planning procedures have to be rigorously adhered to, and representatives of the HCH service need to become involved in these procedures. If necessary, the home should be visited and modifications made before discharge takes place. In the UK context, agreement has to be reached over whether services are coordinated by the hospital or the community and over who retains clinical responsibility. This report has shown that the US, despite its weak primary and domiciliary care network has been able to promote

high technology care in the home and provide the appropriate arrangements. In the UK, early discharge schemes have been slow to develop, illustrating how sectorisation can work against innovation in health care delivery. Where they have taken root, however, as in the Peterborough scheme for early discharge following fractured neck of femur, they have been successful in reducing hospital stays. In the Peterborough example, a team spanning the hospital and community was set up to manage cases of hip fracture. One possible route for expanding HCH is the increased use of such teams. In its consensus statement on the treatment of stroke, for example, the King's Fund recommended 'the formation of integrated district stroke services to encompass care, education and research at every level both in hospital and in the community'. This diagnosis-based model could be applied to other conditions.

An alternative organisational route is to set up a generic HCH service which calls on specialist advisers as and when necessary and which makes separate arrangements with hospital consultants with respect to early discharge.

A third route is to focus on particular high technology treatments in the home. For example, the antibiotic committee described in Corby (1986) consisted of representatives from pharmacy, discharge planning, patient education, nurse education and the nursing service. This committee identifies suitable patients, provides instruction for patients and ensures continuity of care from hospital to home. Specialists in infectious diseases are called on as appropriate.

It is likely that a combination of such schemes will be needed.

## Methodological concerns

In addition to these professional and organisational issues, HCH raises a number of methodological problems. The basic issue in relation to early discharge is how to establish the point at which hospital care may be replaced by home care. In this respect, attempts to establish the level of nursing care required at each stage of a hospital stay for common diagnostic categories, described as part of the St John's scheme, in Section 2, provides a useful model. This kind of analysis has to be combined with studies of cost-effectiveness and clinical outcome for the overall feasibility of HCH to be determined. This report has highlighted the particular difficulties involved in carrying out randomised controlled trials in this area of health services research. In practice, information about successful HCH schemes in other countries combined with a new look at the potential of home care given the development of non-invasive operating techniques and technological advances in the administration of drugs are likely to foster further experimentation in this field.

Post-discharge, methodological issues are raised in the development of appropriate case mixes for targeted groups of patients. In general, the longer the treatment continues and the more complex health and social needs, the more difficult it is to establish the mix of services required.

## Research gaps and caveats

The pressure to contain costs should not blind HCH enthusiasts to some of the research gaps and practical problems in promoting this kind of care:

- in general, HCH is given scant attention in medical research
- there is little information on the safety and effectiveness of new technologies in the home
- there is relatively little attention paid to social, financial and psychological effects of acute care at home on patients, their families and carers
- home care for acutely ill people is difficult for those who live alone
- by definition, care in the home environment is less strictly controlled and lies outside institutional safeguards
- medical audit is more difficult to administer, as are quality assurance programmes
- there are questions over professional liability for accidents.

Although HCH is generally perceived as offering increased choice to patients there is a real danger that a preoccupation with cost control might reduce patient choice in the location of treatment. A number of commentators have stressed that HCH should not be used as a way of promoting premature discharge or of denying admission to hospital (American College of Physicians, 1986). This tension is apparent in the US, where cost limits are being imposed at a time when costs are rising and more patients are being discharged earlier from hospitals. It is important that HCH is not viewed as an accentuation of the trend towards earlier discharge but as the deliberate and planned relocation of hospital-style services and equipment into a home setting. If the few experiments in the UK do indeed herald a reassessment of the boundaries between hospital and home care, this may in turn lead to a sharpening of the criteria for discharge and encourage clearer distinctions to be drawn between services to be provided by existing domiciliary services and by specialised HCH teams.

## HCH not a panacea

Setting up innovative HCH schemes may afford a number of additional advantages. If they promote

even a partial local resolution of the problems of integrating primary and secondary care, this will have wider benefits. The development of successful means of spanning hospital and primary care in patient selection, discharge arrangements and acute home care management could be applicable to other areas of health care. The involvement of Regional Health Authorities in the management and strategic development of primary care provides added opportunities to promote such integration. While HCH may encourage innovation in spanning the primary/secondary divide, it is unlikely to produce cost savings in the short term, due to the high proportion of fixed costs involved in running hospitals. HCH would have to be extensive if these costs were to be reduced. In addition, freeing beds is only of financial benefit for the hospital sector where more patients mean more revenue and not a budget deficit. Quite apart from considerations of how extensive HCH would need to become in order to reduce overall health care costs, it is important to emphasise that cost-effectiveness is more clearly demonstrated in home-based high technology services, where HCH is more clearly a substitute for acute hospital care. This is likely to serve a younger population and is generally contraindicated where there is multiple pathology. While HCH represents a valuable part of the continuum of health care, it should not be considered a panacea for the demands on acute beds posed by greater numbers of elderly and very elderly people. Despite an emphasis on cost containment in much of the literature on hospital care at home, in the final analysis the most convincing arguments for this form of care may well rest on humanitarian and clinical grounds.

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