King's Fund

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A systematic review of the evidence on substitution

Emilie Roberts
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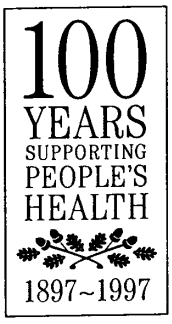

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Contents

Preface

This research was commissioned by the King's Fund London Commission to support its review of London's health services. In 1992, the first London Commission reported on the condition of acute services in *London Health Care 2010*, influencing subsequent health service development. The second London Commission, chaired by Sir Marmaduke Hussey, aims to review the changes that have taken place in the last four years; to suggest a comprehensive pattern of health services to serve London into the 21st century; and to recommend how such a pattern of services might be achieved.

Accident and Emergency Care at the Primary-Secondary Interface is intended as a case study of primary-secondary substitution as an achievable means of reconfiguring health care in London, and the United Kingdom more generally. The traditional organisation of accident and emergency services has come under increasing pressure in the capital in recent years, and is a focus of public debate. Rapid development is already occurring; for example, in inner-city London hospitals, general practitioners are becoming a common feature of accident and emergency departments. This report systematically reviews the available local, national and international evidence on the potential for cost-effective primary-secondary substitution of emergency care.

The evidence relating to substitution and first contact care is discussed thematically in five broad categories. Firstly, the impact of expanding access to primary care; secondly, the potential for reorganising general practice; thirdly integrated models of primary-secondary care; fourth, reorganising the traditional provision of secondary care and finally explicitly restricting access to hospital care. This report highlights important gaps in the literature and draws out the implications of the findings for London.

This report will be of interest to those responsible for developing health care policy for emergency services. It will also be of value to researchers and the academic community as it indicates areas where research is needed and indicates the difficulties in designing and evaluating interventions that cross conventional primary-secondary boundaries.

Acknowledgements

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Summary of Findings

1. Thirty three studies were identified from a systematic literature search which also met the study inclusion criteria for relevance and quality. Results are reported in detail in the body of the report and in Appendix 1.

2. Eight studies examined the impact of expanding access to primary care. The majority of these studies were North American and identified marked reductions in emergency department utilisation following an expansion in primary care provision. Although a causal link seems the most likely explanation for the observed changes in utilisation patterns, methodological limitations and a general lack of reported detail about context and methods, leave the precise nature of this relationship in some doubt. In the United States, patients without insurance have been largely excluded from comprehensive primary care and it is perhaps not surprising to see large substitution effects in this context, whereas, in the United Kingdom, the majority of the population already enjoys good access to primary care and interventions aimed at further expanding or improving primary care services may have a much more limited effect. In London, with higher than average homelessness, tourists and commuters, improved primary care access for these groups may cost-effectively substitute for the traditional emergency department but there is little reliable evidence to confirm this hypothesis.

3. Nine studies focused on characteristics of general practice that might be associated with substitution for emergency care. Concerns that appointments systems, deputising services, single-handed practitioners or out-of-hours primary care emergency centres may be unpopular with patients and inadvertently increase pressure on accident and emergency departments seem largely unfounded. Little obvious effect was noted *in any direction* in any United Kingdom study. This suggests that in the United Kingdom, the decision to attend hospital for first contact urgent care is made irrespective of the way in which local primary care services are organised. The one factor which does seem important is relative distance to health care facilities. General practice and hospital accident and emergency departments may not be generally perceived as substitutes by patients even for minor illness and injury.

4. Three studies examined the impact of general practitioners employed in accident and emergency departments. Two of these studies were based within teaching hospitals in inner London. All three studies found lower general use of diagnostic investigations by the general practitioners and fewer referrals to secondary services. Detailed data on costs were presented and no adverse outcomes identified. Fundamental differences in the design of the interventions under study, make it difficult to generalise the size of effect from these results. Nevertheless, the signs for cost-effective substitution of care are encouraging.

5. Accident and emergency services, traditionally based within the acute hospital are responding to changes in patterns of demand, resources and new technology. A good example of this is the growth of minor injuries units. No evaluative research on minor injuries clinics was located although case-studies suggest that cost-effective substitution of care is a possibility, especially where minor injuries units replace a major accident and emergency department.

6. Telephone triage is an innovation with potentially far-reaching implications for the delivery of emergency care. Patients calling for treatment advice can be directed to primary care substitutes for first contact care where appropriate. Nurse operated telephone triage systems are under development, as are priority dispatch systems for ambulance services which could feasibly be implemented in a similar way. Again, no published research evaluating the likely impact and cost-effectiveness of these schemes was identified although there is evaluative work in progress.

7. Research on 'managed care' health systems indicates that hospital access can be restricted. Two American studies assessed the introduction of copayments for hospital-based emergency care; a blunt instrument applied to all emergency department attenders which resulted in reduced demand for hospital care. Eight studies evaluated diversion schemes whereby patients attending hospital emergency departments are medically assessed and directly referred to alternative primary care providers. There was evidence of a reduction in emergency department utilisation in these studies without any obvious adverse effect on patient outcomes, particularly where patients were offered appointments at the time of referral and received no treatment at the hospital. It is difficult to envisage copayments being acceptable within the National Health Service with its tradition of open access emergency services. Nevertheless, innovations in primary care-based purchasing such as *total purchasing*, could develop general practitioner incentives to manage patient care more cost-effectively.

8. Although substitution is often seen as a mechanism for cost-containment, the potential for realising cost savings may not be great. Whilst the average cost of hospital accident and emergency care is much higher than care provided in primary care and community settings, the marginal costs of treating primary care patients in the emergency department may be relatively low. Significant cost savings may only be achievable where entire hospital-based departments or wards close.

9. The findings from many of the studies included in this review were generally difficult to interpret in relation to London. This is primarily because the organisational and financial incentives described in the international literature simply do not apply here. Much of the UK literature, in the form of case-studies and patient surveys did not meet the review quality inclusion criteria. There is a real gap in rigorous UK-based research evaluating the costs and benefits of service developments in this field on the health care system as a whole. From a UK perspective, the available literature tends either to be relevant but poorly designed or of higher quality but irrelevant to health care in the UK.

Section 1

Introduction

The policy of a 'primary care-led National Health Service' with the aim of reducing the requirement for secondary care services while improving service quality (Department of Health, 1994) implies a change in the nature and balance of health care provision. A key feature of this policy is the notion of primary-secondary 'substitution'; that is, shifting some of the services currently provided in hospital to the primary care sector, thereby reducing the requirement for hospital care. The *Tomlinson report* on London's health services pointed to substitution as a means of improving the fragmented and costly hospital care received by Londoners by improving the capital's primary care sector and allowing the system to operate with fewer inpatient beds (Tomlinson, 1992). The principal benefits of substitution tend to be couched in terms of a more patient-centred service; that is, where appropriate, less intensive treatment is provided by familiar providers, closer to patients' homes. There is also a clear expectation that substitution of primary for secondary care will release resources as expensive specialist facilities become available for the (more appropriate) treatment of more seriously ill patients and that investment in primary care will reduce the demand for more expensive secondary care.

Hospital accident and emergency services are under increasing pressure in the United Kingdom and other developed health care systems, and would seem an ideal area for primary care substitution. Accident and emergency departments offer open access to specialist assessment and treatment facilities. Although around a third of new attendances are referred by general practitioners (Pencheon, 1995), the service is largely led by patient demand and in England and Wales demand has been steadily rising (Hallam, Wilkin and Roland, 1996). Changes to supply-side staffing (for example, 'the new deal' for junior doctors) have left many departments struggling to cope (Audit Commission, 1996). At the same time, emergency admissions which are normally admitted through the accident and emergency department have also been increasing (Capewell, 1996; Edwards and Werneke, 1994).

New models of care are being explored for those patients who attend accident and emergency departments but who do not require specialist hospital care, often categorised as 'inappropriate' attenders. Box 1 illustrates the mechanisms by which substitution might be achieved. While the existence of the 'inappropriate' attender is a long-standing and international phenomenon, the extent of the problem (if, indeed, it is always to be seen as a 'problem' to be eradicated) is much less clear. A review of the literature found estimates of 'inappropriate' attendance ranging from seven per cent to 89 per cent of first attendances,

depending largely on the retrospective assessment criteria employed (Lowy, Kohler and Nicholl, 1994). Lowy *et al* went on to conduct a prospective study of patients attending English accident and emergency departments and found that overall around a fifth of patients were attending 'inappropriately'. There is then the potential for a considerable shift in the provision of emergency services to the primary care sector.

Box 1
Strategies for substitution of emergency care

- Encouraging more patients ('inappropriate A&E attenders') to choose primary care for urgent first-contact care;
- Developing primary care-based emergency services to reduce rates of referral for investigation and admissions;
- Increasing the primary care management of patient on the grounds that it is more effective in preventing complications requiring hospital attendance or admission.

This systematic review aims to assess whether and to what extent primary care based emergency services can substitute for the traditional hospital accident and emergency department model of emergency services. The following questions are considered:

- What evidence is there of substitution and how does this affect costs and effectiveness?
- Which primary care developments are more likely to result in a decrease in accident and emergency attendance and/or inpatient admissions and why?
- Can particular types of patient or condition be identified which are more cost-effectively treated in a primary care setting than in an accident and emergency department?
- Finally, to what extent are the findings of existing studies applicable to health services in London, with its numerous established accident and emergency hospital departments and relatively underdeveloped primary care facilities?

Section 2

Methods

2.1 Interventions Included

For the purposes of this review, non-hospital emergency care was defined as any service which provides first contact urgent care other than that available in the traditional hospital-based accident and emergency department and which also has the following characteristics:

- open access (that is, no requirement for a referral or advance appointment);
- immediate advice, assessment, examination or treatment;
- a therapeutic capacity;
- staffed by primary care professionals (that is, non-specialists) or specialists in a planned generalist community setting;
- attendance is driven by lay perceptions of the need for urgent care (that is, there are no referral or attendance criteria).

The following interventions were considered to fall within this definition of emergency care:

- primary care teams in accident and emergency departments;
- community services in accident and emergency departments (for example, community psychiatric nurses);
- nurse-practitioner services;
- minor injuries units;
- general practitioner out-of-hours co-operatives;
- flexible hours/open access primary care schemes;
- telephone consultation services.

2.2 Participants

The review focused on patients presenting with "minor" (however defined) acute illness or injury for urgent care

2.3 Effects

For each study, the following data were extracted if available:

- *Evidence of substitution*
  number of accident and emergency attendances and hospital admissions;
  acute resource consumption (for example, numbers of diagnostic tests carried out, inpatient bed days avoided);

- *Effectiveness of intervention, if available*
  health outcomes (using proxies if necessary, for example, comparative rates of unplanned
  reattendances);
  self-reported patient satisfaction

- *Costs and cost-effectiveness data, if available*

2.4 Study inclusion criteria

Research designs can be categorised according to the inherent likelihood of bias in their results (Judd, 1991; Cook and Campbell, 1979). For this reason, systematic reviews evaluating clinical evidence have traditionally included only randomised controlled trials (RCTs). However, in health services research where the organisation and/or financial basis of a service is the object of evaluation, the scope for conducting RCTs is often very limited. Therefore, a broader approach was taken to study inclusion. Box 2 lists the study designs considered suitable for inclusion. Each study was subjected to further methodological quality assessment adapted from the criteria used by the Cochrane Collaboration on Effective Professional Practice Review Group [CCEPP]. For example, randomised controlled trials were screened for blinded allocation of subjects; 80 per cent or greater follow-up of subjects; and baseline measurement of the outcome variable in the comparison groups *before* the intervention. The quality inclusion criteria are incorporated in the data extraction form which is reproduced as Appendix 4.

A list of the thirty three studies which were included is given in Appendix 1. Five studies were identified as potentially suitable but were excluded at this stage; these are listed in Appendix 2. One observer (ER) reviewed all studies for relevance and quality. A second observer (NM) was available to check consistency and resolve ambiguous cases.

Box 2
Study designs included for review

1. Randomised controlled trials;
Random allocation of subjects reduces likelihood of selection bias. However, the artificial manipulation of variables can reduce external validity. Strong study design for detecting causal relationships.

2. Quasi experimental (non- random allocation) studies, for example:

- Interrupted time series: Each subject is tested repeatedly before and after the intervention. A relatively strong research design since any external trends should be detectable separately from the effect of the intervention. Only useful where testing is unlikely to influence the outcome variable;
- Controlled before-and-after studies: All groups are pre- and post-tested. One group is exposed to the intervention and at least one other group to a placebo/normal practice. Allows a precise estimation of effects - both between and within study groups;
- One-group or uncontrolled before-and-after studies: Comparatively weak study design open to maturation (i.e. the outcome variable changes naturally due to ageing, development etc.) and external bias. Useful where an intervention affects an entire population;
- Non-random group comparison where different forms of care are compared for naturally occurring or non-randomly allocated groups. Open to selection bias and causation is difficult to infer.

3. Retrospective studies with a comparative analysis. Common form of analysis on routine datasets and cross-sectional survey data.

2.5 Search strategy

Systematic searches were made of the following electronic databases: Medline [1970-], Healthstar [1975-], DHSS-Data, the King's Fund library database, the NHS Research and Development database, the National Primary Care Research and Development Centre's database of publications and ongoing research at the primary-secondary interface and the Global Emergency Medicine Archives internet site (GEMA, 1996). Searches were not limited to articles published in the English language and two Danish studies and one Spanish study were translated into English. Several search strategies were developed to identify a range of relevant interventions. These are printed in Appendix 3.

Other sources: The bibliographies of identified studies were checked. A letter was sent to all NHS Regional Directors of Research and Development requesting information on local innovations in accident and emergency services which were in progress or which had been evaluated. Other recent publications were identified through scanning of contents pages of relevant journals: *New England Journal of Medicine* from 1991, *British Medical Journal* from 1995. The following leading subject area experts were contacted for advice on ongoing research: Professor Jon Nicholl of the Sheffield Centre for Health and Related Research, University of Sheffield, Dr Jeremy Dale of the King's College School of Medicine and Dentistry, and Lesley Hallam of the National Primary Care Research and Development Centre, University of Manchester.

2.6 Data extraction

A standardised form was used to extract data from each study included in the review (see Appendix 4). Information was extracted on study aims, context, study population, the intervention, study design, quality criteria, and results (normally percentage change in utilisation).

2.7 Analysis

The studies located for review have been analysed within five sections: expanding primary care; reorganising primary care; integrating primary care; reorganising acute care and barriers to hospital access. This structure has been adopted for ease of analysis but it should be noted that these divisions are to some extent artificial since interventions at the primary-secondary interface often explicitly extend to both the primary and acute sectors. Given the range of interventions and study designs and contexts identified a narrative approach was adopted to ensure consistent presentation of the findings.

Section 3

Expanding primary care services

3.1 Improving access to primary care

The concept of hospital 'substitution' rests on an assumption that primary care has the capacity to deliver services that are an acceptable alternative to hospital care. But to what degree is this true for patients requiring *immediate* reassurance, assessment or treatment (that is, for urgent need)? In this section, the relationship between primary care provision and utilisation of hospital emergency services is explored. Eight studies were located which were both relevant and met the study inclusion criteria (see methods section). These are summarised in Table 1.

3.1.1 Study Findings

Six studies examined the impact of major improvements or developments to local health centres on the target population's utilisation of hospital emergency department care (Hilditch, 1980; Hochheiser, Woodward and Charney, 1971; Moore, 1972; Porter *et al, 1988*; Sjönell, 1986; Ullman, 1978). Bonham *et al* (1987) looked at the effects of a managed care scheme for poorer residents in a suburban county in Kentucky. All studies reported a decrease in emergency department utilisation following the intervention, except for Moore *et al* (1972) who nevertheless found a lower rate of increase in emergency utilisation in the study area than in other areas of Boston during the study period; that is, the effect was in the expected direction. It is worth looking at these results in more detail.

The Jefferson county scheme (Bonham and Barber, 1987) covered 40,000 low income residents previously eligible for Medicaid. The scheme was developed in an attempt to control costs following a financial crisis at Louisville general hospital. Recipients were compelled to register with a participating family doctor for all subsequent non-emergency care. Doctors were paid through capitation, (the previous norm had been a fee-for-service system) in an attempt to encourage preventive and lower cost health care provision. Staff at the local hospital emergency department only accepted serious medical emergencies without prior agreement from the family doctor.

Table 1. Summary of studies included for review

Author	Setting	Method	Intervention	Outcome measures
Included studies				
Bonham and Barber (1987)	Kentucky, USA	SBA	Medicaid 'managed care' scheme. Financial incentives to encourage preventive primary care; Prior physician approval required for emergency department attendance	Emergency department utilisation; Resource use i.e. investigations; drugs; Patient satisfaction with quality and access to health care
Farmer and Chambers (1982)	London, UK	Obs	Primary care registration in London	A&E utilisation; GP registration
Hilditch (1980)	Toronto, Canada	SBA	Primary care health centre with multidisciplinary team, diagnostic facilities and emergency room	A&E utilisation; Case-mix; Reasons for attending A&E
Hochheiser *et al* (1971)	New York State, US	CBA	New primary health care centre for Medicaid enrolled children	Emergency department utilisation
Moore (1972)	Boston, US	CBA	Reorganisation of community health centre to provide primary care services (staffed by hospital physicians)	Emergency department utilisation, comparing in-hours and out-of-hours attendance; Patient pathways to the emergency department
Porter (1988)	Southern Israel	CS	Reorganisation of paediatric community health centre to integrate preventive and curative health services	Emergency department utilisation - attendances and admissions; Patient pathways
Sjönell (1986)	Stockholm, Sweden	CBA	Reorganisation of local health centre to provide wide range of primary care services	Utilisation of emergency outpatient visits; Emergency home visits; Utilisation of primary care
Ullman (1978)	New York, USA	SBA	New health centre adjacent to hospital, employing salaried primary care physicians	Utilisation of emergency department for medical and paediatric, accident and non-accident cases

Key: CS = Controlled study; CBA = Controlled before-and-after; SBA = Simple before-and-after; Obs = Comparative observational study

Appendix 1 gives more detail of interventions, settings and results

Bonham and Barber (1987) interviewed a stratified random sample of recipient households in 1983 immediately before the scheme was introduced and again one year later - 208 households were interviewed twice, 140 households were interviewed in 1984 only. There was a significant decrease in the rate of emergency department attendance - from 15 per hundred to nine per hundred during the three months under review. The proportion of visits to the emergency room that were not considered to be serious (this categorisation is not defined) also decreased from 39 per cent to 28 per cent. Patients recalled seeing a physician more often (97 per cent compared to 90 per cent of all health care visits) and having fewer tests (28 per cent compared to 38 per cent of all visits). This study provides reasonable evidence that the intervention was successful in reducing emergency department attendance amongst enrolled patients. However, without a convincing comparison group, it cannot be assumed that the intervention was the only influence on visiting behaviour, (although most of these patients would not previously have had a family doctor). Furthermore, it is difficult to identify the principal mechanism at work - was the scheme successful because patients were attracted to newly accessible primary care services or because access to the hospital emergency room was restricted? This scheme was an early example of 'managed care', a system of health care which has become very much more prevalent in the United States over the last twenty years. Several studies of more recent managed care systems, which focus specifically on the impact of barriers to hospital emergency department access, are examined below (see 'Reorganising acute care').

Five studies looked at interventions which focused on improving access to primary care without placing restrictions on hospital attendance. The earliest study included for review looked at the development of the Rochester paediatric health centre in a deprived area of New York state in 1968 (Hochheiser, Woodward and Charney, 1971). Hochheiser *et al* used a controlled before-and-after design to look at the effects of introducing comprehensive family-oriented health care facilities. Data were collected from three local hospital emergency departments between February and March in 1967, 1969 and 1970. Data were analysed by area of residence. A big reduction in observed attendance at the emergency department was seen in children resident in Rochester (almost 40 per cent fewer between 1967 and 1970). Interestingly, there was also a reduction in the number of children using the department from a similar inner city ward outside the catchment area of the health centre (20 per cent fewer visits) - although this reduction was not statistically significant. An analysis of the results at small area level ('census tracts') supports the hypothesis that the centre was influencing demand for urgent care: for example, the biggest changes in utilisation within the catchment area were observed in localities with good public transport to the centre; the smallest changes occurred in one tract with relatively poor direct access to the centre, but good transport links to two hospitals.

Despite the reported successes of the Rochester health centre, by 1972 another primary care intervention was being assessed at the Genessee hospital (which took part in the earlier study) in an attempt to address rising non-emergency demands (Ullman, 1978). Here a health centre (open during office hours, but providing 24-hour emergency cover) was established adjacent to the hospital and staffed by salaried primary care physicians. A simple before-and-after study found a small statistically significant reduction in mean annual visiting rates for reasons other than accidents in children and a targeted group of patients who had been heavy users of the hospital outpatient department. Overall, these reductions translate into an annual estimated decrease of only seven visits per day. This was an uncontrolled study and it is possible that other changes in the health system were confounding the results, although the authors found no maturation effects (that is, as a result of natural changes of the characteristics and behaviour of the sample over time, for example, through ageing) and claim there were no important additional changes to the organisation of local health services during the study period.

At around the same time, Moore *et al* (1972) researched the effects of a new stand-alone health centre in the community of Charlestown - a middle and lower income area of Boston. Here the number of practising family doctors had declined to one per 4000 and there was a high rate of use of the hospital emergency department for primary care conditions. Moore *et al* also used a simple before-and-after study design and the results should be interpreted with caution. Data were collected on Charlestown residents visiting the emergency department at Massachusetts General Hospital in 1968 (the centre opened in January 1969), 1969 and 1970. The records of approximately 200 patients were sampled for each year. The results indicated a small, non-significant increase in emergency room attendance overall. Significantly fewer patients under 20 years old who were registered at the health centre attended the hospital during the health centre's opening hours, however. Hospital attenders who were also registered at the health centre were twice as likely to have been referred as unregistered attenders. The authors note that the emergency department utilisation rate by patients not resident in Charlestown increased by 15 per cent over the study period. Was the centre more effective in preventing hospital attendance than the results appear to suggest? Again, the lack of an effective control group means that the true impact of the centre is difficult to assess. One finding is unambiguous, the health centre was attracting patients - 66 per cent of the local population had registered by mid-1970.

Hilditch (1980) studied the impact of a new health centre on the use of emergency facilities in a district of Toronto. In 1972, when the centre opened, the ratio of family practitioners to local residents was 1:10,000. Like Bonham and Barber (1987), Hilditch conducted a before-

and-after population interview survey. The population had a lower median income than the Toronto average, high proportions lived in rented accommodation and the population was highly mobile. Although the same random sample of addresses was used for both surveys (in 1972 and 1975), only five families from the 141 in the first sample were interviewed twice. Hilditch found that in 1975, residents were 0.6 times as likely to visit the emergency department as in 1972. In 1975, people who attended the emergency department were twice as likely to have tried to contact their family physician before attending the hospital as in 1972. Also, the reasons for attending the hospital had changed: in 1975, fewer attenders cited poor access to primary care, fewer stated that the emergency department was the most appropriate place for their problem and more felt that their problem had been a real emergency. By 1975, the ratio of practitioners to residents had increased dramatically (1:1800). These results seem to support the hypothesis that better access to primary care reduced inappropriate utilisation of the hospital. However, the 'after' survey sample had different socio-demographic characteristics from the 'before' sample. In an attempt to counter possible confounding problems, emergency department utilisation was correlated with likely confounding variables. Only one variable, 'perceived ill-health' was found to be significantly correlated with emergency utilisation. In 1975, respondents perceived themselves to be in better health and made less use of the hospital.

There appear to have been few similar European studies. Sjönell (1986) examined the impact of a primary care health centre in the Matteus district of Stockholm using a controlled before-and-after population questionnaire survey. Primary care provision improved in Stockholm generally over the study period and little information was reported about the utilisation patterns in the comparison area, so the results should be interpreted cautiously. He found a 40 per cent reduction (standardised for age and sex) in the number of emergency hospital outpatient appointments by Matteus residents between 1979 (before the centre opened) and 1982. Emergency home visits fell by 24 per cent while they rose by 6 per cent in the control area. Visits to general practitioners rose by 130 per cent in Matteus and by 23 per cent in Stockholm generally. Sjönell calculated the net impact of the health centre on overall utilisation rates for ambulatory care (secondary and primary) and found a decrease of 26 per cent.

The town of Ofakim in Southern Israel (Porter *et al, 1988*) was the setting for an experiment in comprehensive primary care. Only one hospital served the town. There were two paediatric health centres. Both were apparently similar in terms of services and catchment populations (not described in detail). In 1974, one centre was developed while the other acted as a control. Key changes introduced to one centre were the integration of preventive and curative services within the centre (traditionally provided separately in the Israeli health system), more

paediatric specialists at the centre and increasing the age of children seen by the paediatric doctors from 10 to 14 years. Porter *et al* surveyed the records of all paediatric attenders at the emergency department in 1980 and analysed the results by health centre catchment area. They found that the hospital attendance rate by children from the intervention area almost halved. Those children who did attend from the intervention catchment area were twice as likely as children from the comparison area to be admitted, although the overall admission rate remained stable over the study period in both areas. This implies that the intervention successfully diverted patients with urgent but 'minor' problems away from the hospital whilst children with more serious conditions continued to be seen and treated in a hospital setting.

The final included study compares emergency department utilisation in inner and outer London (Farmer and Chambers, 1982). This was an observational study which did not evaluate a specific intervention, but it provides an unusual British focus on the relationship between primary care and emergency department utilisation. All new attenders in six selected hospitals were interviewed in a typical week in February 1981. Three hospitals were located in inner London and three in outer London. Not surprisingly, the central hospitals were more likely to see attenders who were not living locally (that is, tourists and commuters) (37 per cent compared to 20 per cent). They were also more likely to see local residents who were not registered with a general practitioner (20 per cent compared to 13 per cent). Non-registered patients were more likely to attend with primary care problems. The same proportion of registered attenders attempted to contact their general practitioner in both areas before attending hospital, but *self-referred* outer London attenders were almost twice as likely to view their general practitioner as a potential alternative to the A&E department. These results provide evidence that inner London hospitals saw a greater proportion of patients without immediate access to primary care. Farmer and Chambers' work raises questions about relative access to primary care for local residents, but the nature of the analysis (non-population based) means that this hypothesis could not be explored further. Also this study was conducted 15 years ago, so the figures presented may not be applicable to the current picture of access in London. Nevertheless, this study suggests that even in the UK, access to care can vary and can affect A&E use.

In summary, the majority of the studies described above identified marked reductions in emergency department utilisation following an expansion in primary care provision. Although a causal link seems the most likely explanation for the observed changes in utilisation patterns, methodological limitations and a general lack of reported detail about context, methods and occasionally results, leave the precise nature of this relationship in some doubt.

None of the studies included a comparative cost analysis that could be related to effect measures. Any achieved reduction in emergency department utilisation tended to be viewed straightforwardly as a resource saving. In the case of the managed health care organisation studied in Kentucky (Bonham and Barber, 1987), this was probably a fair assumption - the programme as a whole was contracted to a commercial organisation for 5 per cent less per recipient than the previous fee-for-service Medicaid programme. However, the relative cost-effectiveness of primary care developments are generally more difficult to assess. For example, equipping and staffing a health centre or improving practitioner-to-patient ratios requires major funding. Williams (1996) recently costed in detail emergency care visits to six hospitals in non-metropolitan Michigan. The marginal costs of treating primary care-type patients was low at $24 each. This suggests that the financial savings from substitution of emergency hospital care may generally be small - particularly out-of-hours when the marginal costs of family practice tend to be higher.

3.1.2 Explaining the study findings

The studies described cover various countries and health care settings and were undertaken over a considerable period of time; factors which are likely to explain some of the variation in the results. They also include a range of primary care developments. These are described in Table 2. The majority of studies have attempted to evaluate complex interventions. Unfortunately, the intervention is not always described in detail. For example, Sjönell (1986) states only that primary care resources (that is, family physicians and district nurses) were doubled in Matteus health district. Crucially for the interpretation, little other information is presented on the nature of primary care in the district (or comparison areas) at the time. While it would be unwise to place too much weight on a comparative analysis of findings (particularly as many of these studies are potentially biased), some tentative observations can be made.

All the interventions included in this section were described in the literature as primary care innovations, but the specific services on offer differed. Some key characteristics associated with the concept of primary care are listed in Box 3. (Starfield, 1992) . For example, Hilditch (1980) describes the impact of a primary health care clinic staffed by specialist and generalist doctors, equipped with radiographic and other sophisticated diagnostic facilities including an emergency treatment room. Whilst the clinic provided primary care, it also

Box 3
Characteristics of primary care

Community-based
First contact care
Continuing care
Preventive and curative services
Gate-keeping role
Generalist practitioners

Table 2. Features of primary care interventions evaluated

Intervention	Bonham (1987) US	Hilditch (1980) Canada	Hochheiser (1971) US	Moore (1972) US	Porter (1988) Israel	Sjönell (1986) Sweden	Ullman (1978) US
Advocacy/interpreting			●				
Capitation payment/salaries	●						●
'Comprehensive' primary care	●	●	●		●		●
Diagnostic facilities		●					
GPs & district nurses						●	
Multidisciplinary primary care team		●			●		
Nurse-practitioners		●					
Restricted access to hospital	●						
Specialist doctors				●	●		
Telephone advice			●				
Opening hours per week	-	70	69	48	'office'	Not stated	'office', evenings & Sat am
Emergency on-call cover		●	●		●		●
Emergency treatment room		●					
Study population	poor families i.e. met Medicaid criteria		children on Medicaid		children		health centre users
Impact on emergency department attendance [NS: p>0.05]	-40%	-38%	-38%	+7% [NS]	-47%	-40%	children: -47% adult: -8% [NS]

duplicated some services more normally provided in the acute hospital. This form of care is not typical of general primary care provision in the UK, although has some similarity with the relatively new concept of the 'primary care resource centres' (Glendinning, 1995). It is not really surprising, therefore, that large reductions in hospital-based emergency room use were observed in this study.

The impact of a primary health care intervention will to some extent depend on the pre-existing availability and use of primary care services. The majority of studies included here considered areas or populations with poor access to primary care, most notably, low income families in the United States. It is interesting that there was already a relatively high ratio of primary care physicians to patients (1:4000) before the neighbourhood clinic was established

in the one study which failed to find any significant decrease in emergency department utilisation (Moore, 1972).

Parents of sick or injured children seemed to be responsive to primary care interventions included in the review. Why might this be the case? Parents naturally tend to be anxious about a child's symptoms or injuries and are perhaps more likely than other patient groups to seek medical reassurance and advice (that is, they exhibit 'risk averse' behaviour). It may be that by offering better access to primary care, parents develop more trust in the ability of primary care-based staff to deal effectively with urgent need. In addition, it is to be hoped that preventive care and routine health surveillance, for example immunisation and screening programmes, reduce the incidence of illness and injury, although this is an effect which may not be observable in a short-term research study. Perhaps too, parents are more likely than other patient groups to view the emergency department as a frightening and undesirable source of care for their children (Audit Commission, 1996) and primary care settings more reassuring.

3.1.3 Policy Implications

Few evidence-based policy recommendations can be made due to the difficulties in generalising from the available research. However, three general points can be made.

The literature reviewed here, focuses on improving *access* to primary care. The evidence suggests that improved access to primary care where access was previously poor can reduce emergency department utilisation. Britain already has comprehensive primary care provision free at the point of delivery. Yet, London, like other major cities, has a highly mobile population and attracts a large proportion of non-resident visitors and homeless people without an obvious source of primary care. For example, Jankowski and Mandalia (1994) found that 29 per cent of attenders to one large inner London A&E department in early *December* were not locally resident or had moved to London within the previous three months. The London Initiative Zone programme, implemented in 1993 to tackle London's primary care problems (Department of Health, 1993), included some experimentation with open access clinics and initiatives aimed at vulnerable groups such as homeless people or refugees. However, no evaluations of the impact of these primary care initiatives on emergency hospital utilisation relevant to this review could be identified. Poor actual or perceived access to primary care may be a problem, compounded by difficulties in attracting general practitioners to the capital (Tomlinson, 1992; Boyle and Smaje, 1993). This situation may improve following the recent government White Paper which highlighted the uneven

distribution of general practitioners as an area of concern and proposed new ways of recruiting general practitioners in inner cities (Department of Health, 1996a).

The imposition of *compulsory* primary care coverage was successful in achieving cost-effective substitution for the hospital in Kentucky (Bonham and Barber, 1987). However, this scheme was abandoned shortly after the evaluation, primarily because of patient and physician resistance to capitation payment and restricted choice of family practitioner (in this case, problems were exacerbated by a lack of information available to patients about the scheme). Although capitation is the norm in the UK, schemes which limit open access to A&E services may be similarly unacceptable. Freedom to choose a general practitioner is an established principle under the National Health Service (although the British system of registration does limit the number of points of access to formal medical care more than is usual in North America) and recent well-publicised reports suggest that self-referral to hospital is the most effective route to care for certain conditions such as heart attack (Pallot, 1996).

Finally, access to primary care is unlikely to be the only important factor influencing demand for hospital emergency services. In the Israeli study, Porter (1988) found that self-referral rates were very low in *both* intervention and 'control' groups. Ninety per cent of children overall were referred by doctors. This implies that access to primary care was good and primary care was perceived as the appropriate first contact for the great majority of children. The key intervention was the introduction in the experimental primary care clinic of relatively specialised paediatricians, who it seems, were less likely to refer to the accident and emergency department than generalists. The number of children visiting the hospital emergency department from the intervention catchment area was reduced by 47 per cent. This finding implies that providing better access to *generalist* primary care physicians or staff who do not perceive their role in terms of 'gatekeeping', may not be sufficient to reduce hospitalisation rates. In England and Wales in 1990, approximately 66 per cent of A&E attenders were self-referred (Pencheon, 1995). So here, changing referral patterns would have limited effect. Nevertheless, these findings raise questions about the possible role for specialists in primary care and, more interestingly, the use of evidence-based guidelines and protocols by general practitioners to strengthen their gatekeeping function. Placing specialists in primary care setting may have the unacceptable effect of increasing the costs of services.

Section 4

Reorganising primary care

4.1 General practice characteristics

Could the way in which primary care is organised directly affect demand for first contact care for urgent need?[1] For example, the House of Commons Expenditure Committee (1974) suggested that general practitioner appointment systems and commercial deputising services may deter patients from seeking appropriate care, many of whom consequently attend accident and emergency departments for treatment. What evidence is there to support such views?

Although there is a considerable body of work focusing on the relationship between primary and secondary care, for example studies of variations in referral rates, relatively few studies were located in which first contact care was defined as the dependent variable. What research there is, can be categorised into three broad areas: the organisation of UK general practice; the relatively new role for nurse-practitioners in primary care; and the provision of primary care outside normal surgery hours[2]. Table 3 summarises the nine studies that met the inclusion criteria. Two systematic reviews were located and two experimental studies, one of which was a randomised controlled trial. A further five observational studies which employed multivariate analysis were also included.

4.1.1 Study Findings

Appointment systems have become the norm in primary care in the United Kingdom. It was suggested at one time that appointment systems might deter patients with urgent problems because of a perceived difficulty in obtaining immediate treatment. To look at this, Russell (1977) modelled health care utilisation for minor trauma in Greater Newcastle using logistic discriminant techniques. Data collected from patients and medical records at the three city hospitals and 58 general practices showed no correlation between accident and emergency department attendance and either general practice appointment systems or the use.

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[1] Inevitably there is some overlap between the research summarised in this section and that of the previous section on improving access to primary care services. For example, Campbell's comparative study of primary care appointment systems (1994) raises issues of access *and* quality.

[2] Cragg et al (Cragg *et al, 1997*; McKinley *et al, 1997*) have recently published the results of a randomised controlled trial comparing the process and outcomes of care provided by patients' general practitioners and commencial deputising services out-of-hours. The study was published too late for inclusion in the review.

Table 3. Summary of studies included

Author	Setting	Method	Intervention	Outcome measures
Included studies				
Brown (1995)	Mainly US (systematic review)	SR	Primary care nurse-practitioner performance compared to physicians	Comparative effectiveness of nurses (various outcome measures reported)
Campbell (1994)	West Lothian, Scotland, UK	Obs	Appointment systems in general practice	Accident and emergency department utilisation; Access to primary care; Patient satisfaction with access; Patient waiting times
Darnell *et al* (1985)	US (inner city)	RCT	Telephone access to primary care physicians out-of-hours	Accident and emergency department utilisation
Feldman (1987)	Various (systematic review)	SR	Primary care nurse-practitioner performance	Comparative effectiveness of nurses and physicians (various outcome measures reported)
Hansen (1993)	Ringkøbing County, Denmark	SBA	Impact of new out-of-hours general practitioner on-call system	Demand for ambulance services; Ambulance call-outs resulting in admission; Emergency calls logged by police service
Hull *et al* (1997)	London, UK	Obs	Indicators of primary care quality: eg. number and sex of partners	Adult utilisation of local accident and emergency department departments
McKee *et al* (1990)	Northern Ireland	Obs	Mean general practitioner list size	Utilisation of accident and emergency department
Russell (1977)	Newcastle, UK	Obs	Indicators of primary care quality: partners, appointment systems, deputising services	Utilisation of accident and emergency department; Utilisation of primary care
Williams (1973)	Leicester, Nottingham, Sheffield UK	Obs	Deputising services	Utilisation of accident and emergency department
Other studies				
Cragg *et al* (1994)	Various, UK		Out-of-hours primary care emergency centres	Survey of patients asked to attend the centre
Key: Obs = comparative observational study; RCT = randomised controlled trial; SR = systematic review; SBA = before-and-after study				

Appendix 1 gives more detail of interventions, settings and results

of deputising services out-of-hours. The model suggested that patients tended to select the nearest facility, either general practice or accident and emergency department, all other things being equal. The only practice characteristic that seemed to have any relationship with utilisation was whether the practice was run by a single handed general practitioner or by a partnership, and this effect was so weak that it was excluded from the final model.

Campbell (1994) conducted a cross-sectional observational study of general practitioner appointment systems in seventeen practices in West Lothian, a semi-rural region in Scotland. She found little correlation with accident and emergency attendance, despite wide variation in the operation of appointment systems (16 of the 17 practices had some sort of appointment system, but appointments were available for different numbers of hours each week). Patients generally perceived primary care to be available for urgent problems regardless of measured appointment availability, although accident and emergency department attenders (both referred and self-referred) reported being less satisfied with the arrangements for seeing their general practitioner than primary care attenders (31 per cent accident and emergency department attenders were not 'satisfied' compared to 19 per cent of primary care attenders). This analysis was simpler than the Newcastle study, with only a basic adjustment for case-mix in the comparison between accident and emergency department and general practice attenders.

McKee *et al* (1990) looked at variations across general practices more generally, comparing accident and emergency attendance patterns by practice in Northern Ireland. A stratified random sample of all new attendances in 1986 to one accident and emergency department serving a semi-rural population was selected (1029 patients). Linear regression was used to examine the effect of mean distance and list size on practice-based attendance rates (26 practices were included in the analysis). Mean list size had no significant effect, while distance accounted for around 30 per cent of the variation in attendance rates. Census-derived socio-demographic variables were included in a ward-based analysis, but none of these was significantly associated with attendance rates. Distance accounted for 52 per cent of the variation in ward-based accident and emergency department attendance rates when socio-demographic variables were included in the analysis.

Hull *et al* (1997), in a more recent study, attempted to correlate general practice characteristics associated with indicators of good quality (for example, high preventive screening rates) to see if these had any effect on adult accident and emergency utilisation rates in East London and City Health District, an inner city area of high deprivation. Characteristics studied included number and sex of partners, and the presence of a computer, practice manager or vocational trainer. Census-derived socio-economic and demographic

variables were also included as independent variables. Hull *et al* found that distance and some socio-demographic characteristics were strongly related to attendance rates, but there was no relationship with any of the practice characteristics.

The expanded role for nurse-practitioners in primary care which was designed to increase the availability of primary care services and, thereby, influence A&E utilisation, has been the trigger for considerable research over the last three decades, much of it conducted in the United States. Feldman *et al* (1987) and Brown and Grimes (1995) both conducted systematic reviews of nurse-practitioner effectiveness. Out of 56 studies reviewed by Feldman *et al* only one early American clinical trial (1963) looked at emergency department utilisation as an outcome measure. In this study, a reduction was observed (size of effect not specified). Brown and Grimes pooled data from relatively homogeneous studies and calculated weighted odds ratios to give an overall measure of effect size. They identified three further studies which looked at emergency department utilisation as an outcome measure. When compared against physicians, nurse-practitioners had little impact on emergency department utilisation. However, three non-experimental studies suggested that nurse-practitioner management resulted in fewer hospital admissions. Both reviews also reported that nurse-practitioners were as effective as medical staff in managing certain categories of patient with improved patient compliance and patient satisfaction. This research was American and thus may not be straightforwardly generalisable to a UK setting; for example, a recent NHS sponsored evaluation of ten nurse-practitioner pilot projects in a range of community and hospital settings found no similar improvement in patient compliance (Lister, 1996).

Five studies were identified that looked at the impact of primary care out-of-hours arrangements. It has been suggested that deputising locums or general practitioners from a pooled rota may be more likely to refer or admit patients because of their unfamiliarity with the presenting patient. There have also been concerns that patients asked to travel to a primary care emergency centre rather than receive a home visit might be more inclined to use the hospital emergency department if this is more convenient. Conversely, it has been suggested that primary care telephone consultation out-of-hours may offer a convenient source of reassurance and advice with considerable scope to prevent unnecessary hospital utilisation.

Darnell (1985) conducted a randomised controlled trial of the impact of an out-of-hours telephone line staffed by primary care physicians. A sample of patients was selected from patients registered at an American primary care clinic in an inner city area (2627 enrolled patients). Patients were eligible for inclusion if they were aged 15 years or over and had visited the practice at least three times in the previous year. Patients were randomised into

three groups: the control group received no information about the telephone service; patients in the first intervention group were able to call a physician who did not have access to their medical notes; and patients in a second intervention group were able to call a physician with computerised access to their medical notes. During the first year of the trial, uptake was disappointingly low (a rate of 6 calls per thousand per month) - mainly because the service had been poorly advertised to minimise the likelihood of cross-group contamination. After the first year of the study, patients who had used the clinic once in the previous year were included in the second phase of the trial and were educated about the telephone service. In the final year 314 of 1616 patients in the intervention group used the service at least once (a rate of 24 per thousand per month). However, despite extensive efforts to maintain this utilisation rate, no significant differences in emergency room utilisation were detected. Post-study interviews with a random sample of patients who used the emergency room without calling the telephone line first, found that 66 per cent had the telephone number and understood how to use the service. Two-thirds of these patients said that they had been 'too ill' to ring (that is, they considered the telephone line inappropriate for their medical problem) and 20 per cent said that they had been taken to hospital by someone else. Physicians with access to medical notes consulted the notes relatively rarely - there was no difference in the management of patients in the two intervention groups.

Williams *et al* (1973) looked at the impact of general practitioner deputising services on accident and emergency departments in Sheffield, Nottingham and Leicester in 1970. Deputising services had been established since the mid-1960s in these areas. The authors estimated that the deputising services in Sheffield and Nottingham referred less than one person a day on average to accident and emergency departments during the periods when they were in operation, although considerable use was made of the service by three-quarters of local general practitioners. The authors then compared trends in the rate of first attendance to accident and emergency departments from 1960 to 1971. There was a general increase in England and Wales which was broadly mirrored by the rate of increase in Sheffield and Nottingham. The rate of increase in Leicester was markedly slower. This study suggests that deputising services had little obvious impact on accident and emergency services, a finding similar to that reported in the Newcastle study described above (Russell, 1977).

In Denmark, out-of-hours primary care was reorganised in January 1992. Hansen *et al* (1993) looked at the impact of the new system on ambulance call-outs in the county of Ringkøbing. The new Danish system is organised on a county-wide basis and is similar to the general practitioner co-operative model which is becoming increasingly prevalent in the UK. All primary care out-of-hours calls are diverted to a central pool of general practitioners who can give telephone advice, offer a consultation at an emergency primary care clinic or arrange a

home visit, as appropriate. Would primary care clinics be acceptable to patients? Hansen *et al* conducted a before-and-after study to look at this question. Information on all ambulance call-outs was collected during the last eight weeks of 1991 (the 'before' period) and the first eight weeks of 1992 (the 'after' period). They found little change in the number of ambulance call outs (around 27 per thousand residents called an ambulance in both periods), or the number of emergency calls registered by the police. However, there was a significant decrease in the proportion of call-outs that resulted in an admission - 79 per cent before the intervention and 69 per cent afterwards. The authors suggest that the threshold for calling an ambulance had fallen as a result of the change in out-of-hours care. A real problem in assessing these results is the likelihood of the study period chosen being atypical. The control period covered the Christmas holiday (an adjustment was made to the analysis for New Year's Eve, but the methodology is not detailed in the paper) and the 'after' period immediately followed implementation. Data published separately on the utilisation of out-of-hours primary care for the years 1990 to 1993 suggest that there was a 20 per cent decrease in calls to primary care physicians in Ringkøbing between 1991 (158,000) and 1992 (126,000), but that calls increased again in 1993 (135,000), although not to their previous levels (Olesen and Jolleys, 1994). The temporary and rather dramatic reduction in the number of patients calling the service in 1992 may have been due to patient unfamiliarity with the system or may be the result of undefined secular trends in health service utilisation. Only around a third of callers in Ringkøbing in 1992 and 1993 were advised to attend a primary care centre. This pattern was repeated for Denmark as a whole. The evidence from Denmark suggests that there has been little substitution of primary for secondary care, but it is hard to interpret the subsequent pattern of hospital use.

4.1.2 Explaining the study findings

The body of research looking at the effect of the organisation of primary care-based services for urgent need is sparse. This is partly because, in the UK at least, it is difficult to distinguish primary care consultations for urgent need from other consultations. More general variations in registration, utilisation and referral patterns are not considered here (Roland and Coulter, 1992).

Ten studies met the review inclusion criteria and contributed useful information, but two general methodological points should be noted. Firstly, the Hull (1997) and McKee (1990) studies were limited by a reliance on routine data aggregated to practice level. This greatly restricted the range of variables available for analysis. It may be that important variables affecting the patients' behaviour were unavailable or the degree of aggregation masked interesting variation. (Appendix 1 lists the independent variables included in each study).

Secondly, the majority of studies drew little or no distinction between minor illness or injury and more serious conditions looking instead at overall utilisation rates. This is true of the studies by Campbell (1996), McKee (1990) and Hull (1997) looking at practice-based variations, Williams' (1973) study of deputising services, Hansen's (1993) study of emergency ambulance call-outs and also Darnell's trial (1985) of an out-of-hours telephone line. The Darnell trial also excluded patients under 15 whose parents might have been expected to make higher than average use of the telephone line (Hallam, 1989). Thus, relatively subtle variations in demand for minor trauma and injury, (the conditions amenable to treatment in a primary care setting), may not have been detected.

Nevertheless, taken together, the research reviewed here suggests that concerns that certain aspects of primary care organisation (such as appointments systems, deputising services, single-handed practitioners, or primary care emergency centres) may be unpopular with patients and may inadvertently have increased pressure on accident and emergency departments seem largely unfounded - little obvious effect was noted *in either direction* in any study. This suggests that in the UK the decision to attend A&E is largely irrespective of general primary care organisation - the two settings may not be perceived as substitutes by patients. Despite high levels of patient satisfaction, primary care nurse-practitioners similarly seem to have made little impression on hospital emergency department attendance in the United States. The provision of a new model of out-of-hours care in Denmark was a more complex intervention, but the consequences are inconclusive so far.

4.1.3 Policy Implications

The recently published primary care White Paper (Secretaries of State, 1996) encourages innovation and flexibility in the delivery of primary care with a greater role for nurses, professions allied to medicine and community services such as pharmacy. There is a notable lack of research evaluating effectiveness or the likely impact of such developments on hospital utilisation and costs.

On the purchasing side, there have been developments in the UK since 1994 in GP-led 'total purchasing' on a pilot basis. 'Total purchasing' is an extension of the general practitioner fundholding concept: general practices co-operate in taking responsibility for purchasing all health care required by their patients, including emergency care, from a fixed budget (Total Purchasing National Evaluation Team, 1997). A key feature of total purchasing is that it provides general practitioners with the incentive and resources to develop a cost-effective approach to health care. For example, costly unplanned hospital admissions or unnecessary attendance at accident and emergency departments will have an observable opportunity cost

under this scheme. Again though, it is too early to say whether total purchasers will be able to control demand by their actions in primary care.

Similarly, out-of-hours primary care arrangements have been changing in the UK (Jessopp *et al, 1997*) despite little evaluation of the implications for patient care or resource utilisation. In 1995, the national NHS general practitioner contract covering out-of-hours provision was re-negotiated. The impetus for change came from general practitioners, dissatisfied with the growing demand for out-of-hours home visiting, as in Denmark. The changes gave general practitioners more freedom to decide on the appropriate form of out-of-hours consultation, with fees payable for telephone and clinic consultations in addition to home visits. The formation of general practitioner co-operatives is encouraged through development funding available from health authorities, and there has been a rapid expansion in the number of these from around six in 1980, to 30 in 1994 and over 60 by the end of 1995 (Hallam, Wilkin and Roland, 1996; NAGPC, 1996). Cragg *et al* (1994) surveyed patients referred over the telephone to five primary care emergency clinics by a commercial deputising service in the United Kingdom in 1993. They found that attendance rates were low: overall, only 22 per cent agreed to attend the primary care centre. The most common reasons given for refusing to attend the clinic were lack of suitable transport (40 per cent of the sample of non-attenders) and, echoing the American study of a primary care-based telephone line (Darnell *et al, 1985*), severity of illness, although interestingly, there was no significant difference in the rate of prescriptions or admissions between attenders and non-attenders. Thus a question remains over the likely acceptability of this model of care. A recent study of a general practitioner co-operative found that patients in London were particularly resistant to primary care emergency centres (Salisbury, 1997). With the increase in general practitioner co-operatives in the UK, it is possible that patient expectations may change as this model becomes more common. However, the trend for siting clinics adjacent to hospital emergency departments allows for the possibility of directing inappropriate accident and emergency department attenders to the clinic staffed by general practitioners without altering their underlying attendance behaviour.

The evidence from research on deputising services suggests that continuity of care (that is, care provided by a known physician) in itself does not seem to be an important factor influencing direct referral rates to accident and emergency departments. This finding seems to be also evident in Darnell's trial (1985) of the use of medical notes by doctors staffing an out-of-hours telephone service. The doctors made little use of these notes for the majority of calls.

Finally, the research reported here highlights a persistent gap between patient and professional perceptions of appropriate levels of care. This was a particularly notable feature of the Darnell trial of an out-of-hours telephone line. 'Inappropriate' attendance at the

emergency department was viewed as a problem by professionals both before and after the introduction of the out-of-hours telephone service. The telephone service operated for two years with remarkably little effect - indeed, far from promoting substitution, it seems to have attracted *additional* primary care service users. The general increase in demand for emergency care in the United Kingdom implies that this gap in expectations is widening. Reorganising primary care in isolation from other changes is unlikely to result in a shift in the pattern of patient-driven demand for immediate care, or affect overall costs.

Section 5

Integration of primary and hospital care

5.1 Primary care in Accident and Emergency departments

Continued perceived 'inappropriate' non-emergency demands on hospital accident and emergency services, particularly in inner cities, have prompted some hospitals to employ staff with primary care expertise, typically general practitioners and/or nurse-practitioners, to provide a more appropriate and more cost-effective response. These hospitals offer an integrated primary and secondary emergency service; patients are triaged on arrival to the professional most appropriate to their needs. Underlying this approach is a pragmatic response to difficulties in matching hospital staff to workload and a recognition that open access accident and emergency services have little choice but to respond to *patient* perceptions of urgent need.

The foremost British example of primary care provision in the emergency department which has been researched began in early 1989 at King's College Hospital, London (Dale *et al, 1991*). The encouraging early results reported from this experiment prompted Sir Bernard Tomlinson to recommend that this model of provision be considered more generally in London:

> "... where there is a high proportion of primary care attenders, adapt hospital A&E services in a cost-effective way, for example by including general practitioners and nurse-practitioners amongst the A&E staff so that patients get the service which is appropriate to their requirements. ... [This approach] offers advantages to patients by providing better advice than is often given by less experienced doctors, to the hospital in reducing inappropriate investigations, treatments and admissions, and to junior doctors in better training."
>
> Sir Bernard Tomlinson (1992) *Report of the inquiry into London's health services, medical education and research.* HMSO, London. p. 13, para. 47.

As a result, there has been considerable investment in establishing similar schemes. Within the London Initiative Zone, which received additional primary care development funds following publication of the *Tomlinson Report*, around £900,000 was spent in 1995/96 alone on primary care (Mays *et al, 1997*). The growth in these schemes has been fuelled by an expectation that they are both cost-effective and result in substitution - of primary care

professionals for hospital staff - and lead to fewer expensive investigations and admissions and more appropriate referral to community and primary care facilities for continuing care.

Three published studies on this topic met the criteria (see Methods section) for inclusion in the review and are summarised in Table 4. Only one of these (Murphy *et al, 1996*) was a randomised controlled trial, but the King's College Hospital study (1991; 1995; 1995; 1996) was a carefully designed prospective controlled study in that, for example, the authors tried to take physician experience into account in the basic design. All three studies examined the impact of employing general practitioners on a sessional basis to manage patients presenting with suitable problems; two of the schemes were based in inner London.

5.1.1 Study Findings

The results seem to confirm that substitution can occur. All three studies found lower general use of diagnostic investigations by the general practitioners and fewer referrals to secondary services. Neither of the two studies that considered health outcomes found any significant difference in patient outcomes between general practitioner and hospital doctor management.

The Dublin study (Murphy *et al, 1996*) provides the strongest evidence because patients were randomly allocated to the intervention and control groups. The physicians were not blind to the allocation of patients and knew that they were the subject of research, but a research nurse was present to monitor physician compliance with the research procedure.

This study found that the team of hospital doctors of various grades, but predominantly made up of senior house officers, were significantly more likely to order blood tests and X-rays, admit patients and refer patients for hospital follow-up than general practitioners. General practitioners however were 1.4 times more likely to prescribe for both the 'urgent' and 'non-urgent' triage categories.

The King's study found a more marked difference in usage of X-rays (hospital doctors being more than twice as likely to order these as GPs). Unlike the Dublin study, Dale *et al* also found that hospital doctors were more likely to prescribe than general practitioners.

Table 4. Summary of studies included

Author	Setting	Method	Intervention	Outcome measures
Included studies				
Dale *et al* (1991; 1995; 1995; 1996)	London, UK	CS	General practitioners employed on sessional basis to manage patients triaged as 'primary care'	Resource use: investigations, prescriptions, referrals; Patient satisfaction; Outcomes: self-reported health status, general practitioner report of outcomes; Costs
Murphy *et al* (1996)	Dublin, Ireland	RCT	General practitioners employed on sessional basis to manage patients triaged as 'non-urgent'	Resource use: Investigations, prescriptions, referrals; Patient satisfaction; Outcomes: self-reported health status, unplanned reattendance; Costs
Ward *et al* (1996)	London, UK	CS	General practitioners employed on sessional basis to manage patients triaged as 'primary care'	Resource use: investigations, prescriptions, Patient compliance with primary care follow-up; Professional satisfaction
Other studies				
Dale et al (1996)	West London, UK		Studied five general practitioner and nurse practitioner schemes in A&E departments	Describe wide variation in aims and organisation of schemes.
James and Pyrgos (1989)	Preston, UK		Hypothetical management of patients by untrained nurse practitioners.	Acceptability of nurse practitioners to patients; Nurse practitioner competence
Middleton (1993)	University hospital A&E in inner city location, US		Descriptive account of the implementation of a nurse practitioner scheme	Describes benefits of scheme to staff and patients without health insurance
Read *et al* (1994)	UK hospital emergency department		Descriptive account of pilot project (randomised controlled trial) to evaluate nurse practitioner performance	Detailed account of the problems encountered in setting up a pilot study

Key: RCT = randomised controlled trial; CS = controlled study

Appendix 1 gives more detail of interventions, settings and results

The St Mary's London study (Ward, Huddy and Hargreaves, 1996) also found that general practitioners were less likely to order investigations, but there was little difference in prescriptions or referral to the community between GPs and hospital doctors. This might be because the general practitioners saw a restricted range of conditions for which relatively few patients required follow-up care. This study also had the weakest research design, relying on A&E nurses to allocate patients consistently between hospital doctors and general practitioners and collected no data on cost-effectiveness.

A concern at St Mary's was that employing general practitioners might encourage more local residents to use the hospital for their primary care needs. In fact, there was little observed change in the utilisation of the A&E department for primary care over the course of the study or in subsequent months. The King's study asked patients about their future intentions and found no significant differences between the groups - overall, 63 per cent claimed they would use the A&E department again for a similar problem. The underlying trends in A&E attendance over the study period are not described in either of these studies, so the longer-term impact of the intervention on the demand for A&E care is difficult to assess.

Costs and cost-effectiveness

Both the King's (Dale *et al, 1996*) and Dublin (Murphy *et al, 1996*) studies attempted to evaluate the cost-effectiveness of employing general practitioners. Murphy *et al* measured unplanned reattendances to the A&E and found no increase as a result of the intervention. The general practitioners in this study managed a wider range of conditions than the general practitioners in the other two studies. The savings associated with the intervention were comparatively low, however, and their sensitivity to change in underlying assumptions, (for example, in the case-mix profile of each triage category) is unclear.

In contrast, the King's study included a more thorough cost analysis which indicated considerable potential savings that were robust to changes in underlying cost assumptions. This was primarily because the general practitioners made lower use of X-rays and generated fewer hospital referrals than the hospital doctors. There was no obvious difference in patient outcome or satisfaction between the two groups.

No study attempted to measure whether hospital doctors' management of patients was altered as a result of working alongside general practitioner colleagues - although this had been a primary objective of the St Mary's scheme.

5.1.2 Explaining the study findings

The variation in the detailed pattern of results in these three studies is not surprising.

Firstly, the reported results will be generalisable only if the health professionals involved were typical in their management of patients. Few individual general practitioners were involved in each study. In total, eight general practitioners were employed at King's College Hospital during the study period and five at St James' Hospital, Dublin. No information on the distribution of general practitioner performance against local or national norms is reported in any of the studies.

Secondly, the hospital settings described in the three studies are similar only in that they are all located in inner city environments. St James' Hospital is in Dublin; the Irish health-care system is structured rather differently from the UK National Health Service and charges are made for most emergency department visits.

Thirdly, the triage systems employed in the three studies were different (see Appendix 1 for details). Only 17 per cent of patients attending St Mary's A&E was deemed appropriate for primary care - in this case, general practitioners were not assigned patients expected to require radiography since general practitioners were assumed to be inadequately skilled to interpret X-ray films. Compare this with 41 per cent of patients also described as having 'primary care' needs less than five miles away at King's College Hospital. Recent descriptive research looking at general practitioner and nurse-practitioner schemes in A&E departments in West London suggests that there is wide variation in aims, organisational structure, triage and training between such schemes (Dale, Morley and Dolan ,1996).

Why should general practitioners manage patients less resource intensively than hospital doctors? Understanding the answer to this question would aid an understanding of the cost-effectiveness of the intervention and its relevance in different settings. There are several possible explanations - any or all of which may play a part since the studies were not specifically designed to *explain* differences in clinical behaviour. For example:

- general practitioners tend to have longer clinical experience and consequently may be more confident in their diagnoses than junior doctors (who form the largest group of clinical staff in the typical emergency department);
- general practitioners have more experience of chronic conditions and are more likely to be aware of the existence and availability of community health, social and voluntary services (that is, alternatives to hospitalisation);

- general practitioners are used to making diagnoses without the benefit of immediate access to hospital investigative facilities and may therefore make less use of these (eg. X-rays);
- general practitioners have a generalist and perhaps inherently less invasive approach to medicine. For example, they may be more likely to recognise the psycho-social basis of problems than hospital staff and, thereby, avoid inappropriate use of physical investigations for social problems.

The King's study attempted to control for experience by employing GPs who had registered at a similar time to the registrars in the emergency department and analysing the effects by grade of hospital doctor. The results are tantalising. In terms of investigations, the registrars differed from general practitioners only in the number of X-rays ordered. These findings are limited, however, being based on a comparison of only four registrars and eight general practitioners.

The King's study also included observation of a sample of consultations. Again the findings are interesting. The general practitioners were observed to be more patient-centred than hospital staff - that is, they were more likely to introduce themselves, make eye contact, allow the patient to share control of the consultation and include discussion of the role of work or social factors on the patient's health and treatment. Whilst this provides some qualitative support for the view that general practitioners have a more holistic approach to patient care than hospital doctors, it is not sufficient to prove a causal link with lower resource use.

5.1.3 Policy Implications

Integrating primary care specialists such as general practitioners into the accident and emergency department can reduce secondary care resource consumption. In the case of the studies reviewed here, the intervention was clearly acceptable to patients and staff - both hospital staff and general practitioners have reported personal benefits (Ward, Huddy and Hargreaves, 1996; McGuinness, 1977). In addition, hospital staff workload was successfully reduced, patients with minor injury tended to have shorter waits on average and patient outcomes were not obviously affected. On the other hand, locating primary care professionals within hospital departments provides patients with appropriate care for one acute episode only. These practitioners are not able to offer continuity of care and are very unlikely to be familiar with the presenting patient or their medical history. The general cost-effectiveness of such schemes, if they become the norm, is more difficult to judge. Nurse-practitioners and general practitioner schemes require considerable financial investment and it is not clear, given the variation in results, that resource savings will generally make such investment

worthwhile. Other interventions, (for example, improved training and better senior support for junior doctors) may also be worth evaluating. These alternatives could conceivably achieve comparable results at lower cost. The considerable variation in the way the studies were designed and their urban settings makes generalising from their results, for example to rural settings, far from straightforward.

It was unfortunate that no studies meeting the review inclusion criteria were found in which the comparative performance of nurse-practitioners in the emergency department was evaluated. There is strong evidence that nurse-practitioners can manage certain groups of patients effectively, that they find the practitioner role rewarding and that patients find nurses acceptable in an extended clinical role (Feldman, Ventura and Crosby, 1987; Covington, Erwin and Sellars, 1992; Potter, 1990; Powers, Jalowiec and Reichelt, 1984; James and Pyrgos, 1989). Middleton (1993) provides a descriptive account of the process of establishing nurse-managed primary care in an American hospital emergency department and the resultant benefits to staff and patients, particularly poorer patients unable to afford private health care. The methodological difficulties in conducting a comparative study of nurse-practitioner and junior doctor performance have been described by Read *et al* (1994). In the course of a UK pilot study, they discovered that fewer patients were managed by the nurses than expected, many patient pathways were extremely similar (that is, the course of treatment), and there was very little variation in eligible patients' outcomes. As a result, the proposed clinical trial was abandoned. If it is to be useful, future research must add to the findings reported here; that is, researchers should employ a comparable study design and take account of the inherent problems of conducting experimental research in emergency health care settings.

Taking a wider perspective, there is a developing shortage of general practitioners in the United Kingdom, especially in inner city areas (Carlisle and Johnstone, 1996) which raises the question of the costs of employing GPs in accident and emergency departments. There is a need to establish whether salaried schemes have an impact on the distribution and availability of primary care professionals; indeed, such schemes may be highly attractive. Despite all these caveats, the available evidence does suggest that the provision of primary care professionals in A&E departments stands a reasonable change of bringing about a cost-effective substitution of primary for secondary care provision.

Section 6

Reorganising Acute Care

6.1 Minor Injuries Units

Minor injuries units (MIUs) are a growing feature of the UK health care scene. For example, the number of MIUs in London will have increased from ten units in 1995 to around 20 units by the end of 1997 (NHS Executive North and South Thames ,1995). Most of these units have replaced full-scale A&E department facilities, often despite considerable public opposition, for example, at St Bartholomew's Hospital in the City of London (Boyle and Hamblin, 1996). MIUs vary both in terms of organisation and the range of services offered (Read, 1994; Rich, 1994). MIUs are typically staffed by general practitioners and/or nurse-practitioners, although medical cover may be provided by accident and emergency clinicians. They usually have fixed opening hours and may be located either on a hospital site (community or acute) or as a stand-alone centre. As a rule, ambulance-borne patients are transported to the nearest hospital accident and emergency department, bypassing MIUs (Department of Health, 1996). MIUs differ from primary care centres in that they aim to provide immediate care for a pre-defined range of minor injuries. The prevailing function of MIUs in the UK is to deliver single episodes of acute care.

6.1.1 Study findings

The literature search for studies evaluating the impact of acute emergency centres for minor trauma (or illness) produced only one study that met the review inclusion criteria (Table 5).

Included studies

Ferber and Becker (1983) used a controlled before-and-after study design to assess the impact of the rapid growth of free-standing emergency clinics (sometimes termed 'emergicenters') in the United States. The free-standing clinic is normally staffed by doctors and open for around 12 hours a day, although staffing and opening times vary. Clinics tend to be well equipped, for example, with resuscitation facilities, but, as with British minor injuries units, patients with major or life-threatening problems are almost always immediately transferred to a hospital emergency department. The majority of attenders present with minor trauma, although treatment is available for other medical problems (Schaffer, 1984). Free-standing emergency centres have declined in the US since the early 1980s (Middleton, 1993).

Table 5. Summary of studies included for review

Author	Setting	Method	Intervention	Outcome measures
Included studies				
Ferber and Becker (1983)	US	CBA	Free-standing emergency clinics	Hospital utilisation rates
Other studies				
Dale *et al* (1994)	Folkestone and Deal, Kent, UK		Two minor injuries units	Patients' perceptions of alternative sources of care; Number of patients using local hospitals with conditions suitable for treatment in the MIUs
Garnett and Elton (1991)	Ancoats, Manchester, UK		Minor injuries unit	Patients' perceptions of alternative sources of care; Costs
Heaney *et al* (1995)	Edinburgh, UK		Minor injuries unit	Emergency department utilisation at nearby Edinburgh Royal Infirmary;
Newman (1994)	St Albans, UK		Minor injuries unit	Number of patients using local hospital with conditions suitable for treatment in the MIU

Appendix 1 gives more detail of interventions, settings and results

Ferber and Becker selected two samples of hospitals. The intervention sample was randomly selected from a list of hospitals located in the same area as a free-standing emergency clinic (94 hospitals in sample); in contrast, the comparison hospitals offered the only source of acute emergency care to their catchment populations (1,125 hospitals in sample). The 'control' sample was selected in such a way that the distribution of key characteristics (number of beds, type of hospital and number of emergency visits in 1977) was similar for both samples. Routine data on emergency room utilisation was analysed between 1976 and 1982 in order to compare utilisation trends before and after the free-standing emergency clinics opened. No significant difference was found between the two samples of hospitals or in the utilisation patterns before and after the clinics opened. Interestingly, the hospitals in the intervention sample were not generally experiencing any major increase in emergency department utilisation before the arrival of the free-standing emergency clinic. However, free-standing emergency clinics however, did tend to open within the catchment area of larger than average hospitals with busier emergency departments (mean emergency department visits in 1980, 28,750 compared to 13,570 for all other community hospitals). This study was based on routinely collected aggregate data and no adjustment was possible for hospitals or

areas with other emergency facilities, for example, walk-in clinics. The authors note that the coding scheme and process used to categorise hospitals were unlikely to have been completely accurate (no estimate is given for error).

Other studies

Several other studies of minor injuries units are described below. Although none of these studies met the review criteria; they provide relevant information in a British context.

Heaney *et al* (1995) also used a before-and-after analysis to evaluate the impact of a minor injuries clinic based at Western General hospital in Edinburgh. The unit replaced the nearby Craigroyston minor injuries unit which had been open for less than a year (evenings only) but had failed to attract enough patients to be viable. The new unit opened in late 1994, for 12 hours a day (9:00am to 21:00pm), with x-ray and resuscitation facilities. It was staffed by nurse-practitioners without medical cover. Initially, clinical protocols developed to support nurse-led clinical management at St Charles' MIU in London were employed, but these were subsequently abandoned because the organisation of the two units was not comparable. Almost 10,000 new patients attended the unit in its first year and 650 telephone calls were logged. The vast majority of patients (95 per cent) were self-referred. Twenty per cent of attenders were subsequently referred to hospital and a further 6 per cent to their own general practitioner.

The authors studied attendance at the Edinburgh Royal Infirmary - the nearest hospital with full accident and emergency facilities - in the first quarters of 1994 and 1995 as a measure of the effect of the MIU. Overall there was a five per cent reduction in the number of patients with minor conditions presenting to the hospital. An analysis of the data by postcode sector showed a fall in attendance by patients resident in the four postcode sectors within the catchment area of the minor injuries unit of 15 per cent. However, a reduction in attendance was also observed in patients from eleven other areas of the city (ranging from one per cent to 16 per cent). In fact, the total number of attendances at the hospital increased between the two time periods because more patients apparently attended with serious conditions. These figures should be viewed with caution: firstly, it is difficult to isolate the effects of the minor injuries unit from secular changes in patterns of attendance; and, secondly, the Craigroyston minor injuries unit was open during the first quarter of 1994, thus precluding an accurate baseline measure. A questionnaire survey of 695 attenders of the minor injuries unit provides some limited evidence that patients perceived the unit as an alternative to hospital care: 58 per cent stated that had the minor injuries unit not been available, they would have gone to the

accident and emergency department. But 26 per cent said they would have gone to their own general practitioner and 8 per cent would not have sought medical care at all.

Dale *et al* (1994) reported very similar percentages in their study of two MIUs in Kent. Dale *et al* appraised two MIUs in Kent, one in Folkestone and the other in Deal. Both units had replaced hospital accident and emergency units in the 1970s. By 1994, both hospitals were without major acute medical or surgical departments but provided outpatient facilities, including an x-ray department, elderly care beds, physiotherapy and GP beds. The MIUs opened daily from early morning (8.00am or 9:00am to 6:00pm) and were staffed by a general practitioner and nurses. The nearest accident and emergency departments were twenty miles away. The future of both units was under question, particularly as new attendances (around 7000 per annum per unit in 1993) had been steadily declining.

Newman (1994) evaluated a new MIU which had replaced the accident and emergency department at the St Albans General Hospital. The unit (open from 9:00am to 9:00pm daily) treated 4,600 new patients in its first seven months (roughly equivalent to 7,700 new patients per annum). The unit was staffed by nurse-practitioners without medical cover. During the study period, the nurses had no direct access to x-ray facilities, which were introduced later in the first year.

Both the St Albans and Kent studies included an estimate of the number of patients attending nearby hospital accident and emergency departments who would have been more appropriately treated at the minor injuries unit (i.e. resident within the MIU catchment area, arriving by public or private transport and presenting with minor injury during times when the injury units were open). There was some disparity in the findings, with Dale *et al* reporting that fewer than three patients per day in total would have been suitable for care at the two MIU units. A panel of clinicians, general practitioners and nurse-practitioners looking at utilisation patterns in St Albans judged that around four patients a day could have been treated at the MIU (without x-ray facilities) and a further three patients (after the introduction of x-ray facilities). Interestingly, this panel judged the total number of patients attending the accident and emergency department not in need of specialist treatment to be approximately 20 patients per day. In order to provide safe treatment to all of these patients, the MIU would have needed reorganisation and augmented staffing: principally, direct nurse-practitioner referral to the fracture clinic (three additional patients per day), the introduction of continuous medical cover from a general practitioner (three to five additional patients per day) and cover from an accident and emergency specialist (five to eight additional patients per day). But how specialised is it appropriate for MIUs to become? The services these units provide are

inherently limited by their lack of major surgical or acute in-patient facilities The staffing changes in particular are likely to affect the cost-effectiveness of MIUs adversely.

Garnett and Elton (1991) provide another account of a MIU which replaced a hospital accident and emergency department - this time in Ancoats, North Manchester. Unlike St Albans, this area had very low levels of car ownership and the nearest full-scale accident and emergency department was reported to be an hour away by public transport. The unit opened in March 1989 (9:00am-9:00pm daily), two years after the accident and emergency department had closed. It was staffed by nurses without medical cover and also provided a needle exchange service, but had no x-ray facilities. In 1990, there were just under 7,000 new attendances and 3,500 follow-up attendances. Eight per cent of patients were transferred to the accident and emergency department and 12 per cent to their own general practitioner. The authors compared the age/sex profile of patients attending the MIU against the profiles of general practice and accident and emergency department attenders identified from the literature. They observed a similarity between accident and emergency and MIU clinic patients (predominantly under 35 and male) and suggested that the MIU was acting as a substitute for the accident and emergency department rather than duplicating services available from general practitioners. A problem with this analysis is that the age/sex profile of patients attending general practice with *minor injuries* is not known. A questionnaire survey of a random sample of 300 new patients attending the MIU revealed that of self-referred patients 40 per cent would have attended the hospital accident and emergency service for their injury had the MIU not been available; 27 per cent would have seen their general practitioner; and 16 per cent would not have sought medical care at all.

Costs and cost-effectiveness

The Manchester study was one of very few studies to compare the cost of treating patients with minor injury at the MIU and the hospital accident and emergency department although cost-effectiveness was not assessed. A very simple comparison of average cost per patient was calculated from health authority records. The average cost per patient attending the MIU for treatment was estimated to be £6.90 in 1989/90, considerably cheaper than the £16 average cost per patient at the neighbouring accident and emergency department (at 1989/90 prices). Bevan and Morris-Thompson (1993) examined comparative costs of MIUs based within community hospitals. These are reported to be approximately 50 per cent lower than full acute A&E departments (Read, 1994). No data are presented on patient outcomes.

6.1.2 Explaining the study findings

Ferber and Becker's study of emergency centres (1983) seems to indicate little substitution for first contact care. This is an interesting finding given the widespread development of these centres in the US during the 1980s. A possible explanation is that the analysis did not adequately control for confounding variables. Certainly, the finding that free-standing emergency centres tend to be located near to very large hospitals suggests that clinics are deliberately located in densely populated areas, but there could be other factors not matched for in the control sample such as socio-demographic characteristics. The lack of any change in the intervention sample before-and-after clinics opened, suggests that these centres might be attracting *additional* patients into the health care system or attracting patients who would previously have sought ordinary primary care. The American health care system is very different from the National Health Service in that free-standing emergency centres are independent health care providers which charge for care provided. As a result, they cannot be said to 'replace' hospital emergency departments. Hence, the results from the Ferber and Becker study (1983) may not be directly applicable to the UK.

The Edinburgh study (Heaney *et al, 1995*), in contrast, provides some evidence, albeit weak, that the MIU at the Western General Hospital was a substitute for patients who would otherwise have travelled to Edinburgh Royal Infirmary. However, the size of the effect reported here (a 15 per cent reduction) may not be entirely valid because of the difficulties in establishing a true pre-MIU period. The studies of MIUs in Kent and Manchester are similarly suggestive of a degree of substitution. Between 40 and 60 per cent of patients attending MIU claimed they would have attended an accident and emergency department for their injury if the MIU had been unavailable. Equally, though, a large proportion of MIU patients would *not* have attended an accident and emergency department for their condition. Without a clearer understanding of concurrent trends in hospital utilisation, a reliable estimate of net substitution remains elusive.

The results of the Kent and St Albans studies (Dale, Dolan and Lang, 1994; Newman, 1994), which examined the number of 'inappropriate' attenders at hospital emergency departments who also had access to an MIU, are conflicting. There are several possible reasons for these differences:

- the St Albans unit was comparatively new so patients may have been unfamiliar with the service and were more likely to attend the hospital accident and emergency department;
- appropriateness was assessed retrospectively using different methodologies;
- patients had to travel further to reach a hospital emergency department in Kent which may have deterred emergency hospital attendance;
- the St Albans and Kent MIUs offered a different range of services and were staffed differently which may have affected patient expectations of care.

The Kent results are surprising since the MIU in Folkestone had experienced a 20 per cent decline in attendance since 1987 and there was little publicity about the unit. Estimates of the number of A&E attenders for whom MIU care could have been safely substituted, were calculated retrospectively by health professionals and are hypothetical; that is to say, even if MIUs were better publicised or upgraded, patients might still choose to go to hospital for urgent treatment.

6.1.3 Policy implications

All the studies of MIUs identified in the course of this review showed mean waiting times for treatment were shorter at MIUs than accident and emergency departments and that patients were highly satisfied with the care received (Heaney *et al, 1995*; Jones, 1993; Garnett and Elton, 1991; Dale and Dolan, 1996; Bond, 1994; Dale and Dolan, 1993; Read, 1994; Sykes ,1996; Bevan and Morris-Thompson, 1993; Glasman ,1996). Nursing staff were clearly acceptable to patients in this context. Few studies examined clinical outcomes, but samples of MIU case notes were audited by an accident and emergency consultant in Basildon (Jones, 1993) and a panel comprising two general practitioners, a senior accident and emergency nurse and an A&E consultant in Edinburgh (Heaney *et al, 1995*). In Edinburgh, two per cent of case notes were judged to be 'unsatisfactory' and in Basildon the consultant found no incorrect diagnoses or prescriptions, suggesting that quality of care was not a limitation on the use of MIUs.

Nevertheless, MIUs are not always successful. The future of both the Deal and Folkestone units was under question at the time of the research (Dale, Dolan and Lang, 1994) and the Craigroyston evening service was withdrawn (Heaney *et al, 1995*). Many factors will influence cost-effectiveness, such as the size of the catchment population, opening hours, the range of services available, the distance to alternative sources of care, staffing structure, treatment protocols and publicity. Further research is needed to evaluate the best way of organising MIUs and emergency care for minor injuries and illness. For example, should the nurse-practitioner role be extended to include drug prescription, x-ray interpretation, and direct referral to specialist clinics? Should ambulance services have more discretion over patient destination?

It should be stressed that the cost analyses reported above are highly context-specific. For example, the Kent units were staffed by general practitioners on a sessional basis rather than nurse-practitioners and also accepted patients for elective minor surgery. The total costs (or savings) of establishing MIUs will depend largely whether the new unit is replacing a full-scale accident and emergency department or is an additional service. The cost-effectiveness of MIUs, (even where patient demand is high) *vis-à-vis* alternative sources of care has yet to be established.

Evaluating the impact of minor injuries units on overall service utilisation is made more complicated when an established accident and emergency department is closed simultaneously. In this situation, neighbouring hospitals can expect to receive more seriously injured patients because their catchment areas have effectively expanded for these conditions, but, predicting the utilisation rates and patterns of patients with minor injury and illness is less straightforward. Some proportion of patients who would have attended the original hospital will now use the minor injuries unit. But what proportion of patients? In the St Albans study, Newman (1994) estimated that between 16 per cent and 24 per cent fewer patients from St Albans attended the MIU and neighbouring accident and emergency departments in 1993 than had attended the St Albans accident and emergency department in 1992. It is unclear whether general practitioners faced increasing demand in 1993 or if more patients with minor problems self-treated.

The evidence presented leads to three further points. Firstly, MIUs seem to have very high reattendance rates - around 50 per cent in Deal and Manchester (Dale, Dolan and Lang, 1994; Garnett and Elton, 1991). This is much higher than the accident and emergency department average of 10 per cent (Audit Commission, 1996) and suggests that MIUs might increase total workload. In the absence of data on health outcomes, it is difficult to interpret these rates. Secondly, MIU referral rates to neighbouring accident and emergency departments vary

greatly. Around a fifth of attenders in Edinburgh and St Albans (Heaney *et al, 1995*; Newman, 1994) were referred to hospital compared with around two per cent in Folkestone (Dale and Dolan, 1996) and eight per cent in Manchester (Garnett and Elton, 1991). Units with high hospital referral rates do not seem likely to be offering an effective substitute for hospital care for a substantial number of patients, but rather duplicating assessment procedures and contributing to delay in treatment.

Finally, some MIUs described in the literature have few links with other emergency health care providers and operate in comparative isolation (Heaney *et al, 1995*), indeed the MIU concept is not always welcomed by health authorities (Jones, 1993), general practitioners or accident and emergency staff (Heaney *et al, 1995*). There is a danger in this situation that emergency health services may become fragmented and duplicated. Table 6 gives an example of the potentially diverse range of open access emergency services available at various times of the day.

Table 6. Examples from the range of open access emergency services

	Normal opening hours		
	8:00am-6:00pm	6:00pm-9:00pm	9:00pm-8:00am
Primary care	✓		
GP deputising services or co-operative with primary care emergency centre		✓	✓
Minor injuries unit	✓	✓	
Hospital based accident and emergency department	✓	✓	✓

Both the St Albans and Leicestershire studies (Newman, 1994; Bevan and Morris-Thompson, 1993) recommended closer links between the MIU and the local accident and emergency department to encourage collaboration over appropriate referral and treatment - the model adopted at St Charles' MIU in London (Baker, 1993). This would ensure, for example, that patients referred to the accident and emergency department from the MIU are 'fast-tracked' (that is, given priority) to minimise their overall time spent waiting for care. Dale and Dolan (1993) in their appraisal of options for the development of Gravesend MIU go further and

suggest the conversion of the MIU into an integrated minor injuries and primary care resource centre, that is, offering comprehensive primary care services in addition to treatment for minor injuries.

6.2.1 Telephone triage

In common with other developed countries, domestic access to a telephone is widespread in the United Kingdom: over 90 per cent of households now have access to their own telephone (Foster *et al, 1995*). This has prompted serious consideration of the potential for remote medical consultation, advice and triage. Callers to the hospital emergency department who do not require hospital treatment can be advised on home management or referred to an alternative service (such as their general practitioner) so that unnecessary hospital utilisation is reduced. Whilst there is a considerable literature on the quality of advice and the potential risk attached to telephone services in a range of settings (for example (Aitken, Carey and Kool, 1995; Singh, Barton and Bodiwala, 1991; Isaacman, Verdile and Kohen, 1992; Evans *et al, 1993*), very few studies have attempted to measure the success of accident and emergency telephone services on patterns of utilisation. Only one study met the review inclusion criteria and this is summarised in Table 7.

6.2.1 Study findings

Included studies

Shah *et al* (1980) evaluated the effect of the 'medical information center' (MIC) on paediatric hospital utilisation at the Hospital for Sick Children in Toronto. In March 1977, the centre was established to take responsibility for accident and emergency triage (which had previously been undertaken by untrained clerks), the dissemination of information on poisons and the provision of consistent and safe telephone advice to patients and physicians. All calls were taken by trained nurses working with treatment protocols. Emergency department attendances and hospital admissions in the two years before (1975-76) and after the centre opened (1977-78) were compared. The authors found a six per cent decrease in total emergency department attendances between the two time periods from 152,000 to 143,000. The number of patients treated in the emergency room for serious trauma and injury declined by ten per cent while the number treated in the walk-in clinic (the 'walking wounded') increased slightly (by one per cent). The proportion of emergency department patients who were admitted was unchanged (17 per cent), but the proportion of patients attending with an injury increased very slightly (38 per cent to 41 per cent).

Table 7. Summary of studies included for review

Author	Country	Method	Intervention	Main outcome measures
Included studies				
Shah *et al* (1980)	Toronto, Canada	SBA	Telephone triage and advice for patients, telephone advice for physicians	Hospital emergency department utilisation and admissions
Other studies				
Crouch *et al (1996)* Dale and Crouch *(1997)*	London, UK		Analysis of telephone calls to general A&E department, King's College hospital; Development of telephone triage system	Number of calls and advice given
Kernohan *et al* (1992)	Aberdeen, UK		Analysis of telephone calls to paediatric emergency department in Aberdeen	Number of calls, advice given and compliance
Molyneau *et al* (1994)	Liverpool, UK		Analysis of telephone calls to paediatric emergency department in Liverpool	Number of calls, advice given and compliance
Key: SBA = before-and-after study				

Appendix 1 gives more detail of interventions, settings and results

This hospital was a regional poison centre and was unusual in receiving a very large number of telephone calls (30,000 in 1978). The authors analysed the records of a consecutive sample of 1227 callers who had telephoned the MIC between January and September 1978. Fifty-five per cent of callers were given advice on how to deal with the problem at home. Around a quarter of callers were advised to bring the child to the emergency department. In a subsequent postal survey of callers who had telephoned between January and March 1979, just over half of all callers stated that they would have attended the emergency department if the telephone advice line had not been available (231/430); this was also true of callers for whom emergency department attendance had been unnecessary (178/341). Physicians made little use of the telephone advice service.

Changes in population structure or the health care system over the four years of the study period are not discussed by the authors, so it is difficult to ascribe the overall reduction in emergency department attendance to the telephone advice line with confidence. The more consistent triage practice intuitively seems a likely explanation for the changing pattern of use of the walk-in clinic and emergency room, but the complexity of the intervention makes this difficult to assess. A further difficulty in evaluating the true impact of telephone advice is that previous practice was taken as the comparison, but little is known about the process and outcomes of patient calls *before* the development of the MIC.

Other studies

Some recent British studies are worth describing here, although these studies do not attempt to quantify the impact of telephone services against a defined baseline. Two studies (Molyneux *et al, 1994*; Kernohan, Moir and Beattie, 1992) examined relatively informal systems of telephone service - the prevalent form of provision in British accident and emergency departments.

Molyneux *et al* (1994) conducted an observational study at the Royal Liverpool Children's Hospital in 1992. Around 15 per cent of all patient contacts were conducted by telephone in this year. Telephone calls were answered by a senior nurse. A survey of all 764 calls made during a four-week period in June and July 1992 revealed that 84 per cent of callers had not been advised to contact the accident and emergency department by anyone else and most had not consulted any other health agency beforehand (69 per cent). Forty per cent of callers needed only advice or reassurance to manage the problem at home, around a third of callers were advised to bring their child to the hospital and a fifth were referred to their general practitioner. Of parents advised to bring their child to the accident and emergency department, only two-thirds subsequently attended. In contrast, 41 per cent of those advised to go to the general practitioner and 7 per cent of those given advice and reassurance, nevertheless, attended the hospital. The study found, not surprisingly, that many calls were received during periods when the accident emergency department was busiest (early evenings and weekends) and took up a considerable amount of the senior nurses' time.

Kernohan *et al* (1992) also looked at telephone advice in a paediatric accident and emergency department in the Royal Aberdeen Children's Hospital. Here a consecutive sample of 493 calls was evaluated from March 1989. Again most calls were received in the evenings and were perceived as a significant burden by the staff. The type of advice given was significantly different from that in Liverpool with 43 per cent of callers advised to attend hospital (93 per cent of these patients did subsequently attend) and 42 per cent given reassurance and advice

on home management. Of callers not advised to bring their child to the hospital, around nine per cent subsequently attended.

Crouch *et al* (1996) analysed telephone calls to King's College Hospital A&E department - a general department treating adults as well as children. All calls over a three-month period covering November 1993 to February 1994 were analysed. Almost 600 calls were received during this time. Twenty-seven per cent of callers were advised to attend the department and 32 per cent were given advice or reassurance about self-care. The remainder were referred to their general practitioner. The number of patients complying with advice is not reported. Subsequently, King's College School of Medicine and Dentistry has developed a telephone advice service (TAS) with computerised decision support protocols to aid consistent and safe telephone consultation and triage (Dale and Crouch, 1997; Crouch *et al, 1996*; Crouch and Dale, 1997; Dale, Williams and Crouch, 1995). This system is protocol-driven and designed for use by trained nurses - the staff most likely to provide telephone advice in hospitals. The scheme is being piloted in a variety of settings: accident and emergency departments, general practice and minor injuries units. To date, the results suggest that successful implementation of the system requires considerable staff training and support and organisational commitment (Dale and Crouch, 1997).

6.2.2 Explaining the study findings

Shah's study of the reorganisation of the Toronto Hospital for Sick Children's information and triage procedures provides weak evidence that substitution may be achievable as a result of providing consistent telephone advice from a paediatric emergency department. However, even if the net reduction in emergency department attendance could be ascribed to the reorganisation of telephone services, (rather than changes in morbidity, the restructured triage system, or other health care developments), a six per cent reduction seems modest. This is not surprising because telephone advice was provided in the control period as well. The intervention focused on quality, that is, *who* gave advice and *what* advice was given. It did not explicitly attempt to influence the numbers of callers using the service.

The same is true currently in the United Kingdom: national guidelines on accident and emergency telephone services were issued in 1992 (British Association for Accident and Emergency Medicine, 1992) and most hospitals' emergency departments already provide some form of informal telephone service (Evans *et al, 1993*). The advice given to patients and subsequent patient compliance differed between the studies reported here, but in all three cases the majority of callers were not judged to need hospital attention. The difference in advice given and patient compliance in the Aberdeen and Liverpool paediatric emergency

departments may have been due to differences in the socio-demographic composition of the population, population morbidity, or differences in the organisation of the telephone services which were developed separately from one another.

6.2.3 Policy implications

There is a paradox in the effect of providing telephone triage in the emergency department. Although it seems to succeed in preventing some unnecessary attendance, it is perceived as a time-consuming additional task by accident and emergency staff with associated costs (Kernohan, Moir and Beattie, 1992). Attempts to standardise the service, such as the King's College TAS require a large investment in nurse training and support. Substitution and quality are the key incentives for making such an investment. However, the scope for substitution, in the UK at least, is limited by the low volume of calls currently made to many hospital emergency services - particularly to non-paediatric departments. For example, at King's College accident and emergency department only six patients telephoned the department per day on average between November 1993 and February 1994 (Crouch *et al, 1996*). A contemporaneous study at Peterborough District Hospital accident and emergency department suggested an average of just three calls a day (Egleston, Kelly and Cope, 1994).

A cost-effective solution might be to encourage more patients to contact the hospital by telephone before arriving. As an explicit policy, however, this is open to interpretation as a barrier to public access to emergency services and likely to be highly politically sensitive in the NHS. Raising awareness of accident and emergency telephone advice, of course, far from relieving pressure on hospital staff, may actually increase the number of calls received.

An alternative option could be the development of a dedicated telephone triage service either within the hospital (if justified by patient demand), or at an alternative location, (for example, a general practitioner co-operative, minor injuries unit or ambulance headquarters). The latter option offers more scope for the promotion of the telephone as a first point of access for a range of urgent care services and advice. Clearly, the feasibility of such a scheme is dependent on the triage process being 'portable' and acceptable to patients. The results of the King's College TAS pilot tests suggest that nurses can provide effective advice in a range of settings, but there is little published research on the scope for other professionals to operate such a system or its cost-effectiveness. A pre-requisite for the successful integration of telephone communication systems is co-operation between different health care agencies, for example, to agree local protocols for referral to hospital.

The natural extension of these ideas is the recommendation made in the recent Department of Health, Chief Medical Officer's review of pre-hospital emergency care that a telephone helpline should run alongside the '999' service (the so called '888' service) (NHS Executive, 1996). The review was published as a consultation document in 1996, but it seems likely that telephone triage and advice will be subject to further evaluation as a result. A form of protocol-driven telephone triage, *priority dispatch,* has been successfully piloted in the ambulance service (Jones, 1996; Department of Health, 1996b). These developments could signal a radical change in the future organisation of emergency care.

Section 7

Barriers to Hospital Access

In the United States in particular, the rise of 'managed care' systems, with their focus on cost containment, has resulted in the increase of restrictions on emergency department access. In relation to first contact care, health providers have tended to restrict emergency department to those patients judged to be in need of hospital emergency care or those patients prepared to bear the cost of the visit. Barriers to access are occasionally cited as a viable policy option for the National Health Service (Davies, 1986), but are they effective in reducing the demand for secondary services? 'Managed care' extends across primary and secondary care boundaries and there is therefore some overlap between some of the interventions described in this section and previous sections.

7.1 Referral schemes and copayments

Ten studies were located which met the review inclusion criteria (Table 8). Nine of these studies were American; one study described a Swedish experiment. One study was a randomised controlled trial.

7.1.1 Study Findings

The majority of studies examined the impact of restricted access to the emergency department. Chan *et al* (1985) conducted a controlled before-and-after study of a diversion programme in Los Angeles county. This was a state organised scheme designed to contain costs and provide more appropriate primary care to a deprived population. Patients attending the hospital emergency department with primary care type problems who were resident in areas with primary care clinics were screened by 'community workers' (not defined) and a physician and, if appropriate, an appointment was made at the local clinic. All patients in the intervention group were informed about the primary care facilities available in their area. Baseline measurement revealed that the intervention and comparison groups (selected by area of residence) had a somewhat different pattern of health care utilisation *before* the diversion programme.

Table 8. Summary of studies included for review

Author	Setting	Method	Intervention	Outcome measures
Included studies				
Chan *et al* (1985)	Los Angeles, US	CBA	'Inappropriate' A&E attenders triaged to primary care providers	Hospital emergency department utilisation
Derlet *et al* (1994; 1995)	Sacramento, California, US	SBA	'Inappropriate' A&E attenders triaged to primary care providers	Health care utilisation of referred patients; Patient outcomes
Gadomski *et al* (1995)	Maryland, US	CBA	'Inappropriate' A&E attenders triaged to primary care providers	Health care utilisation of referred patients; Patient outcomes
Hansagi *et al* (1990; 1989; 1987) Edhag *et al* (1986)	Stockholm, Sweden	CBA'	'Inappropriate' A&E attenders triaged to primary care providers	Hospital emergency department utilisation; Primary care centre utilisation
Kelly (1994)	Yuba, California, US	SBA	'Inappropriate' A&E attenders triaged to primary care providers	Hospital emergency department utilisation
O'Grady *et al* (1985)	Various, US	RCT	Copayment for emergency department utilisation	Hospital emergency department utilisation
Rivara *et al* (1986)	Memphis, US	SBA	'Inappropriate' A&E attenders triaged to primary care providers	Utilisation of primary care, compliance and satisfaction
Selby *et al* (1996)	Northern region of California, US	CBA	Copayment for emergency department utilisation	Hospital emergency department utilisation
Skinner *et al* (1977)	Houston, US	SBA	Referral from hospital outpatient department to primary care providers	Hospital outpatient utilisation; Hospital emergency department utilisation; Primary care utilisation
Straus *et al* (1983; 1980)	Baltimore, US.	SBA	'Inappropriate' A&E attenders triaged to primary care providers	Hospital emergency department utilisation
Other studies				
Wrenn and Slovis (1996)	Tennessee, US		'Inappropriate' A&E attenders triaged to primary care providers	Account of the experience of setting up a Medicaid managed care scheme

Key: RCT = Randomised controlled trial; CBA = Controlled before-and-after;
SBA = Simple before-and-after; Obs = Comparative observational study

Appendix 1 gives more detail of interventions, settings and results

All patients who attended the emergency department in April 1981 were included in the evaluation. The study found little change in the emergency department utilisation of patients in the intervention group in the twelve months before and after the intervention. Similarly, there was no significant difference between the intervention and control groups following the intervention; the annual rate of attendance was similar in both groups (0.5 visits per person).

However, over the same period, there was an extraordinary increase (over 500%) in the number of visits made to the neighbourhood health clinics by the intervention group (average annual rate of 0.18 pre- and 1.01 visits per person post-intervention). Utilisation rates of the neighbourhood clinics also increased in the comparison group, doubling over the study period (from 0.05 to 0.10 visits per person). So instead of substituting care, the intervention seems to have revealed additional latent demand for primary care. The authors suggest that the limited opening hours of the primary care clinics may have contributed to the lack of reduction in emergency department utilisation. However, it seems at least as plausible, that the length of time to get an appointment at these centres (*average:* two weeks; *range:* one to four weeks) was a deterrent for problems perceived as requiring immediate care. In addition, patients were normally given initial treatment at the emergency department before their referral, perhaps reinforcing attendance as an appropriate behaviour. This is an interesting study because it suggests that despite high levels of 'inappropriate' attendance at the hospital emergency department and the apparent availability of primary care health centres, the population had high levels of unmet primary care need despite the existence of public funded primary care health clinics. The costs of primary care attendance were estimated to be approximately half that of a hospital visit, but few data are presented to support this figure.

A similar scheme was evaluated by Straus *et al* (1980; 1983). The utilisation patterns of patients who had been referred to a primary care programme following treatment in an American hospital emergency department in suburban Baltimore were examined 18 months before and two years after the index visit. Patients were eligible for referral if they lived locally, had experienced a 'non-urgent' problem not necessitating admission and if they had no primary care provider. Here patients were likely to be referred to primary care programmes being run by and situated in the hospital. In contrast to the Los Angeles study (Chan *et al, 1985*) the scheme was associated with a decline in subsequent patient utilisation of the emergency department for all referred patients, including those who did not comply with the initial referral. Utilisation of primary care, again, increased. Patients who attended an initial appointment were likely to attend their primary care provider again over the study follow-up period.

Gadomski *et al* (1995) focused on a Medicaid managed care programme (Maryland Access to Care) which began in January 1992 in which paediatric attenders triaged to a 'primary care' category were *denied* treatment at a paediatric emergency hospital department in inner city Baltimore. The emergency department utilisation patterns in two six-month periods in 1991 and 1992 (July-December) were compared. Overall, there was a five per cent reduction in emergency department attendance. Attendance by 'non-emergency' Medicaid patients on the programme fell by 27 per cent. But attendance also declined in the comparison group of non-Medicaid 'non-emergency' patients by 22 per cent. Over the same period, attendances for 'urgent' and 'emergency' conditions increased (12% and 21% respectively) regardless of payer status, for reasons which are unclear.

Longer term patterns of utilisation were also assessed. The 216 children who were denied care were compared with two matched samples (matched by age, sex and main medical complaint). The first comparison group comprised children who had succeeded in obtaining authorisation for treatment at the emergency department and, the second, children seeking initial care at an adjacent primary care clinic. The emergency department utilisation rates were similar for children denied care and accepted for care at the emergency department (0.65 visits per child over the study period). Subsequent emergency department utilisation was significantly lower among children who had sought initial care from a primary health care clinic (0.33 visits per child). The children who had been denied care had significantly higher hospitalisation rates than the other two groups at 0.18 admissions over the six months.

No direct information is presented on the take-up of other managed care programmes and health maintenance schemes during the study period which may confound the figures, or on the extent to which patients were reclassified as 'urgent' to allow treatment without prior physician approval. The emergency department opened an extended 'lacerations service' in 1992 which may explain some or all of the increase in more seriously injured patients attending the hospital.

Hansagi *et al* (1990; 1989) evaluated a referral scheme in Huddinge Hospital emergency department in a suburban area of Stockholm in April 1984. This scheme was aimed at *adult* attenders at an accident and emergency department with 'non-emergency' medical problems. Data on health care utilisation one year before and one year after the index visit were collected for a sample of attenders referred by a nurse advisor at the accident and emergency department to their local health clinic for primary care.

Data were also collected on self-reported patient satisfaction, health outcomes and general attitudes to health care provision. As in the Baltimore scheme (Gadomski *et al, 1995*), patients eligible for referral were not seen by a physician or treated in the emergency department before referral. However, in this study, a primary care appointment was arranged for the patient by the trial nurse at the time of referral, where appropriate.

Eleven per cent of 347 patients seen by the nurse advisor refused to be referred and were treated in the emergency department. The nurse successfully referred 192 patients. The comparison group was comprised of a further 107 patients who would have been eligible to see the nurse advisor during the study period, but were treated in the emergency department because she was unavailable. The proportion of referred patients who attended the emergency department declined by 14 per cent in the year following the intervention while the proportion of patients from the comparison group attending increased by 25 per cent. In terms of the utilisation rate however, there was little change over the study period in the referred group. In marked contrast, the average number of emergency department attendances doubled in the comparison group. The 'appropriateness' of visits, assessed by case note review, did not significantly differ between the two groups after the intervention. The rate of utilisation for primary care and the emergency department *combined* was similar for both groups both before and after the intervention. No data were presented on costs or cost-effectiveness.

Compliance was high: 93 per cent of the referred group who were given a primary care appointment subsequently kept it. However, self-reported recovery was significantly poorer in the referred group. Interestingly, referred patients who had obtained an appointment were significantly more satisfied with care *in the emergency department* than the comparison group although there was no difference between the referred and comparison groups with respect to satisfaction with primary care.

This is an interesting European study which does suggest that the intervention resulted in modest substitution. Methodologically, there is a question over the comparability of the two patient groups. In particular, the comparison group was likely to have included a proportion of patients who would have refused referral (these were selected out of the referred sample) and these patients may have had a greater propensity to use the hospital emergency department. The possible reasons for the observed rise in overall demand for ambulatory health care in both groups, over a relatively short time-span, were not discussed in the paper.

Kelly (1994) describes in some detail the process involved in setting up an effective referral system in an overcrowded hospital emergency department in California. In this case, many patients were uninsured with no access to primary care facilities. The Fremont-Rideout

Health Group which owned the hospital also took over the management of a nearby health centre (Kelly, 1994). The time taken to triage patients, give advice and make a referral was considerably longer than the previous practice of 'booking' patients into the emergency department, but the scheme was continued in anticipation of cost savings and an improvement in the standard of patient care for non-emergencies.

This paper presents a very simple analysis of utilisation from uncontrolled before-and-after data and it is not clear over what period of time these data apply. At the same time as the referral scheme, better access to primary care was established for low income patients. Thus the results should be viewed with caution. However, the intervention was clearly viewed by staff as a success. After the introduction of the referral system in January 1992, emergency department physicians were treating, on average, 800 fewer patients a month, a 25 per cent reduction. Evidence on the utilisation of primary care facilities is not presented.

Rivara *et al* (1986) conducted a simple before-and-after study in a paediatric hospital in Tennessee serving a low income population in Memphis. Here the direct impact of the triage scheme in the emergency department was marked; 28 per cent of all attenders over a six-week period between October and November 1982 were referred from the hospital to primary care substitutes. A further eight per cent were sent home with advice on self-care. Sixty-three per cent of patients for whom a primary care appointment was arranged by the triage nurse, subsequently attended. The researchers contacted patients two weeks after their index visit (the response was biased towards patients with access to a telephone) and found that 82 per cent of patients had completely recovered. There was no correlation between patient outcome and the site of treatment; that is, whether the child was treated within the emergency department, another hospital clinic, a primary care setting, or was sent home without treatment.

Skinner *et al* (1977) examined a scheme in which patients with chronic conditions attending the general medical outpatients clinics at one public hospital in Houston were referred to more appropriate neighbourhood health clinics (primary care providers). A before-and-after analysis of patient utilisation patterns suggested that the scheme had had an important impact on patients' utilisation of outpatients clinics over a six-month follow-up period but also indicated a wider effect on utilisation behaviour, including a significant reduction in the rate of emergency department attendance (from 0.6 to 0.2 visits per patient per annum on average). The rate of primary care visits was significantly increased after the index referral suggesting a substitution effect. There was no control group, so the observed changes may not be directly attributable to the intervention.

Derlet *et al* (1995) evaluated a triage system at the emergency department of a hospital in Sacramento, California. Trained nurses examined patients before referral. Appointments were not arranged at the hospital, but information was provided on alternative sources of care. Two per cent of referred patients returned to the emergency department because of self-reported difficulties in accessing primary care. Few adverse outcomes (0.5 per cent) were attributable to the triage scheme and these were not considered serious; no patient was subsequently admitted for hospital treatment after having been referred out of the department. A cost analysis suggested that the triage scheme represented potential savings on *hospital care* of $3,500,000 over five years (excluding set-up costs). Interestingly, the number of patients annually referred out of the department declined by 40 per cent over the five year study. The authors attribute the decrease in the number of 'primary care' attenders to demographic changes and a reorganisation of local health care provision; in particular the growth of HMOs in the vicinity facilitated wider access to good quality primary care services. The referral scheme itself may have contributed to more appropriate utilisation over the longer term but this hypothesis is not explored in the study.

Diversion schemes are not always successful. Wrenn and Slovis (1996) describe the implementation of a state-wide managed care system supplanting Medicaid in Tennessee. Patients were compelled to enrol with participating primary care physicians. Patients attending the hospital emergency department without the approval of their physician were denied access. The hospital was also required to refer patients to primary care providers for follow-up care. The scheme was implemented rapidly in January 1994 and is described as resulting in widespread confusion amongst patients and providers. In a survey of patients attending the emergency department at one hospital in March 1994, five per cent of patients triaged to their primary care physician were subsequently hospitalised. Wrenn and Slovis identify several reasons for the difficulties in implementation: patients did not have enough information to choose the most appropriate plan for their needs; there were too few primary care physicians; and referral routes between the hospital and alternative providers did not exist. There are parallels here with the earlier Citicare scheme in Baltimore (Bonham and Barber, 1987) which was eventually abandoned.

Two studies focused on copayments. Copayments are a blunter instrument to reduce 'inappropriate' attendance since they apply to all attenders and require no prior medical assessment. O'Grady *et al* (1985) analysed data from a randomised controlled trial of health insurance schemes with emergency care copayments. This research was part of the Rand Health Insurance Experiment (Newhouse, 1982; Brook *et al, 19*83). Patients were randomly assigned to one of five insurance plans with different rates of cost-sharing. One insurance plan offered free access to emergency department services and patients enrolled on this

scheme were taken as the comparison group. The patients liable for copayments were significantly less likely to visit the emergency department in the following three years (for example, patients liable for 25 per cent of emergency room expenses made 21 per cent fewer visits per thousand patients). Interestingly, the size of the copayment did not seem an important influence on patient behaviour. This is likely to have been because the total annual 'out-of-pocket' expenses incurred by families was capped (in relation to household income). The effect of cost sharing was also evident in emergency visits resulting in admission (33 per cent fewer visits per thousand patients). The copayment schemes had a significant impact on both urgent and less urgent diagnoses (as classified by a panel of four emergency physicians) but this effect was much more marked on less urgent conditions (23 per cent fewer visits for urgent conditions and 47 per cent fewer visits for less urgent conditions). The authors found no difference in the effects of copayments on attendance for accidents or illness. Low income groups were as sensitive to cost-sharing as other groups although these patients made more use of the emergency department on average than other patients.

Selby *et al* (1996) conducted a controlled before-and-after study of the impact of a fixed copayment of $35 or $40 introduced by the Kaiser HMO. The charge was requested by a group of firms sponsoring health insurance schemes for their employees and only applied to employees of these firms. All patients who were subject to the payment were included in the study, with the exception of children under one year of age. Two comparison groups were studied: the first was a randomly selected sample of enrolees who were not subject to the payment; the second was a sample of enrolees from similar firms to those in the intervention group. Utilisation rates were compared in the year preceding (1992) and following (1993) the introduction of the charge. The copayment groups reduced their utilisation of the emergency department by 15 per cent relative to both comparison groups. Interestingly, utilisation of other outpatient facilities did not greatly change in the copayment group - the assumption is that patients chose to access their primary care providers. The research suggested that the impact of the intervention was borne by patients with minor conditions - the relative change in the minor group was almost 30% relative to the comparison group. Nevertheless, attendance in the most severe group fell by seven per cent. Outcomes as measured by inappropriate admissions and mortality did not significantly change in any group although there are questions about the sensitivity of these two outcome measures. Primary care utilisation was not measured and neither were costs.

7.1.2 Explaining the study findings

The studies evaluating referral schemes revealed variation in the direct impact of the intervention, that is the proportion of all patients referred away from the emergency

department. This varied from below five per cent (Chan *et al, 1985*; Straus, Orr and Charney, 1980; Gadomski *et al, 1995*; Hansagi, 1990), to around ten per cent (Derlet *et al, 1994*; Kelly, 1994) and 36 per cent (Rivara *et al, 1986*). Two of these studies (Straus, Orr and Charney, 1980; Chan *et al, 1985*) referred patients following treatment, reducing the direct impact of the scheme in practice. Clearly, the scope for direct substitution of primary care for emergency department care depends both on the proportion of patients attending with primary care needs and on the specific triage system employed by the hospital. Nurse-led triage was common to all the schemes reported here, but, the specific triage criteria were unique in each study. The studies referring low proportions of patients tended to have stricter eligibility criteria. For example, referral in the Los Angeles study (1985) was limited to patients resident in areas with a participating primary health care centre (seven postcodes out of 50 in the hospital catchment area). In the suburban Baltimore study (Straus, Orr and Charney, 1983), only patients with no regular source of primary care were referred; whilst in Maryland (Gadomski *et al, 1995*) the intervention was restricted to Medicaid patients. The Memphis study (Rivara *et al, 1986*), in contrast, referred over a third of paediatric patients. Here the recent closure of a nearby hospital outpatients department may have increased the number of patients attending with non-emergency problems. The five-year evaluation of a Californian referral scheme by Derlet *et al* (1995) showed that, even in one hospital employing a consistent triage system, the proportion of patients eligible for referral was not necessarily stable over time.

Referral schemes are expected to have a wider impact on patient behaviour by educating patients about appropriate attendance and enrolling patients with primary care providers for continuing care. None of the three studies that examined longer term utilisation against a comparison group found a significant long term *decrease* in emergency department utilisation that was attributable to the intervention. However, the Swedish study (Hansagi, Allebeck and Olof, 1989) found a significant difference between patient groups with emergency department visits doubling in the comparison group and remaining stable in the intervention group. The three uncontrolled studies that examined longer term utilisation did observe decreases but these results may be confounded by secular trends. Three studies examined the impact of the intervention on primary care utilisation. Both the Swedish study (Hansagi, Allebeck and Olof, 1989) and the Houston study (Skinner, Price and Gorry, 1977) found evidence that primary care acted as a substitute for emergency care with overall utilisation of primary and emergency facilities remaining stable over the study period or between comparison groups.

Both the studies of copayments reviewed here (Selby, Fireman and Swain, 1996; O'Grady *et al, 1985*) were well designed and provide strong evidence that cost sharing significantly reduces hospital emergency department attendance. The overall impact on utilisation will

depend on the number of patients eligible for cost sharing. Interestingly, the absolute size of the copayment seemed to have little effect on utilisation in these studies. In both studies it is assumed that patients utilised their primary care physician, (primary care is relatively accessible for insured patients) although no data are presented to support this assumption. In both these studies, copayments did result in some reduction in attendance for relatively urgent conditions. This is not surprising given the blunt nature of the intervention which applied to all emergency department attenders. Concerns remain about the effect of copayments on health outcomes.

7.1.3 Policy Implications

The evidence on barrier schemes suggests that they may be useful in diverting patients away from hospital. Referral schemes which divert patients away from the hospital *before treatment* were more likely to promote substitution of first contact care. Copayments as an intervention were aimed at patients able to afford insurance premiums, in contrast to the referral schemes reviewed above, which tended to focus on low income patient populations. Data on outcomes and compliance suggest that barriers to emergency department utilisation carry an acceptable level of risk (Derlet *et al, 1995*) and are acceptable to patients (Hansagi, 1990), although some concerns about the sensitivity of triage systems and their effects on health outcomes have also been noted (Wrenn and Slovis, 1996; Lowe, Bindman and Ulrich, 1994; Birnbaum *et al, 1994*). The outcomes evidence is difficult to assess against the plethora of different triage schemes. Cost-effectiveness was not assessed in the literature.

The referral schemes reviewed here almost always involved a lengthy process of assessment, for example, ranging between ten minutes and two hours in a descriptive study of compliance by Kuensting (1995). Additional training was provided for staff involved in the referral procedure. The triage decision was made in conjunction with patient education about primary care options and an explanation for the referral. In one study, nurses physically examined patients before referral (Derlet *et al, 1995*) and in several schemes the nurse was also responsible for making a primary care appointment or follow-up telephone calls. These schemes then involved considerable commitment in staff time and responsibility.

Most of the research reviewed here is American. Cost-containment is a goal built into many health care systems including the NHS, but American managed care schemes provide an effective mechanism to influence patient demand for health care across the primary and secondary sectors. Patients not complying with authorised referral routes are either denied access to care or must bear the cost of treatment. Medical claims databases also provider American researchers with reliable data on health care utilisation. In the United Kingdom

such mechanisms are far less well developed. The British system is further complicated by a strong tradition of open access accident and emergency services.

Whilst it is difficult to envisage widespread adoption of cost-sharing in the NHS, there may be considerable scope to extend nurse triage in emergency departments to refer patients to primary care settings. This seems most likely to develop where primary care emergency centres are located adjacent to accident and emergency departments. Furthermore, vertical integration of care is encouraged in the primary care White Paper *Choice and Opportunity* (Secretaries of State, 1996) which stresses flexibility and innovation in service provision. For example, total purchasing in which general practitioners are responsible for purchasing most or all health care for their patients may provide an opportunity for GPs to manage their patients' utilisation more actively. Inner city London hospitals could feasibly become involved in *establishing* primary care clinics to alleviate 'inappropriate' demand from commuters and tourists.

Section 8

Conclusions

This review has focused on the extent to which first-contact emergency services can be transferred to primary care or community based settings. The benefits of substitution as a general policy have been put forward (South East Thames Regional Health Authority, 1994; Townsend, 1994) as offering a more appropriate level of care for certain conditions, in a familiar and convenient setting. In addition, hospital care, particularly inpatient care, is costly, so substitution might be expected to reduce costs.

While open-access accident and emergency departments and the "999" service may be very convenient, it seems that many patients currently attending hospital for immediate care could be treated in a less specialised setting (Singh, 1998; Lowy, Kohler and Nicholl, 1994; Padgett and Brodsky, 1992). There is considerable pressure for change in emergency service provision in the United Kingdom, but this is largely driven by supply-side tensions (in both the primary and secondary sectors) in dealing with increased demand rather than the result of changing patient preferences. Emergency health care provision is already changing with the rapid development of large general practitioner co-operatives and minor injuries units replacing many full scale accident and emergency services. Pre-hospital care has recently been the focus of a Department of Health review chaired by Sir Kenneth Calman (NHS Executive, 1996). Nonetheless, we have found little evaluation of service changes in the UK in terms of their impact on service utilisation and cost-effectiveness.

At the beginning of this review, we posed four questions. What evidence is there of substitution in relation to accident and emergency services? Are there particular interventions which are more likely to result in a decrease in accident and emergency attendance and/or inpatient admissions? Can particular types of patient or condition be identified which are more cost-effectively treated in a primary care setting than in an accident and emergency department? And, are the findings of existing studies applicable to health services in London?

The nature and quality of the available evidence is variable and limits the confidence with which we can answer these questions. For example, few studies presented data on cost-effectiveness. But there is some evidence of substitution in relation to particular interventions.

The papers which met the review criteria, suggest, firstly that access to primary care is an important influence on patient demand for accident and emergency care. However, whether the way in which primary care is organised makes any difference to patient behaviour is more

difficult to answer. Aspects of primary care organisation that have been hypothesised to be important such as general practice appointment systems, the use of nurse-practitioners in primary care (in the United States), single-handed general practitioners and the use of general practitioner deputising services appear to have little obvious impact on hospital utilisation for emergency care.

We found three studies that took primary care into the accident and emergency department. Here there was evidence, in urban settings at least, that patients who are seen by general practitioners in the accident and emergency department are significantly less likely to experience diagnostic tests or investigations (such as x-ray) and referrals to secondary care than patients managed by hospital doctors. There was no evidence of any change in health outcomes as a result of the intervention. The cost-effectiveness of this approach remains unproved.

American research of 'managed care' health schemes found that patients could be successfully transferred away from hospitals. The more effective mechanisms by which patients were diverted included copayments and, unsurprisingly, preventing patients judged to have primary care needs using the hospital (for example, by nurse triage and/or arranging appointments to see primary care professionals instead). Questions remain about the appropriate size of copayments and the effect of payments on health outcomes. The two studies included here found no obvious deterioration in outcomes but employed relatively insensitive indicators, for example, case-fatality rates for myocardial infarction (Selby, Fireman and Swain, 1996).

The scope for substitution of emergency care should be considerable, yet in practice, the results of interventions expected to achieve substitution in circumstances where people already have reasonable access to primary care have been modest. One reason may be that demand is largely driven by patient perceptions of the need for care which are not well understood by health professionals. Efforts to educate patients in the appropriate use of emergency services have been unsuccessful (Leydon *et al, 1996*). Patients who choose to self-refer to the accident and emergency department would normally be examined and if necessary treated there - perhaps legitimising the decision to attend (Bentzen, Christiansen and Pedersen, 1987).

Another important factor may be that primary care is already widely accessible in the UK, although coverage is not universal. The scope for influencing patient behaviour through further primary care based interventions may be much more limited than, for example, in the United States where primary care coverage has historically been uneven. There may be a natural ceiling effect within the NHS.

The cost savings associated with substitution may not be particularly high. Whilst the average cost of hospital accident and emergency department treatment is much higher than care provided in primary care and community settings, the marginal costs of treating primary care patients in the emergency department may be relatively low. Significant cost savings may only be achievable in cases where entire hospital-based departments or wards close, for example, as when an accident and emergency department is replaced by a minor injuries unit. Interventions which themselves require significant investment, for example, such as employing general practitioners, or training nurses for telephone triage may not be cost-effective.

This leads on to a more general point about systematic reviews of organisational interventions. These interventions belong within the context of particular health care systems, and are driven by a financial or organisational incentives which may not be applicable to the United Kingdom or London. The research included in this review includes British, North American, Israeli and Scandinavian health care settings over a period of twenty five years. There is considerable variation in the context of the studies included for review. Furthermore, we have been looking at complex interventions which are not always adequately described in journal articles (for the purpose of this review at least). The result is that generalising and interpreting findings from the literature is more than a question of methodology.

What are the implications for the way that emergency health care should be organised in London?

- Firstly, although many studies were set in metropolitan areas, primary care interventions described in the literature tended to target identifiable study populations for example low-income children resident in Rochester, New York (Hochheiser, Woodward and Charney, 1971). But primary care interventions aimed at relatively stable local populations may have mixed success in London, partly because of the ceiling effect described above, but also because many primary care hospital attenders in London are not locally resident.

- The variation in the precise nature of the interventions evaluated complicates things further, for example, the different triage systems and measurement tools used in the geographically similar St Mary's and King's College Hospital evaluations of general practitioners employed in accident and emergency departments obstruct a precise assessment of the likely benefits of the intervention.

- Prompt access to effective emergency care is a sensitive issue, particularly in London, where the ambulance service's failure to meet national performance targets was heavily publicised in 1992 and there has been widespread public concern over plans to rationalise the provision of acute care in the capital. It seems doubtful if any policy which formally restricted patient access to accident and emergency or ambulance through the introduction of user charges or triage systems would be publicly or politically acceptable in the current climate despite some success abroad.

With the exception of general practitioners working within A&E departments, it is not possible to identify a particular organisational intervention that might be expected to produce real resource savings or change the pattern of demand for emergency care in London. Indeed, experience in other countries has shown that implementing change in order to substitute primary for secondary care can have unexpected consequences, for example Darnell's study the out-of-hours primary care telephone advice line resulting in increased demand for emergency care (Darnell *et al, 1985*).

The interventions which seemed to be most successful in terms of substitution, namely the shift to managed care in the United States, were effective through harnessing provider and patient incentives to minimise expensive hospital utilisation. The rapid increase in general practitioner co-operatives is an example of the power of professional incentives to drive radical change (in this case a relaxation in general practitioners' contractual obligations out-of-hours). Perhaps the nearest current British equivalent to the health maintenance organisation in terms of the ability to motivate such change are the total purchasing projects.

It may be that the focus on substitution as a means of providing cost-effective emergency care is not particularly helpful in planning the health care delivery for Londoners. A more effective approach might be for purchasers and providers to evaluate areas of local weakness in their system. For example, what scope is there for improving the way ordinary acute hospitals work by providing appropriate primary care training for junior doctors or implementing guidelines for appropriate management in accident and emergency departments. The danger of this approach is a fragmented range of care options - perhaps duplicating services.

At the other extreme, the development of new technology seems to offer a more integrated approach to emergency care provision. A London-wide computerised telephone triage system (driven by the London ambulance service perhaps) might be feasible to direct patients to the most appropriate source of care before they leave home for the hospital.

Despite a thorough review of the available research evidence, these scenarios remain highly speculative at this point in time. Experimentation is already underway on total purchasing, and telephone triage. Research which focuses on the impact of options for care across both the primary and acute sectors is required.

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Appendix 1. Summary of Studies Included for Review by Author

Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Bonham and Barber (1987)	*Aims*: Cost containment; improve appropriateness of care; improved access to primary care and more preventative care *Setting*: County-wide state sponsored managed care scheme to replace Medicaid following rising costs and a financial crisis at Louisville general hospital *Population*: Jefferson County, Kentucky. Urban/suburban population. 40.000 recipients under 'Citicare' *Design*: before-and-after *Sample and study period*: Stratified random sample of households. Interviews with all household members Before: June-July 1983 (69% response) 300 households After: June-July 1984 (90% response) 208 households repeated 40 households on Medicaid long-term 100 new recipient households	Citicare Inc was paid $46.55 to cover care for each recipient Citicare Inc contracted with family physicians, hospital and home care and drugs. Capitation payments and financial incentives introduced to encourage low-cost preventative care 40% primary care doctors signed up. Recipients forced to enrol with these doctors Hospital emergency staff had to obtain clearance from primary care physicians to treat recipients unless life-threatening condition or urgent treatment required	Self-reported utilisation of health care, investigations, drugs and charges in previous three months; Perceived quality of health care; Perceived access to health care; Health status	*Rate of visits to hospital emergency department per respondent per year* Before 0.60 After 0.36 % Change -40% p<0.05 *Severity of hospital emergency department visits* 'Not health threatening' Before 39% After 28% No test *Percentage of visits rated 'excellent' or 'good' quality* Emergency dept Before 72% After 73% NS Family doctor 93% 87% NS Health centre 83% 92% p<0.05 *Percentage of all visits with following characteristics:* Patient charged Before 5% After 10% p<0.05 Doctor seen 90% 79% p<0.05 Tests 38% 28% p<0.05 X-rays 57% 54% NS Drugs 57% 54% NS Operations 4% 3% NS Authors report that the percentage of patients who felt they could contact their *own* primary care physician in an emergency decreased although primary care was still perceived as available Overall the programme cost 5% less than the previous Medicaid scheme	No natural control group - all eligible recipients were obliged to take part in Citicare. Medicaid provision varies from state to state, other parts of Kentucky rural Comparatively short study period (one year); sample not likely to suffer from maturation bias Low response in first survey, unclear if representative sample Appropriate analysis weighted to take account of differential response and assumed clustering of individual and visit characteristics within households Patients asked about previous 3 months. Not likely to be much recall bias over this short a period 'After' sample was stratified by Medicaid status - unclear if comparable with 'before' sample	Some evidence that Citicare successfully reduced health care costs to the state through reducing 'inappropriate' attendance at hospital emergency departments. Results are weakened by lack of control group However, Citicare was halted after a year The scheme was politically unacceptable. It was viewed as inapplicable to rural areas and had high administrative costs Physicians were opposed to capitation payments Patients were opposed to capitation payments, lack of choice of primary care physician (the scheme forced a major redistribution of patients to physicians) and restricted access to the emergency department

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Brown (1995)	*Aim*: To evaluate primary care nurse practitioner performance *Setting and study population*: Nurse practitioners in various primary care settings (not described) *Design*: Systematic review. Randomised studies analysed separately from other controlled studies. Independent reviewers assessed studies against inclusion criteria (not fully specified) *Sample*: 38 studies (out of 142 located in search) *Study period:* Literature search from June 1991-May 1992	Interventions provided by primary care nurse practitioners where performance measured against physician care	Various measures including patient compliance; utilisation of hospital emergency department care'; admissions; laboratory testing; prescribing and patient satisfaction Pooled effect sizes calculated	*Nurse practitioner performance relative to physician care (weighted effect size)* *Randomised studies* Compliance: Effect +0.36, Number of studies 3, p<0.05 *Quasi-experimental studies* ED visits: -0.03, 3, NS Satisfaction: +0.30, 5, p<0.0001 Laboratory tests: +0.20, 4, p<0.0001 Prescriptions: -0.07, 3, NS Functional status: +0.03, 3, NS *Observational studies* Admissions: -0.17, 3, p<0.0001 Time with patient: +1.02, 3, p<0.0001	Little information given about individual studies	Limited evidence to suggest that primary care-based nurse practitioners have not substituted for emergency department care Strong evidence that nurse practitioner care is at least as effective as physician care for appropriate interventions

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Campbell (1994)	*Aims*: To evaluate the impact of general practice appointment systems on emergency department utilisation *Setting*: West Lothian - semi-rural district of Scotland. Higher than average indicators of deprivation Observational study *Sample*: Postal questionnaire survey of practice patients attending 18 participating practices and one A&E. Patients attending participating practices 5685 (response 66%) St John's hospital A&E department 275 (response 65%) *Study period*: 8 consecutive weeks between February and April 1993	No specific intervention. Observational study comparing range of appointment systems in 17 practices and one open access practice	Primary care appointment availability (adjusted for list size); workload and list size Satisfaction with primary care availability Waiting time before consultation Source of referral to St John's A&E	*Emergency department utilisation (self-referrals) per person per year* Number of free appointments at start of day (practices grouped into bands) Low 0.13 Medium 0.14 High 0.16 No significant difference Workload (number of consultations) (practices grouped into bands) Low 0.16 Medium 0.14 High 0.14 No significant difference List size (practices grouped into bands) Low 0.14 Medium 0.16 High 0.10 No significant difference 70% of A&E attenders from participating practices self-referred. Self-referral (but not GP referral) was significantly associated with distance *Not 'satisfied'* General practice Self referred A&E 23% 36% p<0.001 Both self-referred and referred attenders perceived their general practitioner to be available for urgent (same day) appointments (71%). No measure of availability, perceived availability of the general practitioner for urgent appointments or waiting time were significantly correlated with A&E attendance for accidental injury	Large observational study - careful construction of variables around availability. However, only real comparison was between practices with appointment systems. The one practice with an open system was untypical in other respects. No adequate control for case-mix differences between the primary care and A&E samples. May be some recall bias in A&E attenders group, self-referrers may not have recent experience of the practice appointment operation. Unclear if there were socio-demographic differences between the A&E attenders and primary care attenders. Satisfaction questions only related to administrative availability. No questions on satisfaction with quality of care.	Reasonable evidence that primary care appointment availability does not greatly influence inappropriate attendance at A&E. Primary care was generally perceived to be available for urgent need. Results may not be generalisable to urban settings.

Appendix 1. Summary of Studies Included for Review by Author

Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Chan *et al* (1985)	*Aim*: Assess impact of referral from emergency department to primary care clinics *Setting*: University of Southern California Medical Center - the largest acute hospital in Los Angeles county. Seven neighbourhood health clinics participated in the study *Population*: Adult patients attending the 'walk-in' area of the hospital emergency department and triaged to 'referral' *Design*: Controlled before-and-after study. *Sample*: Intervention: 260 patients resident in participating clinic catchment areas (7 of 50 zip code areas) Control: 1468 patients not referred *Study period*: Before: 1980/81 After: 1981/82 *Exclusions*: Patients without a hospital number prior to April 1980.	Community workers trained for the project screened all patients for residence criteria from 8.00am to 6.00pm during weekdays in April 1981 Patients then treated by a physician who 'triages' patient. If patient is eligible for referral, a community worker educates the patient about available primary care facilities and makes a follow-up appointment at the appropriate primary care clinic if appropriate NB. Triage criteria not fully specified	(1) Emergency department utilisation (2) Hospital outpatient utilisation (3) Primary care health clinic utilisation *Source*: Hospital and health centre records	Number of visits per person per year *Emergency department* Before / After Referred 0.72 / 0.50 NS Not referred 0.56 / 0.49 NS *Outpatient clinics* Before / After Referred 2.68 / 2.77 NS Not referred 3.06 / 3.22 NS *Primary care clinics* Before / After Referred 0.18 / 1.01 p<0.0001 Not referred 0.05 / 0.10 p<0.05 Referred patients given appointments vs referred patients informed about primary care facilities. *Emergency department* *Number of visits per person per year* Before / After Appointment 0.64 / 0.42 NS Information 0.85 / 0.63 NS	Exclusion of patients without hospital number prior to April 1980 may have biased the sample and limits sample size in the intervention group Utilisation patterns of intervention and control group before the utilisation appear to be different. Non-referred group may not be comparable eg more severe medical problems on average Utilisation of other hospital emergency departments and private physicians not measured	Reasonable evidence that the intervention created additional demand for primary care No convincing evidence of a substitution effect of primary for secondary care

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Dale *et al* (1991) Dale *et al* (1995)[a] Dale *et al* (1995)[b] Dale *et al* (1996)	*Aim*: Evaluate cost-effectiveness of GPs in A&E departments. *Setting*: Teaching hospital King's College hospital serving deprived area of inner-city London. *Design*: Quasi-randomised controlled study *Sample size: (patients)* Intervention=1702 $Control_1$=2382 $Control_2$=557 *Duration of study*: 48 wks June 1989-May 1990. *Unit of allocation*: clinic sessions. *Unit of analysis*: patients	General practitioners were employed on a sessional basis to manage 'Primary care' attenders at King's College hospital A&E A&E attenders triaged to 'primary care' category (42% of all attenders) were seen by... *Intervention* Local general practitioner with similar no. of years since registration to registrars in dept. *$Control_1$* Senior house officer (SHO) *$Control_2$* Registrar Patients were unaware of their triage status or grade of doctor	*Processes*: investigations, prescriptions, referrals *Outcomes* (sample of participants): patient satisfaction, self-reported and general practitioner reported outcomes Qualitative observation of consultations. Costs	Adjusted OR 95% CI *SHOs compared to general practitioner* Radiography 2.8 2.32-3.34 Haematology 6.2 3.46-10.97 Chemical path. 5.7 2.89-11.30 Microbiology 2.1 1.40-3.14 Electrocard. 2.4 1.42-3.98 Prescription 1.3 1.11-1.47 Hosp vs community referral 2.9 2.39-3.47 *Registrars compared to general practitioner* Radiography 2.4 1.84-3.06 Haematology 1.3 0.46-3.77 Chemical path. 2.6 0.97-7.12 Microbiology 0.9 0.42-1.89 Electrocard. 2.9 0.51-3.04 Prescription 1.5 1.24-1.91 Hospl vs community referral 2.6 1.98-3.35 No significant differences in patient satisfaction, self-reported outcomes or community follow-up Observation suggested general practitioners more 'patient centred' eg. more likely to make eye contact, discuss social factors, and less controlling Average cost per case excluding admissions general practitioner=£11.70 SHO=£19.30 Reg=£17.97 Over a 12 month period, would thus expect total savings of around £60 000 (1991 prices) There was no significant difference in self-reported likelihood of attending A&E for similar problem in future	Because the unit of allocation was clinic session - any systematic inconsistency in nurse triage when general practitioner on/off duty would introduce bias Originally designed as RCT but proved impossible to fully implement protocol in the A&E department. Compensated by using multivariate analysis adjusting for significant differences in characteristics of the two groups Low response to patient satisfaction questionnaire (66%). This tool was insensitive to shorter waiting times to see general practitioner Costings inexact - however sensitivity analysis shows differences to be robust Contact between general practitioners and hospital staff was likely over the course of the study period and may have influenced practice	This study provides reasonable evidence that general practitioners can manage patients less resource intensively than hospital doctors - SHOs in particular Less clear whether the intervention is cost-effective Weak evidence on patient outcomes Quantitative comparison of general practitioners by grade of hospital doctor provides weak evidence due to small no of drs involved in the study (4 registrars, 8 general practitioners)

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Darnell (1985)	*Aim*: To evaluate an 'after-hours' primary care telephone line on utilisation of Wishard hospital emergency department *Setting*: Inner-city primary care practice adjacent to Wishard Memorial hospital, Indianapolis *Population*: 11,000 adult patients registered with the practice. Population characterised by high unemployment. *Design*: RCTI Unit of allocation: practice team (n=27) Unit of analysis: practice team and patients *Sample*: patients who visited primary care practice 3 or more times in previous year Study 1: 870 (758) patients Study 2: 979 (860) patients Control: 778 (691) patients Phase 2 sample in brackets *Study period*: Allocation: Mar-Aug 1980 Phase 1: 1981 Phase 2: Jul 1982-July 1983	Phase 1: Patients in the two intervention groups were interviewed and given the 'after-hours' telephone number with instructions. 10 physicians (internal medicine) provided out-of-hours cover from their own homes. Doctors could retrieve computerised medical records of patients in *Study Group 2* during call. Patients interviewed after 18 months Phase 2: Patients who made at least 1 primary care visit in previous year received adhesive stickers with the telephone number and written instructions (repeated regularly) Patients who had not used the service were interviewed at end of Phase 2 (50% of these patients had visited the emergency department)	Emergency department visits; Emergency department visits resulting in admission; Patient understanding of the telephone service; On-call physician satisfaction with the service *Source*: emergency department records, computerised log of telephone consultations (low retrieval rates); patient and physician interviews	No significant difference in socio-economic characteristics or utilisation of emergency department in year prior to the study *Percentage of patients attending the emergency department* |	Phase 1	Phase 2	
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Study 1	32%	36%	NS
Study 2	32%	36%	NS
Control	34%	38%	NS | *Percentage of patients attending the emergency department who were admitted* |	Phase 1	Phase 2	
---	---	---	---
Study 1	25%	21%	NS
Study 2	25%	20%	NS
Control	24%	25%	NS	 Low utilisation of the telephone service (6 calls per 1000 patients per month) in Phase 1 led to repeated education about service in Phase 2. By end of study, utilisation of the telephone line had increased (24 calls per 1000 patients per month). In comparison, the patients made frequent use of the telephone during the day. Also local HMO received a higher rate of out-of hours calls (33 calls per 1000 patients per month) 65% of theses callers also made emergency department visits without calling the service. The most common reason given was 'felt too sick' (43%) The number of calls declined per month. 54% of patients Interviewed at end of Phase 2 denied all knowledge of the service Physicians did not make much use of the medical record retrieval facility for *Study Group 2* patients	A carefully conducted study but a major problem with the design was that little publicity was given about the after-hours telephone service initially to avoid cross-group contamination The low utilisation rates in Phase 1 reduce the likelihood of detecting subtle effects in emergency department utilisation. The study only included patients who were comparatively frequent primary care attenders. These patients may have different utilisation patterns to patients making less frequent use of the primary care clinic. The study applied to adults (15 years and over) only The sample in Phase 2 group of the study was older than in Phase 1 (not clear if this difference is statistically significant) Authors also performed analysis of variance. No significant differences between the 3 groups.	Strong evidence that in this primary care practice, provision of an out-of-hours telephone line was not well understood by patients and had no overall effect on emergency department utilisation or subsequent hospital admissions Weak evidence (only 50% of consultation records retrieved) suggesting that access to medical records made no difference to outcome of consultation (results not presented in detail here).

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Derlet *et al* (1995)	*Aim*: To assess safety of triaging patients out of the emergency department *Setting*: University hospital emergency department in metropolitan Sacramento. 60,000 attendances per year. *Population*: adult attenders to emergency department *Design*: Before-and-after *Sample*: 14682 alternate adult patients who were triaged out of the emergency department between July 1988 and June 1993 *Study period*:: After: 48 - 72 hours *Exclusions*: children under 16; patients arriving by ambulance.	Attenders triaged by a trained nurse (24 hours, 7 days a week) with written protocols. Nurses gave patients a physical examination before triaging out of the emergency department. Patients refused hospital treatment could go to a referral desk for advice on alternative providers - although appointments were not available through the referral desk. The triage nurse followed up a subset of patients triaged out with a follow-up telephone call as part of the study.	Record of number of patients triaged (emergency department records) Patients actual treatment following triage (telephone interview) Number of patients returning to the emergency department after being triaged away (emergency department records) Contact with other health care providers and coroner records. Costs (case notes)	*Emergency department records* Approximately 30,000 patients were triaged out of the emergency department over the five year study period. *Follow-up telephone survey* 5065 responders of 14,682 patients in sample (3863 - no telephone; 5764 could not be contacted) 38% - received care elsewhere same day 35% - received care within three days 26% - did not seek further care (99% of these because medical problem had resolved or improved) 1% - attended alternative emergency departments 1.8% - returned to study emergency department No 'serious' adverse outcomes were identified from telephone interview, coroners list or alternative health providers. 31 cases with 'minor' adverse outcomes as a result of triage - none of these patients required admission. The number of patients triaged out declined over the study period. In the first year of the study, 1 7840 patients were triaged out of the department; by the final year, this had declined to 4692. Average variable cost per non-emergency patient was estimated to be $119 (no cost-base given). Notional savings to the hospital as a result of triage were estimated to be over $3 million (excluding study costs). No sensitivity analysis reported.	Long term study with a large sample. However the results are not likely to be reliable because: there was a high rate of non-response to the telephone survey (66%) secular changes: the emergency department was restructured and upgraded to a Level 1 trauma centre; Sacramento's population increased dramatically, primary care access improved due to increased HMO activity.	This study suggests that a significant proportion of patients (in this case 10%) *can* be triaged out of the hospital emergency department without obvious adverse health outcomes. The study does not assess the cost of primary care so cost-effectiveness of the intervention is not adequately assessed

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Farmer and Chambers (1982)	*Aim*: To explore the relationship between A&E and primary care utilisation. *Setting*: A range of hospital accident and emergency departments (not identified) in London. Three located in inner London and three in outer London as a comparison. *Population*: New A&E attenders. *Design*: Cross-sectional interview survey *Sample*: Study: 1848 attenders to inner London hospitals. Control: 9981 attenders to outer London hospitals. *Study period*: One week in mid-February 1981.	No specific intervention. All new attenders were interviewed in one week in February 1981. Response rates high (87%-98%) Piloted methods. Hospitals chosen to be fairly typical of inner city areas.	A&E attendance & treatment patterns. Contact with primary care services. Patient preferences for care settings.	*Attenders living locally*: GP Registered / Not GP Registered Inner 69% / 31% Outer 84% / 16% • Non-registered attenders more likely to attend with primary care problems. • No consistent difference in length of residence of non-GP registered attenders in inner and outer areas. • No consistent difference in the proportion of registered attenders who attempted to contact their own GP or in subsequent GP referral to hospital. *Percentage of attenders not living locally* Inner 37% Outer 20% *Self-referred attenders who would contact their GP as an alternative to the A&E department*: Inner 11% Outer 21%	Carefully designed and conducted survey with large sample of London A&E attenders. Analysis tends to be simple comparison of proportions without adjustment for other factors, for example, distance to hospital.	Strong evidence that in 1981 inner-London hospitals saw a higher proportion of non-registered local patients and non-local patients than outer London hospitals. Little direct evidence is presented to support the hypothesis that access to GP services is more difficult in inner city areas of London.

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Feldman *et al* (1987)	*Aim*: To evaluate the effectiveness of primary care nurse practitioners. *Setting and population*: various *Design*: Systematic review of studies evaluating nurse practitioner roles *Sample*: Located 350 relevant studies. Only studies which scored average or above average for 'clarity' and 'relevance' and average or below average for 'research design flaws' were included for analysis: 59 met the review inclusion criteria.	Nurse practitioner performance or effectiveness in comparison to other professional groups.	Various measures, for example, acceptability, prescribing practice, costs, throughput, patient satisfaction.	Only four of the 56 studies looked at nurse practitioners in an emergency or urgent care setting (the majority were primary care based studies). All 4 of these studies reflected a more general pattern - nurse practitioners were at least as effective as physicians in managing certain patients/conditions. Nurse practitioners tended to be more skilled communicators and history-takers than physicians. Only one study (1963) measured the impact of primary care nurse practitioners on emergency department utilisation and observed a reduction.	Very systematic review, involving teams of independent reviewers. Consistency in applying review criteria was monitored. Relevance and methodological quality rated separately.	Strong evidence that nurse practitioners are highly acceptable to patients and can manage certain conditions effectively in primary care settings.

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Ferber and Becker (1983)	*Aim*: To evaluate the impact of free-standing emergency centres (FECs) on hospital emergency department utilisation in the United States *Setting and population*: All emergency department attenders in the US in the late 1970s *Design*: Interrupted time series with control *Sample:* Study: 49 hospitals in 22 states located in same area as a FEC Control: 96 hospitals not located near a FEC. Control sample selected to have a similar distribution of bed size and governance types as the study sample *Exclusions*: FECs that opened after 1980 *Study period*: 1970-1980 *Number of data points pre and post test* Variable	FECs began to appear in the mid 1970s in the US. These units vary but generally aim to be a price-competitive and convenient source of urgent care for comparatively minor illness and trauma. There was rapid development in the number of FECs - 500 had opened by 1982	Mean annual emergency department visits *Sources*: American Hospital Association; telephone survey of FECs	Covariance analysis revealed no significant difference between the study and comparison group over the study period. There was a small non-significant increase in emergency department attendance in the study group. The FECs in the study group opened in different years. Controlling for the year of opening did not reveal any significant difference between the study and control group of hospitals. The authors tested the hypothesis that FECs might have opened in areas with increasing levels of demand. FECs tended to open near much larger than average hospitals but mean emergency department attendance rates were stable in the study sample of hospitals *before* the FECs opened	FECs did not open at same time. 85% of FECs in study sample opened after 1977 leaving less than two years data for examination in the post-test period Routine data is highly aggregated. May miss subtle trends in attendance for minor illness/trauma Sampling process relied on routine data collected at a time of rapid increase in the number of FECs. Contamination likely, ie some of the hospitals in the comparison group were likely to have been located near an FEC	Weak evidence suggesting that FECs had little effect in the late 1970s on emergency department utilisation.

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Gadomski (1995)	*Aim*: To assess impact of prior physician approval for paediatric emergency department access Setting: University of Maryland hospital emergency department (17,500 visits per year) in inner-city Baltimore *Population*: children on a managed care Medicaid programme with 'non-emergency' health problems. *Design*: Controlled before-and-after study *Sample 1*: All emergency department visits in study period. Before: July-Dec 1991 After: July-Dec 1992 *Sample 2*: 193 children denied access during study were followed over six months. Control 1: 194 matched children authorised to received emergency department care Control 2: 193 matched children attending a primary care clinic initially.	From January 1992, paediatric attenders were screened on arrival at the hospital emergency department. The hospital had to obtain authorisation from the patient's primary care physician to treat any attender with a 'nonemergent' condition. Patients without authorisation were denied access to emergency department care.	Emergency department utilisation Hospital outpatient utilisation; admission rates, prescription rates. Compliance (not presented in detail here) *Sources*: log kept in the emergency department; Maryland medical assistance claims database	Sample 1 *'Non-emergent' emergency department visits* Before / After / % Change Medicaid 2257 1639 -27% Other 2204 1706 -23% *'Emergent' and 'urgent' emergency department visits* Before / After / % Change Medicaid 1977 2346 +19% Other 2392 2675 +12% Sample 2: Six month follow-up Results of ANOVA analysis: *Emergency department visits per child per year* Denied access 1.0 Authorised access 0.98 Primary care attenders 0.54 p<0.01 *Hospitalisations per child per year* Denied access 0.24 Authorised access 0.06 Primary care attenders 0.06 p<001 *Outpatient visits per child per year* Denied access 1.42 Authorised access 1.66 Primary care attenders 0.86 p<0.01 *Compliance*: one week after being denied access, 57% of children had been seen by their primary care provider. Of 319 children not authorised to receive emergency department care, 73 (23%) insisted on treatment and became self-paying. The authors report that 'no child experienced an adverse outcome because of delay in health care delivery	The control groups are not likely to be comparable in terms of health utilisation. The decline emergency department utilisation for non-emergent conditions in both the Medicaid and comparison groups suggests some confounding or the existence of secular trends. For example, some proportion of patients in the control group may have been covered by managed care schemes. During the study period, the emergency department opened a lacerations unit, which may account for the increase in urgent visits. It is not clear why some children's visits were authorised and some children's visits were not authorised for similar conditions - the two groups may not be truly comparable.	Although there is evidence to show that emergency department utilisation declined in this hospital, the effect cannot be ascribed to the intervention with confidence.

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Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Hansagi *et al* (1990; 1989)	*Aim*: to assess the impact of referring patients from a hospital emergency department to primary care providers on utilisation *Setting*: Huddinge hospital emergency department located in suburban Stockholm, Sweden. 90,000 attendances per year. *Population*: emergency department attenders with chronic or non-urgent medical conditions in six specialties *Design*: Controlled before-and-after study *Sample*: Intervention: 192 patients accepting referral to primary care during April 1984 Control: 107 patients eligible for referral during April 1984 but nurse not available *Study period*: Before: one year After: one year *Exclusions*: children under 16; patients arriving by ambulance; patients presenting outside office hrs.	Patients triaged into 'urgent' or 'non-urgent' categories at reception. 'Non-urgent' patients were seen by nurse advisor during office hours (08.00-17.00 Mon-Fri). Were given advice on their condition and advised on alternative sources of care. The nurse made appointments - usually at the patient's own health care centre.	Utilisation of emergency department, and primary care health centres. Source: Stockholm county patient database One week following referral a postal questionnaire was sent to patients asking about compliance, outcomes and satisfaction (73% response rate in referred group; 80% response rate in control group)	*Emergency department utilisation:* *Attendances per person per year* Before / After / % Change Referred 1.04 / 0.98 / -6% Not referred 0.95 / 2.00 / +111% *'Appropriateness' of visits in year after intervention* Referred 55% Not referred 51% *Primary care health centre utilisation* *Attendances per person per year* Before / After / % Change Referred 1.0 / 2.3 / +130% Not referred 1.1 / 1.3 / +18% *NB. Significance tests not reported* *Compliance* Referred: 84% complied. 93% of patients who were given an appointment kept it. 3% of patients returned to the emergency department. *Satisfaction with help obtained in the emergency dept* Referred 80% Not referred 71% NS *Self-reported health outcome* Improved Referred 69% Not referred 86% p<0.01 *Attitudes: positive comments about emergency department (n=88)* Positive comment Referred 66% Not referred 48% p<0.05	Significance tests not reported for changes in health care utilisation. Comparatively small sample sizes render sub-group analyses (for example, of frequent users) unreliable Intervention and control groups may not be comparable. The referred group only comprised patients that had accepted referral. 11% of all patients who were offered referral, insisted on treatment in the emergency department. The comparison group then, is likely to include patients who would have refused referral. These patients may be more likely to utilise the emergency department for non-urgent conditions.	This study provides evidence of primary-secondary substitution for first contact care. This result is weakened by flaws in the study design. Good evidence that referral to primary care providers can be acceptable to patients. This study was unusual in detecting a significant difference in health outcomes between referred and non-referred patients.

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Hansen *et al* (1993)	*Aims*: Impact of nationally reorganised out-of-hours general practitioner on-call system on ambulance and emergency services *Setting*: Ringkøbing county, Denmark. *Design*: Before and after study *Sample*: Before=1172 calls After=1217 calls *Study period*: Before: 1 Nov 1991- 31 Dec 1991 After: 1 Jan 1992- 29 Feb 1992	Introduction of an emergency primary care centre in Ringkøbing reduced the number of hours general practitioners worked on call out-of-hours and increased average distance patients travelled for emergency treatment. Analysis of ambulance call-outs, calls to the police emergency telephone exchange and interviews with attenders at one hospital emergency department.	Total number of ambulance and police emergency calls made. Proportion subsequently admitted to hospital. Availability of on-call GP. Self-referred A&E attenders' experiences of contacting doctor on-call.	No increase in number of ambulance call-outs (27 per 1000 population). No changes in distribution of in-hours or out-of-hours calls. No change in severity of calls as measured by urgency of ambulance drive. No change in median age of patients calling the service. NB. Ambulance call-outs did increase in one of the sixteen districts - situated 20km away from nearest hospital (12/1000 residents to 27/1000 p=0.05). The proportion of call-outs resulting in admission fell (79%:69% p<0.01) although the number of admissions overall stayed constant There was no change in the number of emergency calls registered by the police and no change in the number of callers stating that they were unable to contact an on-call doctor Only three A&E attenders were identified in total who had been unable to contact an on-call doctor	Before and after periods are relatively short and atypical - the before period covers Christmas. (An adjustment [not detailed] was made for figures for New Year's Eve). Patients ringing the police emergency line were not asked directly if they had attempted to contact a duty doctor. This was established only if they volunteered the information. The authors conclude that call-out thresholds were lowered because fewer call-outs resulted in admission. Yet admissions were constant overall. This suggests that a greater proportion of admissions were elective. Why? The hospital emergency department studied is a 'closed department' i.e. it normally accepts referred patients only. Therefore not surprising that few respondents were identified.	Weak evidence that the new system resulted in no obvious overall increase in emergency calls to the ambulance service or police emergency line. The suggestion that call-out thresholds have been lowered by the intervention implies that demand on emergency services might be expected to increase in the longer term.

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Hilditch *et al* (1980)	*Aim*: To assess impact of new primary care health centre. *Setting*: Urban area of metropolitan Toronto under-served by family practitioners (1:10,000) in 1972. By 1975 this ratio had increased markedly (1:1800). *Population*: Population characterised by renting, lower median incomes than Toronto average and high mobility. *Design*: Before-and-after *Sample size and study period:* Before: 467 household members (Summer 1972) After: 494 household members (Summer 1975) Structured interviews at random sample of addresses. Used same addresses for the after survey. Also routine data on total emergency department visits in 1972 and 1974.	Health centre opened in October 1972 with 4 physicians, nurse practitioners, social worker, nutritionist, pharmacists, x-ray, physiotherapy and emergency treatment room for minor injuries. Open for 70 hrs/week and 24 hr cover for emergencies. During study period, 2 family physicians set up in private practice and in 1975, 3 of the health centre doctors left (and replaced) to practice in the study area.	Hospital emergency dept utilisation in 12 mths prior to interview. Reasons for using emergency dept. Perceived ill-health.	*Rate of emergency department utilisation per person per year* Before 0.22; After 0.14; % Change -36%; p<0.01 *Percentage of patients attempting to contact a family physician before attending hospital emergency dept* Before 18%; After 35%; p<0.01 Reasons given for going straight to the emergency department were significantly different Before: 55% (*Access to family doctor*); 7% (*Real emergency*); 37% (*ED more appropriate*) After: 40%; 42%; 9% *Crude control group* Over the study period, there was a general increase in the utilisation of emergency departments in the three closest hospitals (+16% on average). The catchment population increased by 5%.	No information on non response. Authors checked before sample for representative against 1971 census. It is not clear if the 'after' sample is representative. The after sample did not include addresses from a major housing development - almost doubling the population. Respondents were asked to recall visits over previous year likely to be some recall bias. In both samples over a third had moved to the area within the year (only 5 families were surveyed twice). Unclear how partial data was analysed. The authors analysed correlations with potential counfounders. Only perceived ill-health was significantly associated: in 1975 respondents felt less 'ill' and made fewer ED visits.	Impossible to disentangle the impact of the health centre and other forms of primary care provision. Some evidence that the better access to primary care resulted in primary care substitution for the emergency department. Strengthened by the finding that significantly more patients attempted to contact their family doctor in 1975. Weakened by the lack of a comparable control group.

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Hochheiser *et al* (1971)	*Aim*: To assess improved comprehensive paediatric primary care services *Setting*: deprived area of New York served by 3 hospitals. Primary care health centre established in 1968. *Population*: low income children resident in a deprived area (Rochester) of New York county. *Design*: Controlled before and after study *Sample and study period:* Systematic sample of visits at 3 local hospital emergency departments. Visits made by children from other areas of the city were used as a simple comparison. Before: (Feb- Mar 1967) 913 After1: (Feb-Mar 1969) 1247 After2 (Feb-Mar 1970) 1215	Primary care health centre available for children registered for Medicaid. The centre aimed to provide comprehensive family-oriented care. Outreach facilities and advocacy for Spanish speakers. Took a systematic sample of visits at 3 local hospital emergency depts	Utilisation by residence and socio-demographic characteristics. Registration at the health clinic (after samples). Analysis: unadjusted percentage change	*Percentage reduction in visits 1967 - 1970* Centre-area -38.3% *Comparison areas* Matched ward -20% Other city areas 'remained stable' Suburban area +29% *Reduction in visits by centre-area children by hospital* *67/69 69/70 67/70* Strong -49% +10% -45% Genesee +6%- -30% -26% Rochester -20%- -26% -44% During study period Genessee hospital A&E department was improved which may explain initial increase in visits. Analysis by area of residence indicated that the Census tract closest to the health centre and with poor public transport to the hospital had the greatest decrease in hospital visits. Eighty percent of children visiting the emergency department in 1969 and 1970 from the centre-area were not registered at the health centre despite being eligible.	Results have not been adjusted for age and sex. Demographic change during the study period may account for some of the change in utilisation patterns. The variation in utilisation patterns in control areas is unexplained, there was a large decrease in emergency utilisation in the control ward identified as most similar to the centre area - although this is apparently not statistically significant. The size of the effect may not be reliable. The results are not adjusted for population changes There is considerable variation in trends in utilisation	Some evidence that the health clinic did affect utilisation patterns. This finding is weakened by the lack of information about the comparison areas. No data on health centre utilisation is presented. A year after the health centre was established, the majority of children using the emergency department had not registered for primary care.

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Hull *et al* (1997)	*Aim*: Relationship between 'good quality' primary care and A&E utilisation. *Setting and population*: General practice registered population of East London and City health district - a deprived inner-London area. *Design*: Observational study using routine data on population and general practice characteristics. *Sample and study period*: A&E attendances in 1993 *Exclusions*: children	No specific intervention. Practice characteristics of interest: number and sex of general practice partners; whether employing a practice manager; computing facilities and whether a training practice. Independent variables aggregated to practice-level and regressed on practice level A&E attendance rates.	Utilisation patterns at 4 local A&E depts Source: routine hospital data; participating practices; 1991 Census	None of the practice characteristics measured showed any univariate or multivariate association with A&E utilisation.	Case-mix is not included as an independent variable, so behaviour of patients with minor trauma/illness, for which we might expect primary care to have the greatest observable influence, is not explored separately. This analysis may have missed subtle trends. Socio-demographic variables (eg % car ownership, ethnicity, % renting, lack of amenities) and practice distance to A&E were significantly associated with A&E utilisation. Difficult to interpret the results in more detail as multivariate models appear not to be robust/linear. May not be enough variation in practice aggregated independent variables within one inner-city health district to justify this modelling approach.	Reasonable evidence that practice characteristics do not obviously affect overall A&E utilisation rates by adults in East City and London.

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Kelly (1994)	*Aim*: To evaluate referral scheme and improved access to primary care. Objectives were cost-containment and more appropriate care. *Setting and study population*: Yuba, a county in Northern California with a relatively deprived population (compared to state average). *Design*: Before-and-after *Sample and study period*: not defined	Clinic taken over and staffed by the non-profit organisation which ran Rideout hospital. *Changes included* • Strengthened links with hospital eg referrals, transport. • More primary care staff/services • Extended opening • Appointment and triage systems • 24hr telephone advice	Simple comparison monthly workload, and costs per patient.	*Utilisation of hospital emergency department* Before (1991) After (1994?) % non-emergency 28% 9% Attendances: 3000/mth 2200/mth *Utilisation of primary care clinic* Before After 60/day 130/day Specialists more likely to accept referrals from the clinic (primary care clinic staffed by hospital staff). Losses reduced from $1million to $400 000 Cost per patient: ED=$170 Clinic $60	This study is an interesting but largely descriptive account written by a key member of staff at the primary care clinic. Little objective evidence of substitution. The changes described were pragmatic rather than ideal solutions. The papers focus on the problems and conflicts encountered in attempting to improve primary care health care facilities in US context. Impossible to disentangle the impact of the various changes made eg extended opening hours, skill-mix.	Descriptive evidence supporting hypothesis that good quality primary care can attract patients who would otherwise attend hospital emergency department. Highlights barriers and conflicts of interest in the provision of health care to the poor in the US.

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McKee (1990)	*Aim*: To identify general practice characteristics associated which influence attendance at A&E departments *Setting and population*: All new attendances to the A&E department of one acute general hospital in a rural part of Northern Ireland. *Design*: Comparative observational study *Sample and study period*: Random stratified sample of new attendances in 1986 stratified by month (1029 patients)	No specific intervention. Observational study of influence of certain general practice characteristics on A&E attendance	Practice characteristics: mean list size per GP partner; mean distance from each practice to the hospital practice type, that is health centres vs other types of practice Outcome variable: attendance rate of sample patients by practice	Overall annual attendance rate for sample patients = 0.22 visits per person per year. 26 practices had more than 10 patients attendances each and accounted for 87% of all patients attending the A&E. These practices were entered into a multiple regression model. Practice-based A&E attendance rates were significantly associated with mean distance between the practice and hospital (R^2=0.38) but not with mean list size per partner. $\log_{10}$attendance = 2.79 - 0.64 $\log_{10}$distance Attendance did not appear to vary with practice type but this relationship was not formally tested. A separate ward-based regression analysis which included Census-derived socio-demographic variables and distance found that distance (between the patient's home and A&E) was significantly associated with attendance (R^2=0.53)	Analysis of highly aggregated routine data. Distance between practice and hospital only a proxy for distance between patient's home and hospital. Study considers all new attendances including major illness and trauma unlikely to be influenced by primary care characteristics. Thus this analysis is unlikely to detect a subtle relationship between general practice characteristics and attendance behaviour. Number of practice characteristics measured was very limited. Small number of cases in model	Weak evidence suggesting that mean list size has no obvious influence on A&E attendance. Stronger evidence that distance is negatively associated with A&E attendance.

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Moore *et al* (1972)	*Aim*: To evaluate improved access to primary care. *Setting and study population*: Residents of Charlestown, Boston. A middle and lower income urban area. Declining primary care physician availability before the intervention. History of high utilisation of hospital emergency room for non-emergency conditions. *Design*: Controlled before and after study using medical records and postal and telephone survey of emergency department users. *Sample and study period*: Control year: 1968 Health centre opened: 1/1/69 Study year 1: 1969 Study year 2: 1970 10% random sample of emergency room visits by Charlestown residents in each of the three years of interest	New health centre staffed by hospital physicians; with access to primary care facilities.	Emergency room utilisation.	Charlestown residents *Visits* *Patients* *Per capita* C: 251 206 patients 0.159 I1: 275 208 patients 0.177 [ns] I2: 261 204 patients 0.170 [ns] Crude comparison with other emergency department users C I2 % Change Charlestown 2510 2610 +4.0 Others 62,816 71,948 +14.5 Non-significant decrease in the overall proportion of ER visits made during health centre opening hours (36% cf 31%). However, the proportion of registered users under 20 was significantly lower during health centre opening hours however (43/116 cf 13/62 $p<0.05$). Adjusted comparison of registered and non-registered Charlestown patients revealed significant differences in self-referral rates (registered users were twice as likely to be physician referred).	No significant differences in age or sex distribution of the samples or visits over the three years. It is difficult to assess the impact of the health centre because of the lack of a true control group. Crude measures suggest that emergency room use may have been increasing at a significantly faster rate by patients without access to the health centre. Emergency room utilisation was only measured in one local hospital. Not clear to what extent residents utilised other Boston hospitals emergency services before or after the intervention. No data about case-mix or patient outcomes.	Weak evidence that improved access to primary care results in a decreased utilisation of hospital emergency departments. Reasonable evidence however to suggest that the primary care centre was attractive to local residents (66% of target population registered by end of study period).

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Murphy *et al* (1996)	*Aim*: To assess the cost-effectiveness of employing GPs in an urban A&E department. *Population*: A&E attenders at St James hospital, Dublin. *Setting*: Teaching hospital in inner-city Dublin. Patients normally pay for A&E and primary care attendances unless below a means-tested threshold (39.6% of patients in the study were entitled to free health care). *Design*: Randomised controlled study *Sample size (patients)* Intervention=2303 Control=2381 *Duration*: Aug 93 - Oct 94 *Unit of allocation and analysis*: patients	Patients triaged by nurses were managed by *Intervention* Local general practitioners employed on sessional basis *Control* Usual hospital doctors (various grades) Self-referred patients triaged as 'semi-urgent' or 'delay acceptable' according to a series of physiological symptoms were eligible for inclusion (66% of all attenders). Patients were unaware that seen by a general practitioner. Staff were aware of the study. Allocation transparent.	*Processes*: investigations, prescriptions, referrals. *Outcomes:* blind interviews using the general practice patient satisfaction questionnaire - (sample) Health status (non-standard) (sample) Unplanned reattendance within 30 days. Costs	Processes A&E drs compared to general practitioners Unadjusted OR 95% CI *'Semi-urgent' triage category* Any investigation 1.3 1.19-1.34 Any blood investigation 2.4 1.99-2.90 Any X-ray investigation 1.3 1.18-1.37 Referral 1.6 1.40-1.90 Any prescription 0.7 0.65-0.77 Disposal to hospital 1.4 1.28-1.59 Admission 1.8 1.47-2.29 *'Delay acceptable' triage category* Any investigation 1.3 1.19-1.34 Any blood investigation 17.4 2.91-103.92 Any X-ray investigation 1.3 1.14-1.48 Referral 2.8 1.85-4.25 Any prescription 0.7 0.58-0.77 Disposal to hospital 1.5 1.16-1.83 Unplanned reattendance to A&E within 30 days General practitioner=17% A&E dr =18% No significant difference in patient satisfaction scores or self-reported recovery. *Costs:* The marginal saving for every 100 typical 'semi-urgent' and 'delay acceptable' patients treated by the general practitioners was £Ir64 and £Ir58 respectively. Approximate total savings over a year of £Ir 88 000 (1995 prices). Authors cautiously approximate 'Delay acceptable' group (21% of all attenders) with King's College 'primary care' group on basis of similar process and disposal patterns.	No concealment of allocation. Case records were put on shelves assigned to each triage category. Doctors took the next case on the appropriate shelf when ready to see a patient. Although this method transparent, authors state that the research nurse monitored allocation. Likely to have been interaction between hospital staff and general practitioners during the course of the 13 months of the study. Possible, that the study underestimates any effect size through contamination. Slight differences in the patient characteristics of the control and study groups. General practitioner patients were slightly older and more likely to be self-paying. Generalising from this study is difficult, only five general practitioners were involved in the study, they were on average considerably more experienced than the A&E doctors.	Reasonable evidence that general practitioners can manage patients less resource-intensively than hospital doctors. Reasonable evidence that general practitioner clinical management did not lead to higher levels of unplanned reattendance to A&E But less clear whether the intervention is cost effective. The savings (which include admission costs) seem relatively small. No sensitivity analysis is reported. Self-reported outcome evidence weak - not clear that the general practice questionnaire is an appropriate tool. Low response to health status questionnaire.

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O'Grady *et al* (1994)	The impact of copayments on hospital emergency department utilisation Range of geographical regions in US, both urban and rural Random sample of families. Patients were included in the study if over one year old, not in top 3% of earners, not in military service or institutionalised and ineligible for Medicaid throughout the study period Randomised controlled trial Intervention: 692 families [3797 person-years] subject to copayments Control: 332 families [7644 person-years] with free access to the emergency department	Families were randomly assigned to one of several insurance plans (date of intervention not given). Only one plan offered free access to the hospital emergency department. Other plans involved copayments of 25%, 50%, 95% and an 'individual deductible plan (95%). Costs of care were capped - the cap also varied between plans. Families that did not co-operate at any stage of the study were excluded from the analysis. In total 65% of eligible patients were included in the study. Non-respondents were significantly more likely to be older and less educated.	Emergency department utilisation rates over a three year period following the intervention	Binomial regression analysis adjusting for intra-familial correlation *Emergency department visits per 000 persons* Free vs 25% plan: -21% Free vs 50% plan: -12% NS Free vs 95% plan: -35% Free vs 'individual deductible' -20% *Emergency department visits resulting in hospitalisation per 000 persons* Free vs 25%/50%/95% -33% Free vs 'individual deductible' -32% NS *NB: The 'individual deductible' plan paid all emergency department expenses if a visit resulted in hospitalisation. However, patients were not informed of this in the information they were given about the scheme.* Copayments had a greater impact on conditions categorised as 'less urgent' (rated by four emergency department physicians with high levels of agreement) *Crude annual visits per 10,000 persons (not adjusted for intra-familial correlation)* Free vs All copayment Less urgent -47% More urgent -23% No significant difference in utilisation by low income patients. No significant difference in utilisation by patients with injuries compared to patients with other symptoms. Marked geographical variation in emergency department utilisation. High rates of utilisation were correlated with long waiting times for primary care appointments (detail not presented).	Drop-out rates were higher on copayment plans than free plan. Analysis of utilisation behaviour revealed no differences in behaviour of patients who dropped out or remained in study for full three years. Association between primary care accessibility and emergency department utilisation is crude and may be confounded by other factors.	Strong evidence that copayment had a significant effect on patient behaviour.. Not known what alternative sources of care (if any) were utilised as substitute

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Porter *et al* (1988)	*Aim*: To evaluate provision of comprehensive primary care services *Population*: Children in town of Ofakim, Southern Israel, (popn 12,646, 37% under 14) served by two primary care clinics. *Setting*: Universal pre-paid insurance coverage. One teaching hospital serves town. *Design*: Cross-sectional study *Sample*: Control clinic 'A' 329 Study clinic 'B' 200 *Study period*: 1981	Clinic B was selected for development by team at Ben-Gurion University in 1974. Main changes: integrating preventative and curative care, employing more paediatric specialists, children between 10 and 14 consultant paediatrician. improved medical records.	Emergency room utilisation. Emergency room visits resulting in hospitalisation. Source of referral. *Source*: hospital records for attendances in 1981.	Referral source: 90% of patients were referred by a primary care physician. *Catchment area* *Visits per child* — Clinic 'B' — Control Clinic 'A' — S. Israel Region Visits — 0.18 — 0.09 — 0.17 Admission — 0.05 — 0.05 — 0.05 This pattern was observed in all age groups. A higher proportion of children from the intervention catchment area were admitted: 52% compared to 25% from the control clinic catchment area. Again this pattern was observed in all age groups - but was particularly marked in children under a year (78%: 26%).	No data on utilisation of A&E by children resident in the area before the health clinic was developed. Little data presented comparing intervention and control areas - described simply as "equivalent". No data on utilisation of primary care.	The vast majority of children were referred. This suggests that *access* to primary care was good for both intervention and control groups. Evidence supports several explanations: morbidity very different in the two areas; thresholds in seeking primary care are very different; or the specialist paediatricians in clinic 'A' had a higher referral threshold.

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Rivara (1986)	*Aim*: to evaluate an emergency department triage procedure. Patients with 'primary care' problems were referred to primary care providers without receiving treatment at the hospital *Setting and population*: Le Bonheur Children's medical centre in Memphis, Tennessee. 73,000 'walk-in' attendances annually. 'Inappropriate' attenders more likely to be 'indigent' *Design*: Before-and-after study *Sample and study period*: All non-urgent patients seen during a six-week period from Oct to Nov 1983 between 8:00am and 4:00pm (748 paediatric patients). Follow-up telephone survey of sample *Exclusions:* Children not locally resident	Triage performed by 8 trained paediatric nurses between 8:00am and 4:00pm. Patients assigned to one of four triage categories. Patients in 'Level 4' have 'minor minor acute illness or less serious chronic problems' and were typically referred to primary care providers. The nurse attempted to make appointments for patients at their usual source of primary care The triage and referral process was free for patients	Number of patients referred out of the emergency department for primary care or self-treatment; Patient compliance with primary care referral	509 patients attended with urgent problems during the study period (these patients were not triaged but directed immediately to the emergency department for treatment) Of 748 patients with non-urgent problems, 463 were triaged to the 'Level 4' category. Of 'Level 4' patients: 232 were referred to a community health clinic, 125 to a private physician and 97 were given advice on home care Thus, over the study period, 28% of all attenders were referred to primary care substitutes. A further 8% were given advice on home care Over study period, 65% of primary care appointments at community health centres were kept and 61% of appointments with private physicians. Appointment keeping was associated with the time interval between the emergency department visit and the appointment date. 569 patients were contacted by telephone (76% response, biased to respondents with a telephone). 82 % of patients had recovered. There was no correlation between patient outcome and site of treatment No adverse outcomes associated with the intervention, although diagnosis given at primary care clinic was more serious in 6.7% of cases. One subsequent hospital admission but patient's condition is described as having changed Cost savings including set-up costs are reported to be $28,000 for the 748 patients triaged	Simple study. Pre-test period not specified since no children were referred before the intervention began. Short-term substitution effect clearly attributable to the intervention. No detail presented to support cost data	Strong evidence that a significant proportion of patients could be diverted to primary care substitutes. Some evidence that the intervention was cost-effective in this setting.

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Russell (1977)	*Aim*: To assess whether general practice characteristics influence the treatment behaviour of patients with minor trauma. *Population and setting*: Patients in Greater Newcastle. *Design*: Cross-sectional survey covering 3 urban hospitals and 58 GP practices. Data collected for random samples of patients via interviews, medical records, GP survey and routine statistics. *Sample*: A&E attenders: 155 patients GP attenders: 191 patients *Study period*: Not defined.	Not a specific intervention. Certain characteristics of primary care were hypothesised to influence the choice of health provider:: number of partners, whether the practice operates an appointment system and whether the practice employs a deputising service out of hours.	Patterns of utilisation.	Multivariate logistic discriminant analysis. Final model included four variables: distance to GP, distance to hospital, age and diagnosis. All other things being equal, patients were likely to go to whichever was closer, the hospital or GP. 15-44 year olds and patients with wounds or fractures were more likely to attend hospital. Patients were also more likely to go to multi-partner GPs - although the effect was marginal. Appointment systems and deputising services had no measurable impact - bivariate or multivariate - on patient behaviour. Attendance at A&E was significantly associated with previous attendance. This variable was not included in the final model as it was correlated with the independent variables and thus did not add to the discriminatory power of the model.	No odds-ratios are given for the various variables included in the model. Carefully designed study. Two years separated the sampling of patients attending A&E and GP however. Checks on GP referral behaviour, patient characteristics and A&E attendances revealed little secular change in behaviour during this time. Model successfully predicts around 75% of patient decisions correctly. The authors checked misallocation rates between random sub-samples and between hospitals. Model appears robust.	Reasonable evidence that distance was an important factor in the decision to seek care for minor injury at hospital in Greater Newcastle in the early seventies. GP appointment systems and deputising services were not obvious deterrents to seeking primary care.

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Selby *et al* (1996)	*Aim:* To assess the impact of emergency department copayments on hospital utilisation *Population and setting:* patients covered by Kaiser Permanente HMO in Northern California. *Design:* Controlled before and after *Sample:* Intervention: 30,276 (all eligible employees and their dependants subject to copayments) Control 1: 60,408 (random stratified sample of patients not subject to copayment) Control 2: 37,539 (random stratified sample of patients employed in comparable firms) *Study period:* Before: 1992 After: 1993 *Exclusions*: Patients under one year old; patients enrolled with multiple insurers; patients eligible for Medicaid during the study period	From January 1993, 20 firms requested that their employees share costs of emergency care. Fixed copayment of $25 - $35 was introduced for every hospital emergency department visit. Subjects given notice of the charge and had an opportunity to change plans	*Number of visits to:* (1) the emergency department; (2) urgent outpatient clinic; (3) paediatric & adult outpatient clinics *Health outcome:* (1) admissions; (2) 'avoidable' admission rates; (3) mortality; (4) case-fatality rates for MI *Source*: medical claims database; Census	*NB. Because baseline measurement revealed significant differences in utilisation and socio-demographic characteristics of patients in intervention and control group 1, results are only presented here for control group 2.* *Analysis:* Poisson regression analysis adjusted for age, sex, socioeconomic status *% change relative to control group 2* Emergency department: -14.6% Urgent outpatient appointment: +0.1% NS Outpatient paediatric appointments: -5.2% Outpatient adult appointments: -4.6% The intervention had a greater impact on utilisation for non-urgent conditions *% change in emergency department utilisation relative to control group 2* *Severity rating* 'Always an emergency' +7.3% NS 'Often an emergency' -12.7% 'Sometimes not an emergency' -20.1% 'Often not an emergency' -29.2% The intervention had a greater impact on utilisation by patients from poor neighbourhoods *% change in emergency department utilisation in copayment group* 'Poor' Census tracts -22.5% Other Census tracts -14.7% There was no detectable significant difference in hospitalisations, 'avoidable' admissions or mortality.	Some maturation effects detected in 1-5 age groups over study period. Utilisation declined in all groups over the study period. Frequent ED users may have self-selected out of the study. The number of patients opting out of the copayment plan before the intervention was implemented is not given. All outpatients appointments were also subject to a copayment of between $5 and $10 in the intervention group. Rates of avoidable admission and mortality were rare in all groups. These outcomes measures are not likely to be sensitive to subtle differences. The trends in hospital utilisation over the study period were similar for both control groups. The costs of implementing and collecting copayments are not detailed.	Strong evidence that copayment had a significant effect on patient behaviour. Not known what alternative sources of care (if any) were utilised as a substitute

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Shah (1980)	*Aim*: To evaluate an improved hospital emergency triage and telephone advice service *Setting*: Toronto hospital for Sick Children paediatric emergency department and poison centre. 34,000 attendances per year. Located in metropolitan area *Population*: Paediatric attenders and parents telephoning for medical advice *Design*: Before-and-after study *Sample*: All telephone calls logged in first 12 weeks (from March 1977) and last 12 weeks of 1978; Postal questionnaire sent to 637 callers who rang between January and March 1979 *Study period*: Intervention: March 1977 Before: 1975-1976 After: 1977-1978	From March 1977, triage and telephone advice was reorganised and became the responsibility of the Medical Information Centre (MIC) Written triage and advice protocols were developed for trained nurses to use with attenders and callers. Patients given advice on self-care received written information through the post or follow-up telephone calls The MIC also responsible for answering poison information queries from other health care providers	Number of attendances and telephone calls in the 2 years before and after the intervention Number of admissions following an emergency department visit Telephone advice log: type of call Survey: reasons for calling and alternative sources of care	*Emergency department utilisation* *1975-76* *1977-78* *%Change* Attendances 151,993 142,983 -6% Admissions 15,942 (10.5%) 14,507 (10.1%) -9% p<0.05 *Telephone log: first 12 weeks in 1977 compared with last 12 weeks in 1978* *1977* *1978* Average daily number of calls General information 14.6 11.8 Medical advice 13.8 32.8 *No significance test reported* *Postal survey* (430 responded out of 637 in sample): If MIC unavailable, 231 (54%) callers said they would have attended the emergency department. 53 of these callers were advised to attend the emergency department over the telephone.	Triage and telephone calls were received by the hospital during the pre-test period although the system was more ad-hoc The 12 weeks in from March not a good pre-test period as intervention had already been introduced, although not well established. More calls received on average in December so the last 12 weeks in 1978 not a typical post-test period Not possible to isolate the separate interventions in this programme, that is, the effect due to the improved telephone advice line and the effect due to the improved triage system No other changes in health care provision discussed over the 4-year study period	Weak evidence suggesting that the MIC reduced overall emergency department attendance. Not possible to quantify the effect of the telephone advice line with confidence.

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Sjönell (1986)	*Aim*: To assess the impact of improved access to primary care on hospital utilisation. *Population and setting:* population of Matteus, an urban area of Stockholm, Sweden. *Design*: Controlled before and after *Sample*: *Completed questionnaires* Matteus: Before: 241 After: 251 Control: (nearby similar control area and Stockholm district) Before: 65 After:78 *Study period*: 1st questionnaire: Jan 79 2nd questionnaire: Jan 82 Patients were asked to describe utilisation during the 18 months prior to each questionnaire.	Comparison of health care utilisation rates in study area and two control districts. There was a major expansion in staffing levels at the primary care health centre. The number of GPs increased from 2 to 7.5 and the number of district nurses from 4 to 15 by 1 March 1980.	Change in utilisation of hospital outpatient facilities for emergencies Change in number of home visits by Stockholm emergency car	*Emergency outpatient visits (intervention group)* Adjusted percentage change= -40% No control figures given *Emergency car visits* %Change: Matteus: -24% Nearby district: +6% Stockholm district: -5% *Visits to Matteus primary care centre (intervention group)* Adjusted percentage change +63 (over 65s) +131% (all ages) *Visits to general practitioners in control areas* Adjusted percentage change Nearby district: +43% (elderly controls) Stockholm district: +23% (all ages) *Net effect on utilisation in intervention area: -26%*	Methodology is not well described. Unclear if survey was only form of data collection (sample sizes don't match the number of respondents). Likelihood of non-response bias is not assessed. Baseline characteristics of control and intervention groups not compared. Primary care facilities in control areas also increased, by 15% in nearby control district and 19% in Stockholm district overall.	The marked changes in the sample in the intervention area seem likely to be caused by the change in primary care availability. However, little evidence that the sample and controls were comparable or respondents were representative.

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Skinner (1977)	*Aim*: To evaluate the feasibility of influencing patients' choice of health provider following referral from a general medical hospital outpatients department *Setting*: Overcrowded hospital outpatient dept in a public hospital in Harris County, Houston. 'Inappropriate' utilisation very high (84%) *Study population:* Outpatient department attenders. Predominantly female (78%), elderly (mean age 62) and black (75%) with chronic diseases and complications *Design*: Before-and-after study *Sample*: All outpatient charts for patients visiting the clinic over a period of 20 days in May-June 1976 were selected. 236 of 519 eligible patients agreed to be referred to a neighbourhood clinic. Charts were retrieved six months later After: Period between index visit and 6mth review Before: Same number of days before the index visit	Charts were screened to identify patients who lived nearer to a neighbourhood health clinic (primary care provider) than the hospital (952 of 1151 patients). Physicians assessed patient chart for suitability for referral (519 of 952). 236 patients agreed to the proposed referral	Health care utilisation (including emergency department visits) before and after the index visit; Patient compliance *Source*: case note review	*Visits per patient per year* Emergency dept: Before 0.6, After 0.2, %Change -67% p<0.01 Primary care: Before 7.0, After 10.8, %Change +54% p<0.01 Specialist clinics: Before 2.8, After 1.8, %Change -36% p<0.01 Thus, the chart-review of all patients visiting the outpatients clinic over 20 days was associated with 23 fewer visits to the emergency department over the post-test period (6m) *Compliance* 86% of patients attended their primary care provider initially after their referral. No significant differences were found in demographic characteristics, distribution among primary care clinics or case-mix between patients who complied and patients who did not comply After six months, 92% (185) of those patients who had visited their primary care clinic were still registered as patients there. 17 patients returned to the hospital for care. No clinic was a source of a disproportionate number of returners No data were presented on outcomes or costs	Simple study with short term follow-up. No discussion of possible secular trends over study period (one year)	Suggests that this intervention aimed at referring patients from hospital outpatient departments to primary care providers also had a long-term effect on emergency department attendance This outpatients clinic was heavily over-utilised by patients with primary care-type needs before the intervention

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Straus *et al* (1978)	*Aim*: to assess success of referral from a hospital emergency department to primary care providers and factors associated with compliance *Setting*: Sinai Hospital located in suburban area of north west Baltimore *Population*: Non-urgent emergency department attenders (children and adults). Relatively low-income: 49% of sample Medicaid recipients *Design*: Before and after *Sample*: 500 patients attending from Nov 1977 to Dec 1978 identified from hospital records *Study period* Before=18 months After=24 months *Exclusions*: patients with a regular primary care physician; patients not locally resident	Patients seen in the non-urgent area of the emergency department were treated and then given the telephone number of one of three primary care providers and written information. Patients normally made any appointment for follow-up care but in some cases this was arranged by the referring nurse or physician. Two of the primary care providers were associated with the hospital, one provider was a community health centre.	Emergency department utilisation Number of patients enrolling with primary care provider *Source*: hospital emergency department records, primary care clinic records	Number of visits to emergency department per person per year *Before* *After* *% Change* Referred 1.11 0.90 *-19%* NS 33% of referred patients made an initial appointment with a primary care provider Patients making primary care contact vs patients with no primary care contact during study period Number of visits to emergency department per person per year *Before* *After* Contact with 1° 1.22 1.03 Not tested No contact with 1° 1.01 0.79 Not tested	Lack of comparable control group means that trend can not be isolated from secular trends with confidence. For example, children made up half of the sample and tend to use the emergency department less as they get older. The small decline noted in utilisation may be a result of maturation. Changes in health care delivery over study period not discussed in paper Index referrals sampled over a year - No measure of utilisation of emergency care at other hospitals and primary care clinics Intervention was well established before the evaluation and the study may underestimate any effect eg. some patients in sample may have been referred more than once	No evidence of primary-secondary substitution but a weak result because of lack of comparison group and partial data on primary care utilisation.

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Ullman *et al* (1978)	*Aim*: To assess the impact of a primary care health centre. *Setting and population*: Patients with primary care needs attending Genesee hospital emergency and outpatients department, in an urban area of New York. *Design*: Uncontrolled before and after study *Sample*: utilisation patterns of 965 patients attending the health centre *Study period*: Index visit: Jan 72- Oct 72 Before: Jan 71-1st visit After: 1st visit-Oct 74	Health centre adjacent to urban hospital employing salaried primary care physicians.	Comparison of annual rates of attendance to the emergency department before and after the health centre opened.	*Difference in mean annual visiting rates* Paediatrics - accidents -0.00 Paediatrics - non accidents -0.27 p<0.05 (1-tailed) Medicine - accidents -0.01 Medicine - non accidents -0.04 These figures translate into an annual estimated decrease of 2400 visits (or 7 per day) to the emergency dept over the study period.. Differences were greater for a targeted group of patients who had visited to the hospital outpatient department before the introduction of the health centre: *Difference in mean annual visiting rates (former outpatient attenders)* Paediatrics -0.88 Medicine -0.42 p<0.05 (1-tailed)	This study is uncontrolled and it is possible that other changes in the health system affected utilisation. However, the authors check for maturation effects among the paediatric population and state that non-programme factors were unlikely to be important. The study only includes primary care patients who used the health centre. Only utilisation of the Genesee emergency and outpatient departments were measured. It is possible that the health centre attracted some patients previously using other hospitals to Genesee, confounding the results.	Some evidence that provision of appropriate and accessible primary care facilities can attract patients (in this case, parents and targeted patients) previously using the emergency dept. The observed reduction in utilisation (by patients using the centre) is small despite a history of 'inappropriate' visits. The overall impact on the emergency department remains unclear

Appendix 1. Summary of Studies Included for Review by Author

Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Ward *et al* (1996)	*Aim*: To assess the impact of employing GPs in an A&E department in inner London. *Setting and population*: A&E attenders at St Mary's hospital London with 'primary care' needs. St Mary"s is a university teaching hospital. The A&E department has been affected by conversion of nearby St Charles A&E to MIU status in early 1993. *Design*: prospective quasi-experimental study *Sample:* Intervention: 566 patients managed by GPs Control: 404 patients seen by hospital doctors (range of grades) *Duration*: 6 wks: May-June 1993	10 local general practitioners were recruited to work in the A&E dept on a sessional basis. Hospital staff (with experience of primary care) devised nurse triage tree. Patients were triaged to 'primary care' if self referred and symptoms unlikely to be caused by conditions (or complications of chronic conditions) requiring urgent care or admission (17% of all attenders). As part of the intervention, doctors attempted to raise patient awareness of community services.	*Process measures* investigations, prescriptions, compliance with follow-up care, long term demand for A&E primary care. *Outcomes*: professional satisfaction	Processes A&E Drs compared to general practitioners Unadjusted OR 95% CI Any investigation 1.8 1.45-2.35 X-ray 1.9 1.44-2.60 Haematology 2.8 0.91-8.72 Biochemistry 4.7 1.40-15.7 Microbiology 1.6 0.85-2.89 Prescriptions 1.0 0.85-1.17 Any referral 1.2 1.07-1.42 Referral - on call team 2.9 1.42-6.05 Referral - A&E review 2.7 1.36-5.23 Referral - outpatients 2.4. 1.51-3.85 Referral - primary care 0.8 0.69-1.03 Compliance with general practitioner referral assessed by questionnaire to local general practitioners (70% response). No difference in compliance: 'approximately half' in both groups. Staff survey: 'all staff had positive perceptions of general practitioners working in A&E'. Demand for A&E by 'primary care' patients remained 'stable over the course of the study period and in subsequent months'.	The likelihood of bias in this study comes from the non-random allocation of patients to doctors by the triage nurse. The fact that 'Major/primary care' patients were in practice assigned to an A&E doctor is not explained in the paper. GPs had been operating in the department since Feb and efforts were made to integrate them within the A&E team. Interaction was an objective of the study and a benefit perceived in the staff survey, so some contamination is likely despite the relatively short study period. Information on patient characteristics (intervention and control groups are only described as 'similar') are not reported in detail.	Weak evidence that general practitioners manage patients less resource intensively than hospital doctors due to risk of allocation bias. Not enough data to assess cost-effectiveness. No information on patient outcomes or costs Intervention is acceptable to staff

Appendix 1. Summary of Studies Included for Review by Author

Study	Aims, setting, population, research design, sample.	Intervention	Outcomes measured	Results	Comments	Conclusions
Williams *et al* (1973)	*Aim*: To evaluate the relationship between general practice deputising services and attendance at accident and emergency departments *Setting and study population*: Patients consulting deputising services in Sheffield and Nottingham in 1970 *Design*: Longitudinal observational study *Sample*: All consultations to deputising services in Sheffield and Nottingham in 1970 Routine data on new A&E attendances in areas covered by a deputising service, (Leicester, Nottingham and Sheffield) between 1960 and 1971 and the rest of the Sheffield region over the same period which had no deputising coverage	No specific intervention. Deputising services provide on-call cover for GPs out-of-hours where GP wishes to contract out of his/her out-of-hours commitment	Number of new attendances (i.e. excluding follow-up appointments) to A&E departments in the region *Source*: Published routine data	In 1970 less than 1% of all first attendances at regional hospital A&E departments were referred from deputising services. Four per cent (1280) of all patients seen in Sheffield and Nottingham (33,542) by the deputising service were referred to an A&E department A comparison of trends in A&E attendance over time (presented graphically) showed that attendance rates increased over time in all areas. In the three areas with deputising services the rate of increase did not appear to be affected by the introduction of the deputising service. The rate of increase in new A&E attendances over the study period in Sheffield and Nottingham (1960-1971) was similar to the rate of increase in the country as a whole. The rate of increase in Leicester was lower. Attendances in the rest of the Sheffield region (without deputising services) showed a different pattern. Here the rate of A&E attendance was lower in 1960 (90 per 1000 population compared to 125 per 1000 in Sheffield) but increased at a faster rate throughout the study period Possible reasons for differences in the pattern of attendance are not explored in the paper	Aggregated routine data may obscure subtle variation. Routine attendance data includes self-referred patients, patients referred during day and patients with serious injury and illness	Evidence suggests that there was no obvious increase in additional A&E utilisation as a result of deputising services practising in the Sheffield region in the early 1970s

Appendix 2 Studies Excluded from Review

Five studies did not meet the methodological inclusion criteria:

V. Alberola Benavent and F. Rivera Casares (1994) ['Primary care as determinant of the use of hospital emergency services'] *Atención Primaria,* Vol 14, pp 825-8.
Reason for exclusion: Inappropriate multivariate analysis. No useful data presented for the purposes of this review

R. F. Jankowski and S. Mandalia (1993) 'Comparison of attendance and emergency admission patterns at accident and emergency departments in and out of London', *BMJ,* Vol 306, pp 1241-43.
Reason for exclusion: No useful data presented on the relationship between primary care utilisation and hospital utilisation for the purposes of this review. Data on primary care registration not collected.

J.M. Merrill, B.J. Lounsbury, G.S. Gopalakrishna, A.E. MacMahon, S. Sanford and E.V. Boisaubin (1980) 'Relocating primary care patients from tertiary hospital to neighborhood health centers', *Southern Medical Journal,* Vol 73, pp 780-783.
Reason for exclusion: No useful data presented on the number of patients referred away from the emergency department (or other outpatient clinics) to primary care as a result of the referral scheme.

R.A.R. Treasure and J.A.J. Davies (1990) 'Contribution of a general practitioner hospital: a further study', *BMJ,* Vol 300, pp 644-6.
Reason for exclusion: No comparison group for the purposes of this review

G. Westman, M. Hanning and B. Mattsson (1987) 'Utilization of inpatient and emergency care: effects of changes in primary care system', *Scand J Soc Med,* Vol 15, pp 105-9.
Reason for exclusion: Interrupted time series results presented graphically. Inappropriate linear regression analysis. No useful data presented for the purposes of this review.

Appendix 3 Electronic Search Strategy

Medline and HealthStar MeSH Headings

Telephone Access
#1: (telephone or hotlines).sh
#2: telephone$.tw
#3: (telephone or telemed$).ti
#4: 1 or 2 or 3

Integrating primary and secondary care and
impact of primary care on emergency care utilisation
#1: physician's practice patterns.sh
#2: hospital/ut.sh
#3: primary health care.sh
#4: family practice.sh
#5: emergency service.sh
#6: (emergency adj department).tw
#7: (emergency adj room).tw
#8: 1 or 2
#9: 3 or 4
#10: 5 or 6 or 7
#11: 8 and 9 and 10

Minor injuries units
#1: minor trauma.sh
#2: (minor and (injur$ or trauma or accident or illness) adj (unit$ or cent$).tw
#3: (emergenc$ adj4 cent$).tw
#4: (emergenc$ adj4 clinic).tw
#5: (emergenc& adj4 unit).tw
#6: (minor and injur$).ti
#7: major trauma.sh
#8: 1 or 2 or 3 or 4 or5 or 6
#9: 8 not 7

Inappropriate use of A&E

#1: decision making.sh
#2: health services needs and demand/sn.sh
#3: health services misuse.sh
#4: hospital/ut.sh
#5: emergency service.sh
#6: (emergency adj department).tw
#7: (emergency adj room).tw
#8: 1 or 2 or 3
#9: 5 or 6 or 7
#10: 4 and 8 and 9

Primary emergency care

#1: emergency service.sh
#2: (emergenc$ or urgent).tw
#3: primary health care/ut.sh
#4: family practice.sh
#5: referral and consultation.sh
#6: 1 or 2
#7: 3 or 4 or 5
#8: 6 and 7

Ambulance-based interventions

#1: ambulances.sh
#2: ambulance$.tw
#3: ambulance$.ti
#4: (priority adj dispatch).tw
#4: 1 or 2 or 3 or 4

Copayments and referral

#1: emergency service.sh
#2: emergency adj department.tw
#3: emergency adj room.tw
#4: (triage or referral).tw
#5: (copayment or co-payment or (cost adj sharing)).tw
#6: 1 or 2 or 3
#7: 4 or 5
#8: 6 and 7

Methodological terms used to limit search where more than 100 items retrieved from initial search

#1: (meta-analysis or review literature).sh
#2: (systematic$ adj4 (review$ or overview$)).tw
#3: meta-analysis.pt
#4: review.pt
#5: review, academic.pt
#6: randomized controlled trial.sh
#7: cross-over studies.sh
#8: prospective studies.sh
#9: retrospective studies.sh
#10: comparative study.sh
#11: (comparative adj4 study).tw
#12: (control$ adj4 study).tw
#13: cross-sectional studies.sh
#14: sampling studies.sh
#15: (random adj4 sample).tw
#16: longitudinal studies.sh
#17: utilization review.sh
#18: (outcome and process assessment or outcome assessment).sh
#19 patient satisfaction.sh
#20: (evaluation studies or program evaluation).sh
#21: cost benefit analysis.sh
#22 (odds ratio or regression analysis or confounding factors or logistic models).sh
#23 (questionnaires or interviews).sh
#24 (randomiz$ or randomis$) adj4 trial).tw
#25: follow-up studies.sh

#26: rating scales.sh
#27: random allocation.sh
#28: health services research.sh
#29: letter.pt
#30: historical article.pt
#31: case report.sh
#32: case-control studies.sh
#33: review of reported cases.pt
#34: 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
#35: 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20
#36: 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 32
#37: 34 or 35 or 36
#38: 29 or 30 or 31 or 33
#39: 37 not 38
and subject search terms (see above)

DHSS-DATA keywords

PT=article

Hospital utilisation
casualty units.de
hospital special units.de
hospital utilisation.de
self referral.de
patient emergency admissions.de
hospital emergency services.de
casualty nursing.de
nurse practitioners.de
general practitioners.de

Primary Emergency Care
primary care.de
out of hours health services.de
night calls.de
emergency treatment.de
emergency services.de
urgent treatment.de
accidents.de
wounds and injuries.de
casualties.de

Appendix 4

DATA COLLECTION CHECKLIST

Title: _____

_____

_____

_____

Authors: _____

_____

Journal/Pub: _____

RM ID: _____

.....

.....

1. Inclusion Criteria

1.1 Study design

RCT (randomised controlled trial)
CBA (before and after study with control)
ITS (interrupted time series - at least one pre and post measurement) _____
1BA (one group - before and after)
SGC (static group comparison)

Is the study: a) Prospective b) Retrospective _____

Study period (allocation):_____

1.2 Methodological inclusion criteria

a) Study evaluates an intervention against a control activity/practice ? _____

A=YES (eg. before & after, second site, usual practice etc)

B=NOT CLEAR

C=NO or matched case control study

b) Is the control practice/activity comparable with respect to the targeted outcome variable (eg ordering of tests; A&E attendence rates)? _____

A=YES

B=NOT CLEAR

C=NO

c) Objective measurement of primary outcome measures i.e. substitution:, effectiveness _____

A=DONE (eg number of tests ordered, number of referrals to A&E, number of unexpected readmissions etc)

B=NOT CLEAR

C=NOT DONE (e.g. professional perceptions only)

1.3 Review scope

A study is eligible for inclusion in a review if it describes an intervention and one or more of the comparisons described in the review protocol:

A=DONE

B=NOT CLEAR (N.B. the paper should be discussed with the contact editor for the review before data extraction is undertaken) _____

C=NOT DONE

IMPORTANT: If any answer to 1.2 or 1.3 is scored C: the study should be EXCLUDED

2. Quality Criteria

2.1 Power calculation

A=DONE if study reports a power calculation

B=NOT CLEAR if it is not clear whether a power calculation has been reported

C=NOT DONE if no power calculation stated

_____

If A, what is the statistical power of the study?

_____

2.2 Unit of allocation/analysis

a) Patients

b) Health care professionals

c) Site

d) Other_____

X) UNCLEAR

Allocation _____

Analysis _____

2.3 Response/follow-up of subjects

A= DONE if outcome measures obtained for 80-100% of subjects. (Do not assume 100% follow-up unless stated explicitly)

B=NOT CLEAR

C=NOT ACHIEVED if outcome measures obstained for less than 80% of subjects

_____

2.4 Likelihood of contamination (group comparisons)

A= UNLIKELY if allocation was by community, institution or practice and it is unlikely that the control treatment was influenced by the intervention

B=NOT CLEAR it is possible that communication between experimental and group subjects/providers could have occurred

C=LIKELY (same site)

_____

2.5 Likelihood of contamination (before and after/repeated studies)

The intervention is independent of other changes

A=YES can be confident that intervention is independent of other changes

B=NOT CLEAR if not addressed in paper. _____

C=NO if not confident that intervention is independent of other changes in time.

2.6. Baseline measurement

Was baseline data collection undertaken?

A1=Done if performance or patient outcomes were measured prior to the intervention, and no substantial differences were present across study groups

A2=Done but differences were present across study groups (discuss)

B=NOT CLEAR if unclear whether baseline measures were conducted _____

C=NOT DONE

2.7. Data collection is identical before and after the intervention (baseline/b&a/repeated studies)

The **process** of data collection is identical before and after the intervention and is unlikely to influence the data collected from repeated measures.

A= YES data collection identical

B=NOT CLEAR _____

C= NO

2.8 RANDOMISED CONTROLLED TRIALS

2.8.1 Type of RCT

Two-group/ cross-over/ repeated:

_____

2.8.2 Concealment of allocation

A=DONE if:

a) the unit of allocation was by institution, team or professional and any random process is described explicitly, e.g. the use of random number tables (not alternation or other systematic approach)

b) the unit of allocation was by patient or episode of care and there was some form of centralised randomisation scheme, an on-site computer system or sealed **opaque** envelopes were used

B=NOT CLEAR

C=NOT DONE

2.9 INTERRUPTED TIME SERIES

2.9.1. Protection against secular changes:

a) There are sufficient data points to enable reliable statistical inference

A =12 or more data points are recorded before and 12 data points recorded after the intervention.

B=NOT CLEAR

C=NOT DONE if less than 12 data points are recorded before and 12 data points recorded after intervention.

Number of data points Before:_____ After:_____

b) Formal test for trend

A=DONE if formal test for trend using appropriate method is reported

B=NOT CLEAR if not specified in the paper

C=NOT DONE if formal test for trend has not been done.

2.9.2 Completeness of data set

A=DONE if data set covers 80 - 100% of total providers/episodes of care in study area

B=NOT CLEAR if not specified in the paper

C=NOT DONE if less than 80% of total providers/episodes of care in study area

2.10. STUDIES USING SECOND SITE AS CONTROL

Comparability of study and control sites

A1=DONE if characteristics of study and control providers are reported and similar

A2=DONE but there are differences between study and control providers (discuss)

B=NOT CLEAR if it is not clear in the paper e.g. characteristics are mentioned in the text but no data are presented _____

C=NOT DONE if there is no report of characteristics either in the text or a table

2.11. SURVEY STUDIES

2.11.1 Random sampling method

A=YES (describe)_____

B=UNCLEAR _____

C=NO (systematic, alternate, opportunistic, snowball etc)

2.11.2 Non-response bias

a) Response rate:_____

b) Checks for representativeness of sample and non-response bias?

A1=DONE and no significant non-repsonse bias

A2=DONE and evidence of non-response bias _____

B=UNCLEAR

C=NOT DONE

2.12 STATIC GROUP COMPARISON

Appropriate analysis (eg multivariate) controlling for likely confounding

A=DONE _____

B=UNCLEAR or not reported

C=NOT DONE

2.13 GENERAL

2.13.1 Do the authors identify any weaknesses/strengths of their methodology?

Strengths:_____

_____

_____

Weakness:_____

_____

_____

2.13.2 Was a pilot study undertaken?

A=Yes

B=Unclear/Not reported _____

C=No

---

3. Participants/Controls

3.1 Characteristics of providers

a) Profession:

a) General Practitioners b) Nurse practitioners
c) Other nurse d) Pharmacists
e) Hospital Doctors
g) Mental health professionals

h) Other provider staff (specify)_____
X) NOT CLEAR

Study Group:
_____

Control (if diff):
_____

b) Level of experience:

If different mix of professionals are providing service in control group, is there likely to be a difference between the control and study groups in terms of experience/age etc

_____

_____

c) Setting of care (list all as appropriate)

Study:

a) A&E dept b) MIU
c) Emergency primary care centre
d) General practice e) Telephone
f) Home g) Hospital

h) Other:_____
X) Unclear

Control (if diff)

If setting differs between control and study groups, are there likely to be differences in case-mix, patient characteristics etc

_____

_____

3.2 Geographical setting of study

a=London
b=UK
c=Other: _____
X=Unclear

a=Rural
b=Urban
X=Unclear

3.3. Characteristics of patients

i). Which clinical area does the intervention target?

a) 'Inappropriate' A&E primary care attenders

b) Out of hours primary care need

c) Paediatric emergency need

c) Minor injuries

d) Mental health crisis

e) Other

_____
X=UNCLEAR

ii). What patient characteristics are recorded? (circle as approp:)

Age:	YES	NO
Sex	YES	NO
Diagnosis	YES	NO
Severity of condition	YES	NO
Duration of symptoms	YES	NO
Registered with GP	YES	NO
Distance travelled	YES	NO
Socio-demographic	YES	NO

Other recorded:_____

_____

iii) Are patient study groups & controls have similar characteristics (i.e. not statistically different)?

YES NO UNCLEAR

If NO/UNCLEAR, describe:_____

_____

iv) List below the relevant numbers of participants/controls (include patients, subclasses, hospitals, regions, practices, staff as appropriate. Note any information which is missing or unclear):

Study	**Control**

4. Intervention

4.1. Type of intervention

a) Integrating primary/secondary care

b) Reorganising structure of secondary care

c) Changes in professional skill mix providing care

d)Changing demand for emergency care _____

e) Expanding primary emergency care

f) Expanding social/community emergency care

g) Other (specify)_____

4.2. Controls

a)No intervention control group

b)Standard practice control group _____

c)Untargeted activity

4.3 Prospective identification by investigators of barriers to change

a) Information management b) Clinical uncertainty c) Sense of competence
d) Perceptions of liability e) Patient expectations f) Standards of practice _____
g) Financial disincentives h) Administrative constraints

i) Other _____

j)Not Done X)NOT CLEAR

4.4 Source of funding of intervention

a)Governmental organisation b)Commercial health provider
c) Non commercial health provider d) Pharmaceutical company _____
e) Voluntary body f) Charitable trust
g) Research funding body

h)Other: _____

X)NOT CLEAR

5. Outcomes

5.1. Description of the main outcome measure

a) Health professional outcomes/process measures (For example, the number of drugs prescribed - list all standard tools used)

_____

_____

_____

b) Patient outcomes (For example, the number of adverse drug events, satisfaction - list all standard tools used eg SF-36)

_____

_____

_____

c)Economic variables:

Cost base used_____
X=NOT CLEAR

i) Costs of the intervention:

If reported describe costs_____

_____

ii) Changes in direct health care costs as a result of the intervention (e.g. drugs, hospital stays, etc.):

If reported describe costs_____

_____

iii)Changes in non-health care costs as a result of the intervention (e.g. patient travel or time off work for hospital visits):

If reported describe costs_____

_____

iv) Costs associated with the intervention are linked with provider or patient outcomes in an economic evaluation (e.g. net cost per unit change in rate of prescribing, or cost per life year saved)

If reported describe costs_____

_____

*v) Sources/calculations used for costs*_____

_____

5.2. Duration of follow-up of outcomes:_____

_____

5.3. Has a possible threshold effect been identified. i.e., there was little room for improvement in provider performance, because it was already adequate

i)	Identified by investigator	a)Yes b)No c)NOT CLEAR	_____
ii)	Identified by reviewer	a)Yes b)No c)NOT CLEAR	_____

6. Results

6.1. Record and attach:

a) the main results for the main outcomes for each study group, in natural units

b) note the format/statistical tests/standard tools used to present the results

c) any other points/tables/diagrams of interest/notes on context

7. Context

Health System

Setting

Health Professionals

Patients

Intervention

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