

# **New Zealand Health Technology Assessment (NZHTA)**

The Clearing House for Health Outcomes and Health Technology Assessment

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## **Emergency Department Attendance**

*A critical appraisal of the key literature*

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## EXECUTIVE SUMMARY

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### *Aim*

This report aims to examine the key literature that has assessed the appropriateness of attendance at the emergency department.

### *Data sources*

This review did not involve a single structured search strategy but was the result of a number of small, topic-based searches undertaken in conjunction with the review of acute medical admissions (NZHTA Report 6). Topic-based searches were conducted by searching under three MeSH headings (emergency department, hospital and emergency service, hospital) and then using different text words (for example, appropriate, minor injury). The searches were undertaken on the following bibliographic databases: Medline, HealthStar, Cinahl and Current Contents.

Searches were limited to English language material from 1993 onwards and were mainly run between mid-December 1997 and mid-January 1998.

### *Study selection*

Studies were selected if they examined the appropriateness of emergency department attendance. A broad range of study designs were eligible for appraisal including meta-analyses, randomised controlled trials, quasi-experimental studies, cohort studies, cross-sectional studies, descriptive studies, economic evaluations and some expert opinion articles.

Criteria for exclusion from appraisal were: studies with discrepancies in their description of methods/results, studies that did not clearly describe the methods/results, limited generalisability to the New Zealand population, letters and non-English language studies.

A single reviewer applied these criteria.

The report includes interventions for both adults and children.

### *Data extraction*

Critical appraisal forms standardised by study design were used to extract and appraise the literature. These forms were designed for use by the Group Health Co-operative of Puget Sound and were adopted by the New Zealand Guidelines Group (New Zealand Guidelines Group, 1997). A single reviewer conducted the appraisal of studies.

The level of evidence was determined using a modified version of the US Preventive Services task Force protocol (US Preventive Services task force, 1989).

### *Data synthesis and conclusions*

Conclusions about inappropriate ED use

- While studies that have described the inappropriate use of the ED were relatively plentiful, remarkably few studies have evaluated the health outcomes associated with alternatives to ED-based care.
- ED attendance is not included in the National Minimum Dataset and consequently no published national data exists that describes the trends in ED attendance in New Zealand.
- Although published data is not available, consistent opinion suggests that ED attendances have been increasing in New Zealand.
- No valid and reliable method exists to define inappropriate care at an ED. Clinicians, administrators and consumers have markedly heterogeneous definitions of appropriate attendance at the ED.

- A medical viewpoint of appropriateness has usually been presented in the literature. That is, patients presenting for non-urgent care that could be provided by a primary care physician are often designated as inappropriate ED attenders.
- Attendance at an emergency department by patients seeking medical care for non-urgent conditions has been labeled fiscally improvident, as it is considered to be more expensive for health funders as well as medically undesirable due to the discontinuous and unco-ordinated care that is provided. No conclusive evidence exists for either of these assertions (Franco et al., 1997).
- A large number of studies have examined the appropriateness of ED-based care in a number of settings and have produced a wide variation in their estimates of the percentage of attendances that were designated as being appropriate (this review identified that between 3% and 59% of ED attendances have been deemed to be inappropriate in the literature).

#### Conclusions about the effectiveness of interventions to reduce inappropriate ED use

- Without a valid and reliable measure of inappropriate ED attendance, the absolute effectiveness of interventions to reduce these attendances cannot be accurately assessed.
- The evidence for the relative effectiveness of alternatives to ED-based care was found to be patchy in coverage and quality. Relatively little research has been undertaken to evaluate major new developments in primary or secondary care that have an important bearing on the interface between these levels of care. These new developments include: new deputising arrangements for out-of-hours GP care, and the provision of minor injury units located in a variety of settings and staffed by a range of different professionals (**see Appendix 2**).
- Most of the research that has evaluated the effectiveness of new organisational arrangements for inappropriate ED attenders has used a quasi-experimental study design rather than a randomised controlled trial methodology. Only four randomised controlled trials of interventions to reduce inappropriate ED use were identified by this review.
- Despite the general limitations of the research, some evidence was available for the effectiveness of restricted ED access and expanded access to primary care and the efficacy of cost-sharing which have consistently been found to be effective methods to restrict ED use (although the reduction may apply to all types of users and not just inappropriate users). Less robust evidence exists for the effectiveness of social workers in the ED or certain specific medical interventions.
- Available (although generally poor quality) evidence suggests that the following interventions are ineffective at reducing the number of inappropriate ED attendance: triage, patient education and changes in the characteristics of GP services.
- Several major changes in service delivery such as the provision of out-of-hours GP clinics and the development of hospital-based minor injuries clinics have somewhat remarkably not been evaluated in regard to their effect on ED usage.
- Interventions to reduce non-urgent visits to the ED need to be multi-faceted to account for the wide range of determinants that lead patients to seek care at that venue. Single interventions are unlikely to be successful whereas those that involve multiple strategies that include the patient, physician and system changes are more likely to be successful.
- A notable problem with the literature is that most of the research has been based on the provision of primary care to people in the US where an emphasis has traditionally been on specialist-based services. It is possible that the marginal gains for the provision of primary care-based interventions in the US setting may be substantially greater than could be achieved in the UK, Australian or New Zealand setting where primary care is already well established.
- Finally, it should be remembered that interventions to change ED utilisation have been driven by an increase in demand and are sponsored by supply side organisations (hospitals and the funders of ED and hospitals). It should therefore be remembered that new interventions must still provide a satisfactory service to patients. In addition, alternatives to ED-based services have no guarantee of

producing overall savings in resources because it is possible that these services (for example, minor injury units) may actually service patient problems that previously would not have been presented to the health system. A crucial issue, therefore, when managing demand for primary and secondary care services is the need to furnish additional support for patients to appropriately manage their own minor health problems and appreciate when assistance may be needed.

- An alternative to focusing on the inappropriate use of the ED and developing interventions to reduce this use of the department, is to accept that many patients choose to attend the department and therefore the imperative is to expand the scope of the ED to meet the demand for non-urgent care. This could be done, for example, by allowing primary care workers (practice nurses and GPs) to staff EDs or by developing the ED as a primary care centre (Dale et al., 1996).

## GLOSSARY

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**Acute services** ~ Services for urgent conditions that need immediate treatment.

**Age adjusted rates** ~ Mortality or morbidity rates in which there has been adjustment for differences in age distribution of the populations being compared.

**Ambulatory care** ~ Health care provided in other than an inpatient setting.

**Before and after study** ~ A situation in which the investigator compares outcomes before and after the introduction of a new intervention.

**Benchmarking** ~ The process of comparing the prices, quality or scope of services against those of other similar services or against common reference points or standards.

**Bias** ~ Deviation of results or inferences from the truth, or processes leading to such deviation.

**Budget holding** ~ A system where managers have a fixed budget for a defined population and must meet the costs of an agreed set of services used by that population.

**Capitation** ~ A system of paying providers a defined price for each consumer who is registered with a provider.

**Case control study** ~ The observational epidemiologic study of persons with the disease (or other outcome variable) of interest and a suitable control group of persons without the disease. The relationship of an attribute to the disease is examined by the diseased and the non-diseased with regard to how frequently the attribute is present.

**Casemix** ~ The distribution and different types of patients cared for in a health care facility.

**Cohort study** ~ The analytic method of epidemiologic study in which subsets of a defined population can be identified who are, have been, or in the future may be exposed or not exposed, or exposed in different degrees, to a factor or factors hypothesised to influence the probability of occurrence of a given disease or outcome.

**Community care** ~ Corresponds to ambulatory and domiciliary services provided other than through hospitals to patients who are resident at their home, hotel, prison, barrack etc.

**Confounder** ~ A third variable that indirectly distorts the relationship between two other variables.

**Cross sectional study** ~ A study that examines the relationship between diseases (or other health related characteristics) and other variables of interest as they exist in a defined population at one particular time.

**Day patient** ~ A person who is admitted and discharged from hospital on the same day.

**Demand driven services** ~ Services purchased for an unlimited fee-for service basis according to demand.

**Descriptive study** ~ A study concerned with and designed only to describe the existing distribution of variables, without regard to causal or other hypotheses.

**Evidence based** ~ Based on valid empirical information.

**Generalisability** ~ Applicability of the results to other populations.

**Incidence** ~ The number of new cases that occur in a given period in the population at risk.

**Indicator** ~ An item of quantitative or qualitative information reported to enable the monitoring of a condition or the performance of an organisation.

**Intention to treat** ~ A method for data analysis in a randomised controlled trial in which individual outcomes are analysed according to the group to which they were randomised even if they never received the treatment to which they were assigned.

**Managed care organisation** ~ An organisation or service provider, which is given responsibility for ensuring that a defined population receives a defined set of services in a coordinated way.

**Meta-analysis** ~ Any systematic quantitative method that uses statistical analysis to integrate the data from a number of independent studies.

**Misclassification** ~ The erroneous classification of an individual, a value, or an attribute into a category other than that to which it should be assigned.

**Morbidity** ~ Illness.

**Multiple regression** ~ Any analysis of data that takes into account a number of variables simultaneously.

**Odds ratio** ~ A measure of the degree or strength of an association. In a case control or a cross sectional study it is measured as the ratio of the odds of exposure among the cases to that among the controls.

**Prevalence** ~ The number of events in a given population at a designated time.

**Providers** ~ Organisations and health professionals providing health services.

**Randomised controlled trial (RCT)** ~ An epidemiologic experiment in which subjects in a population are randomly allocated into groups to receive or not receive an experimental preventive or therapeutic procedure, manoeuvre or intervention. RCTs are generally regarded as the most scientifically rigorous method of hypothesis testing available in epidemiology.

**Recall bias** ~ Systematic bias due to differences in accuracy or completeness of recall or memory of past events or experiences.

**Relative risk** ~ The ratio of the risk of disease or death among the exposed to the risk among the unexposed. It is a measure of the strength or degree of association applicable to cohort studies and RCTs.

**Secondary care services** ~ These are surgical and medical services, which are generally provided in a hospital setting.

**Selection bias** ~ Error due to systematic differences in characteristics between those who are selected for a study and those who are not.

**Sensitivity analysis** ~ A method to determine the robustness of an assessment by examining the extent to which results are affected by changes in methods, values of variables, or assumptions.

**Triage** ~ A system of prioritising the attenders at an ED.

**Utilisation review** ~ Systematic review of particular procedures to ensure that the right thing was done to the right person, in the right places, at the right time and in the right way.

## LIST OF ABBREVIATIONS

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95% CI	—	95% confidence interval
ED	—	emergency department
GP	—	general practitioner
NHS	—	National Health Service (UK)
NZ	—	New Zealand
OR	—	odds ratio
SD	—	standard deviation
UK	—	United Kingdom
UR	—	utilisation review
US	—	United States

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# ***Section One***

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Introduction



# Introduction

## AIMS

This review aims to identify and appraise the key literature in relation to the appropriate use of the hospital-based emergency department (ED), and the effectiveness of interventions to reduce inappropriate ED attendance.

## BACKGROUND AND RATIONALE FOR THIS REVIEW

This review was undertaken in conjunction with NZHTA Report 6 - Acute Medical Admissions and also reviews the issues underlying the increase in the demand for emergency care that has been observed in many Western countries. In particular this review focuses on a critical appraisal of the literature that has examined the appropriateness of patient attendance to the ED.

The ED has enormous importance in the health systems of Western countries. This department is an important part of the interface between primary and secondary care health services and the ED is a major conduit for the delivery of health care to a significant proportion of a country's population.

The finite resources available for health care demand that patient care should be delivered at the right time, in the right way, and by the right provider (Pancheon et al., 1995). A number of authors have suggested that significant advantages for the individual, and the health system, may accrue in terms of cost savings and improved health outcomes when minor problems are treated within a continuous relationship by a single primary care provider rather than at the ED (Pancheon et al., 1995). A critical issue therefore in any assessment of a health care system is therefore an examination of the appropriateness of ED usage. In turn any inappropriate use of the ED implies that significant barriers may exist that prevent people from receiving primary care and it may also suggest that the full potential of the health system for cost-effective patient care and significant health gain is not being achieved.

### *Methodological issues*

Descriptions of the percentage of inappropriate attendance at the ED have audited ED attendances in relation to a designated standard. Unfortunately no 'gold' standard exists that reliably defines the appropriateness of ED use. A large number of studies

based in different settings have used a variety of standards to assess the appropriateness of attendances and it is difficult to compare the results of these studies.

In general, seven different methodologies have been used in the literature to evaluate the appropriateness of ED attendance. Two of these methods involve assessments made by triage nurses (counting the number of presentations in the least acute triage classification or the number satisfying a published set of triage guidelines for inappropriate attendance). Another three methods are determined by retrospective analysis of patient notes (the number of presentations for which there were no physician-ordered treatments or tests, and the number of attendances that did not require the patient to be hospitalised or the subjective assessments of various sized groups of physicians). Finally, two methods involve patient-based assessments (low self-assessment of seriousness of presenting problem and willingness to trade the ED visit for a clinic appointment). Decisions as to how many visits are appropriate depend on which of these methods have been employed to make the assessment.

The absence of a valid gold standard to define the appropriateness of ED attendance also means it is difficult to assess the effectiveness of interventions to reduce these attendances. Furthermore, logistical and ethical problems would likely prevent many interventions from being evaluated by means of a randomised controlled trial (RCT). This review only located the presence of four RCTs in relation to assessments of the effectiveness of interventions to reduce ED attendance. Most assessments have used a quasi-experimental study design that has assessed the number of inappropriate ED attendances before and then after the introduction of an intervention. These studies, although less prone to ethical and logistical problems, are less able (than RCTs) to eliminate bias or confounding as alternative explanations for their findings (See Appendix 1).



# ***Section Two***

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## Methodology



# Methodology

## LITERATURE SEARCH

This review did not involve a single structured search strategy but was the result of a number of small, topic-based searches undertaken in conjunction with the review of acute medical admissions (NZHTA Report 6). Topic-based searches were conducted by searching under three MeSH headings (emergency department, hospital and emergency service, hospital) and then using different text words (for example, appropriate, minor injury). The searches were undertaken on the following bibliographic databases:

- Medline
- HealthStar
- Cinahl
- Current Contents

Searches were limited to English language material from 1993 onwards and were mainly run between mid-December 1997 and mid-January 1998.

A number of other electronic databases and bibliographic sources were also searched. These included the following:

- New Zealand university and medical library catalogues
- New Zealand Bibliographic Network
- Index New Zealand
- HMSO publications catalogues
- International Network of Agencies for Health Technology Assessment (INAHTA) documents
- Database of Abstracts of Reviews of Effectiveness (DARE)
- NHS Economic Evaluation Database
- King's Fund catalogue of publications
- Cochrane Library
- Material referenced in publications obtained in the course of research on the topic
- Internet sites and personal contacts

The report includes interventions for both adults and children.

As the topic was very broad, no attempt was made to limit the results of the search to particular study designs.

Because of limited financial resources, material that was available within New Zealand was preferentially selected. Abstracts of articles from journals which were not available nationally were scrutinised more closely before making the decision to obtain them from overseas.

This report does not contain detailed reviews of the following topics:

- Acute medical admissions
- Integrated care
- Can outpatient interventions reduce acute respiratory admissions?

These subjects are reviewed in separate NZHTA reports.

### *A limitation of the search methodology*

Because this review was not undertaken by means of a structured and systematic search of the medical bibliographic databases (which is the usual methodology used in NZHTA reports) the report has been termed an overview of the literature. The attention of the reader is drawn to this difference in methodology and the associated possibility that all the relevant literature may not have been included in this report.

## APPRAISAL METHODOLOGY

### *Inclusion criteria*

This review adopted broad inclusion criteria with regard to the literature that was included. Literature that has described the inappropriate use of the ED was included in this review along with articles that specifically evaluated interventions to reduce inappropriate ED attendance. The review attempted to provide an overview of the literature and as such it has included (with appropriate identification) opinion articles and descriptive studies. Study designs evaluated were: meta-analyses, randomised controlled trials, quasi-experimental studies, cohort studies, case control studies, descriptive studies, review articles and opinion articles. Details of these study designs are found in **Appendix 3**.

### *Exclusion criteria*

The following criteria were used to exclude articles from appraisal:

- Studies with discrepancies in their description of methods/results
- Studies that did not clearly describe the methods/results
- Limited generalisability to the New Zealand population
- Letters
- non-English language studies

### *Appraisal and levels of evidence*

Articles were formally appraised using the schedule developed by the Group health Cooperative of Puget Sound and adapted by the New Zealand Guidelines Group of the National Health Committee (New Zealand Guidelines Group, 1997). Summaries of appraisal results have usually been shown in table form and conclusions have been drawn that were dependent on the study design and the specific problems associated with the individual studies.

The level of evidence was graded using an adapted version of the US Preventive Services Task Force protocol (US Preventive Services Task Force, 1989). Thus, levels of evidence were:

- |      |   |
|------|---|
| I    | Evidence obtained from at least one properly designed randomised controlled trial   |
| II-1 | Evidence obtained from well-designed controlled trials without randomisation  |
| II-2 | Evidence obtained from well-designed cohort or case control analytic studies preferably from more than one centre or research group |

- |      |  |
|------|--|
| II-3 | Evidence obtained from well-designed time series studies                     |
| III  | Evidence obtained from descriptive studies (cross sectional, ecological)     |
| IV   | Opinions of respected authorities based on consensus or clinical experience. |

Evidence grades have been applied to all of the literature based upon the study design of each article. The formal critical appraisal process systematically reviewed the methods and analysis of the studies in each of the three grades.

### *Limitations of this review*

This study used a structured approach to review the literature. However, there are some potential limitations inherent in this process.

This review did not use a single search strategy to identify all the relevant literature but instead was composed of a series of topic-based searches. It is possible that these smaller searches may have resulted in a less comprehensive identification of all the pertinent literature.

Although, in general, Grade I evidence (randomised controlled trials and meta analyses) is usually best able to reduce the effects of bias and confounding (through the use of randomisation), the most important determinant of the validity of a study is the rigour applied to its design and subsequent analysis and not necessarily the type of study design that has been used. In addition, certain types of study are more appropriate for particular issues. For example, a cohort study can usually best describe the prognosis of a group of patients with a particular illness and a randomised controlled trial is well suited to evaluate the effects of a treatment. The reader is referred to the original study for full clarification of the methods and results used in any particular study.

This review has been limited by the need to restrict the analysis to English language studies and references presented in the databases cited above. All web sites on the Internet could not be assessed.

Although this review has greatly benefited from advice provided by consultants, it has not been exposed to wide peer review. In addition, the work has been based only upon the published academic literature and has not reviewed unpublished work. The bulk of the studies included in the review were conducted outside of New Zealand, therefore it is uncertain whether their conclusions can be generalised to a New Zealand population and context.

While most of the articles cited in the databases were obtained (>90%), a small proportion were not available from overseas in sufficient time to be included in this review.

This review was conducted over a limited period of time (January–May 1998).



# ***Section Three***

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When is emergency department use inappropriate?



## DESCRIPTION OF ED UTILISATION

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ED (emergency departments) are used by a disproportionate number of young males with unintentional injuries, where most regard the department as more accessible or convenient than their GP and believe hospitals are better suited for the care of unintentional injury, especially with their provision to perform x-ray examinations (Lewis, 1988; Richards et al., 1979)

A similar picture emerges for the attendance patterns of children, where accidents are viewed as the preserve of the hospital and sickness the domain of the GP (Kljakovic and Allan, 1981).

Accessibility is also a factor, with families living closer to a hospital more likely to attend that facility than visit a GP (Roland and Coulter, 1992).

Cost is also a factor for both adult attenders and the parents of children (Roland and Coulter, 1992).

## ESTIMATES OF THE RISE IN ED ATTENDANCE

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Mirroring the rise in hospital admissions, the increase in ED attendances has also annually exceeded 2% in Scotland over the last three decades (Scottish Office Home and Health Department Health Policy Directorate, 1994). No published data was available to describe the trends in attendance at New Zealand-based EDs. However, in this country both the purchasers and the providers of ED-based health care have expressed the consistent opinion that ED attendance has been increasing (Medical and Surgical Services, 1997; Togi, 1997).

## PERSPECTIVES ON THE RISE IN ED CARE

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An interesting perspective on the issue of rising ED visits and the appropriateness of these visits comes from a qualitative study of the literature by Malone (1995). Malone concluded that three themes existed in this literature. The first emphasised the medical model and regarded the rise in the context of heavy users of ED services whose needs were judged as being inappropriate by the medical definition of urgent care. The second theme Malone called the 'public health premise'. This theme viewed the rise as a symptom of deteriorating health and social welfare services. The final theme regarded the heavy use of ED services as a consequence of an improperly functioning market, where 'unfair' competition or

misguided regulation had corrupted the effect of economic forces in health care markets. Interventions to correct the rise in attendances, and the large number of inappropriate users of the service, depended upon the viewpoint held by the writer, and included either the censure or education of patients (biomedical theme), the reform of health or welfare services (public health theme), and deregulation and the provision of economic incentives (market theme).

## APPROPRIATENESS OF ED USAGE

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It is important to consider the appropriateness of emergency department use because the ED is the major conduit for acute hospital admissions. The ED receives patients directed by practitioners as well as self referrals (Pancheon et al., 1995; Roland and Coulter, 1992).

In the literature on emergency department usage, presentations to the ED have often been dichotomised as being either appropriate or not. Numerous studies have found that as many as eighty percent of all presentations to ED are for non-urgent reasons and were deemed to be inappropriate (Gifford, 1980; Gill and Riley, 1996; Grumbach et al., 1993; Lowe et al., 1993; Derlet and Young, 1997).

However, in common with the reviews of inappropriate hospital care, few evaluations of the appropriateness of ED care have actually defined the concept. Furthermore, even among those studies that have defined the concept few have used the same definition (Nadel, 1993). In general most definitions of the appropriateness of ED use are urgency based (Gill, 1994, Grumbach et al., 1993; Gifford, 1980) (**see Table 1**).

The concept of what is an appropriate ED visit largely depends upon whose perspective is being considered (Mitchell, 1994). While health professionals determine appropriateness by medical criteria, third party payers use discharge diagnoses, and patients include a range of other factors such as transportation, child care needs and convenience (Pancheon et al., 1995). Although definitions of appropriateness (usually) closely relate to the concept of urgency, significant disparity exists between (and amongst) patients, doctors, and administrators as to what can, and should be, defined as urgent (Gill and Riley, 1996).

In general, the literature has mainly adopted a medical definition of the urgency (and appropriateness) of care.

Surveys of ED attenders that describe the most important reasons why they considered an emergency

department was the most appropriate venue at which to receive their medical care on a particular occasion rarely include medical concepts of urgency but instead emphasise access and convenience issues (see **Table 2**).

From a societal point of view, the correct viewpoint is the one that leads to the greatest public health benefit.

Measuring urgency in the ED is very difficult and the lack of agreement about what constitutes an urgent visit has led to large discrepancies in the proportion of patients defined as being non-urgent attenders e.g. 5% by Stratmann and Ullman (1975) through to 82% by Haddy et al. (1987).

Even assessments undertaken by the same group (e.g. health professionals) have described large variations in the proportion of visits that have been characterised as being non-urgent (O'Brien et al., 1997; Derlet and Young, 1997; Foldes et al., 1994). For example, reviews of the appropriateness of ED attendance undertaken by doctors have found that between 19% and 82% of visits were non-urgent (Grumbach et al., 1993; Gifford, 1980; Lowe et al., 1994; Haddy et al., 1987; Weir et al., 1989).

Marked differences have been noted in the assessments of patients compared to professionals of what is defined as urgent. E.g. studies by Grumbach et al. (1993) and Gifford (1980).

In short, no reliable and valid 'gold standard' method exists for determining the urgency, and hence the appropriateness, of an attendance at an emergency department.

Allied to the problems associated with determining the appropriateness of an ED attendance is the problem that this assessment has usually been done retrospectively; that is, after the patient has received a consultation (Driscoll et al., 1987). The main implication of this is that methods to prospectively determine which patients should attend an emergency department for any particular episode of care are highly problematic.

There is a long history (back to 1849) of hospital professionals regarding the use of ED services by people with problems that could be managed in general practice as inappropriate users of the service (Liggins, 1993). In the absence of any reliable method of determining the appropriateness of ED care this tradition has continued in the literature with many authors dichotomising appropriateness on the basis of whether the service can be delivered by a GP. For example, a recent study of the use of eight emergency departments in the United Kingdom found 25% of all attendances could have been man-

aged by a patient's GP. The authors concluded that these ED consultations were inappropriate (Lowy et al., 1994). However, if it is inappropriate why do people use the ED and not their GP? Why do people demand primary care in the ED (Clinical Standards Advisory Group, 1995)?

An alternative viewpoint on the use of ED is that it is meeting a community need (Pancheon et al., 1995). Because no firm evidence exists that it is inferior care some authors have suggested that the primary care role of the ED should expand (Pancheon et al., 1995). Few people (less than 7%) attending an ED have tried to consult their GP beforehand so most attenders are choosing ED care (Singh, 1988). Furthermore attempts to divert this attendance also seem to fail, such as campaigns attempting to get people to attend ED only for serious accidents (Driscoll et al., 1987) (see **Section Four**).

Some commentators have further argued that the reasons people attend ED are important to them and they appear to be enduring. Their belief is that the ED provides the most convenient service so their custom should be supported (Davies, 1986).

A number of studies have examined the appropriateness of ED care in a variety of settings. These studies are presented in **Table 3**.

Inappropriate attendance has been defined in most of the studies in **Table 3** on the basis of those people who could have been treated by their primary care physician (Wise, 1997). Usually the studies have involved an audit of patient notes by doctors, although some have collectively defined anyone presenting with a condition that has been present for over 24 hours as an inappropriate attender.

The mode of arrival has been used as another indicator of the urgency of a person's condition and their appropriateness to receive ED care. Patients arriving by ambulance are deemed to be appropriate while ambulatory patients are designated to be inappropriate.

Another proxy indicator of avoidable ED attendance is the use of the number of patients who leave without being seen by a doctor as representing a group of non-urgent and hence inappropriate attenders. Fernandes et al. (1997) found in an audit of the patients who left a Canadian ED without being seen that over 25% were subsequently classified as urgent when their original presenting condition was finally assessed by an emergency physician on another occasion.

Almost all of the studies have adopted a professional, or purchaser-based, definition of appropriateness. The studies by Burnett and Grover (1996) and (Lang

et al. (1996) were two notable exceptions as both included an attempt to recognise the perspectives of ED attenders by incorporating patient-stated urgency, or a perceived need to attend, as a criteria for an appropriate attendance. However, both studies failed to define this group adequately and both exhibited significant selection bias in the recruitment of patients into the study sample. The study by Burnett and Grover primarily recruited patients who had been triaged as non-urgent by an ED nurse, while the study by Lang et al. included mainly unemployed people who received free care if they were attending for a condition that was urgent.

Finally, the study by Lowy (1994), although small, is interesting as one of the few examples of a comparison of the results of several new instruments to classify the appropriateness of ED attendance. Lowy attempted to present the use of a new method of defining the appropriateness of ED care based on the International Classification of Diseases classification system for inpatient care. The authors concluded that the new system was an insensitive arbiter of the appropriateness of ED attendance because it lacked any clear information about the urgency, or severity, of a patient's condition. The authors found there was little agreement when any of the methods of rating the appropriateness of attendance were applied to the same group of patients.

This result was consistent with the conclusions of both Lowe et al. (1993) and O'Brien et al. (1996) who had also individually compared the classifications of inappropriateness made by expert panels, patients themselves, and a review of the investigations and treatments that had been undertaken in the ED. Once again when all of these measures were applied to the same sample of patients there was little agreement about which specific patients had made unnecessary visits.

An essential component of any review of the appropriateness of ED based care is a critical examination of the relationship between the ED and GPs, and an evaluation of which setting is more effective at providing primary care.

## **FACTORS PROMOTING INAPPROPRIATE ED ATTENDANCE**

A wide variation in the percentage of inappropriate visits has been found in studies undertaken in a variety of settings. Although a significant proportion of this variation relates to the different methods used by the different assessors to ascertain the appropriateness of the visit, no single factor explains the wide variation in inappropriate attendance.

A variety of factors were found to be important in governing the percentage of inappropriate attendances in each of the studies. For example, most inappropriate attendances in the study by Buesching et al. (1985) were made by people in lower socio-economic groups and related to their poor financial access to a regular primary care provider. By contrast, Rubin and Bonnin (1995) found that low socio-economic status did not explain variation in inappropriate attendance and refuted the belief that most people attended the ED because they had poor access (financial or otherwise) to a primary care physician. Instead Rubin and Bonnin concluded that the main reasons for inappropriate ED use were ignorance of other options, or inconvenience associated with using other providers (National Health Strategy, 1992).

Another study concluded that patient (mis)perception that the condition was medically serious was the most important determinant of inappropriate ED usage (Afilalo et al., 1995).

In a recent review article, Steel (1995) summarised the reasons presented in the literature for why patients inappropriately attend the ED and not their GP. These factors were:

- misclassification by the study
- proximity to the ED
- social deprivation
- the inability to attend the GP
- a poor knowledge of GP services
- the convenience of 24 hour service
- the perceived urgency of the complaint
- the perceived need for investigations in a hospital setting.

## **DESCRIPTIVE STUDIES EXAMINING THE RELATIONSHIP BETWEEN THE USE OF THE EMERGENCY DEPARTMENT AND PRIMARY CARE**

Although many more people at any one time will be attending their GP compared to the number who are presenting to the ED, a significant proportion of the population will episodically attend an emergency department for conditions that could be treated in primary care (Pancheon et al., 1995). A smaller proportion will always choose to attend the ED in preference to ever using a GP's services.

Bradley et al. (1995) undertook a unique simultaneous review of the reasons why paediatric patients presented to all the emergency departments and general practice surgeries in Ulster (Ireland). The study found that at any one time over 85% of all sick children will be receiving care by a GP. Of the remaining

15%, about half were receiving primary care in an ED setting. The study clearly illustrated the point that at any one time in the community the GP is responsible for providing care to most children presenting for medical services in a defined area.

Only about 3-7% of people attending an ED have tried to consult their GP beforehand (Hallam, 1994; Singh, 1988). That implies the majority of people who did not consult must have viewed the ED as their preferred provider of care for their particular medical condition. Alternatively it could have been that they believed their GP was either not available or would not want to see them (Hallam, 1994; Singh, 1988). Other surveys have concluded that patients who attended the ED did so because of its speed or convenience relative to visiting their GP or because they just did not want to bother their general practitioner (Davies, 1986; Driscoll et al., 1987; Panchon et al., 1995).

ED attendance and the provision of GP care are therefore closely linked. Several cross-sectional studies have found that most ED attendances are by people in low socio-economic classes who often do not have regular primary care (Grumbach et al., 1993; Hurley et al., 1989a).

However, simply providing all patients with a regular primary care giver does not ensure that emergency room attendance will necessarily drop. Access to care involves other dimensions such as cost or the provision of available appointments (Gill and Riley, 1996).

Thakker et al. (1994) in a cross-sectional study based in the United Kingdom assessed the attendance of patients at emergency departments in relation to 20 general practices. Thakker et al. found that increased attendances (and subsequent admissions) at the ED department for patients without significant traumatic injury or serious illness (Thakker et al. defined these attendances as inappropriate) were significantly associated with smaller practices that had fewer doctors. Thakker et al. (1994) suggested that larger practices were better able to provide a more flexible and comprehensive service that resulted in fewer inappropriate ED attendances.

Attendances by patients for non-urgent problems at emergency departments instead of their GP may be increasing. A time series study in the United States found there was a stepwise increase between 1964 and 1993 in the number of children attending emergency departments whose caregivers had not contacted their primary care physician, even though their child's presenting problem was one that could appropriately be treated in a primary care setting (Shah-Canning et al., 1996). However, it is notable that other differences in the study populations, or varia-

tions in coding, could have contributed to this finding.

In the US the increasing number of ED attendances is considered to be due to the lack of a regular source of primary care (Grumbach et al., 1993), while in the UK (like New Zealand) it seems to be related to the perception of the ED's role as the main source of care for accidents, particularly when special equipment is considered to be needed (such as X-rays) (Singh, 1988). Many people, it seems, increasingly regard emergency departments as their preferred source of a number of services on a 24-hour basis under one roof. Allied to the perceived convenience of the ED is the apparent inconvenience of unavailable, or inaccessible, GP care (Lewis, 1988).

## **ARE EMERGENCY DEPARTMENTS LESS EFFECTIVE AT PROVIDING CARE FOR NON-URGENT PROBLEMS?**

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Although it is often argued that receiving primary care from the ED is inferior to GP care, there is a lack of robust evidence to prove (or refute) this assertion (Dale and Green, 1991). It has been suggested that ED-based primary care is less effective than GP care because:

### **1. Staff in EDs are not trained to provide primary care-type treatment.**

Few analytical studies have specifically addressed this issue although some authors have expressed the opinion that ED-based doctors do not have adequate primary care training (Thompson and Ratcliff, 1992). A related problem is what constitutes good primary care training? Several commentators have suggested this also remains undefined (Buetow et al., 1995; Beecham, 1992).

### **2. ED staff tend to over-investigate problems in comparison to their GP colleagues.**

Two small randomised controlled trials based in London and Dublin found that GPs working in EDs use fewer investigations but still achieve similar patient health outcomes compared with their hospital-based colleagues (Dale et al., 1996; Murphy et al., 1996).

### **3. ED care is episodic and not continuous.**

While continuity of care generally provides a good outcome for patients (for example, Wasson et al., (1984)), few studies have compared episodic care in the ED to continuous care in a primary care setting.

One study examining the adherence to treatment of patients receiving care for hypertension in the ED compared to a primary care setting, found ED patients fared less well (Shea et al., 1992). Similarly, another study found that children's abnormal test results were more reliably followed up in a primary care setting (Spivak et al., 1980).

However, some authors have suggested that for some patients some care is better than no care, and a lack of continuity of care may be offset for some groups by the benefits of the ED being more accessible for this group. Childhood immunisations, for example, may be better provided in the ED for some disadvantaged groups whose access to primary care is poor (Lindegren et al., 1993). It seems likely that for some patient groups, at least in the United States, accessibility may be more important than continuity (Kellerman, 1991; Mitchell, 1994). Therefore any attempt to remove patients with non-urgent problems from the ED may worsen their health status.

Overall, it must be concluded that although some process indicators (e.g. the number of investigations or the follow up of test results) suggest that GPs provide better quality care than staff at an ED, it largely is unknown whether ED or primary care provides better outcomes for patients who require non-urgent care.

## THE COST EFFECTIVENESS OF ED CARE

There is a prevalent assumption in the literature that primary care is the more appropriate and cost effective venue for ambulatory medical care (National Health Strategy, 1992, Hurley et al., 1989b; Buesching et al., 1985). Several authors have pointed to the high cost of ED care as the major problem. A review of the costs of treating patients with minor conditions at emergency departments concluded that care in the ED was significantly more expensive than similar care provided at a primary care centre (Baker and Baker, 1994). The authors calculated the excess cost of providing non-urgent care in the ED and then extrapolated their results to conclude that nationally in the United States inappropriate use of the ED cost that country US \$5-\$7 billion annually.

However, the issue of how costs have been presented in the literature requires some clarification. In particular, studies have varied in how costs have been defined. That is, they have varied in the perspective of which costs they have included in their analysis.

The most common definition (or perspective) is to include the costs met by a third party funding agency. Studies that have used this perspective have reported mixed results. For example, a study by

Fleming and Jones (1983) examined the costs to Medicaid of patients using either ED or primary care facilities, and found that ED-based care was significantly more expensive for the treatment of similar, non-urgent conditions.

By contrast, another study (based in Australia) found that the marginal cost of treating primary care type problems in the ED was actually less than in general practice (National Health Strategy, 1992). However, the authors strongly cautioned people that the low marginal cost of patients in the ED setting was likely to be a function of the overall number of encounters in this setting, which was relatively low compared to the number of primary care type encounters in general practice. It was also noted that the primary care-type consultations in the ED might have been biased towards a higher proportion of less expensive consultations related to the excess number of young people who present there for their primary care, often with a musculoskeletal accident.

Finally, some studies have reported that in the United States there is no difference in the marginal cost of providing non-urgent care at an emergency department compared to that delivered in a primary care physician's office (Williams, 1996).

Another perspective is to only include the costs borne by the patient. Typically emergency departments are cheaper than primary care physician visits and this is considered to be a major reason why patients choose to attend EDs (National Health Strategy, 1992; O'Grady et al., 1985). The importance of this financial incentive, particularly in relation to the more frequent use of ED services by people in lower socio-economic groups seeking treatment for primary care type problems, has been noted by a number of authors for both adults (Hurley et al., 1989b) as well as children (Smith and McNamara, 1988).

The third definition of costs are those borne by the hospital. Generally a hospital's fixed costs are high, while their marginal costs are low. Therefore the average costs of treating patients with primary care-type problems in a hospital would decrease with increasing patient volumes (Lowe et al., 1994).

Ideally any assessment of the costs and benefits of treatment for primary care type problems in either an ED or a general practice setting should be made from the perspective of the whole society. However, to date, very few studies have attempted to examine the costs and benefits of providing non-urgent care in either emergency departments or primary care from this perspective (Gill, 1994; Williams, 1996; Baker and Baker, 1994).

Williams (1996) and Tyrance et al. (1996) have separately calculated that limiting non-urgent ED care

would only generate a small financial benefit, because the marginal cost at the ED of non-urgent care was small. However, these studies were based on a small, non-random (and therefore probably unrepresentative) number of US hospitals that, because they were not randomly selected, may not have been representative of other EDs. The studies also used charges as a substitute for actual costs.

# ***Section Four***

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Interventions to reduce inappropriate ambulatory attendance



# Interventions to reduce inappropriate ambulatory attendance

Some studies have examined the effect of interventions to reduce inappropriate usage of the ED, primarily in relation to ambulatory attendance. These studies are reviewed below:

## THE STRUCTURE OF EMERGENCY SERVICES

Some literature has examined the structure of ED services in relation to the optimal management of non-urgent and urgent cases. A recent major review of emergency services in Scotland (Scottish Office Home and Health Department Health Policy Directorate, 1994) concluded that a new service should be based around three main components:

- primary care centres either based in hospitals or free-standing
- hospital-based emergency services
- a limited number of major trauma tertiary centres.

A detailed examination of the provision of ED services in England and Wales by the Audit Commission (1996) came to a similar conclusion that three tiers of services were necessary. The Audit Commission (1996) undertook a survey of existing services and made a number of recommendations. The most notable was their suggestion that ED clinics that received less than 50,000 attendances per year should be reviewed with a view to centralising their facilities. As well as advocating for a small number of major centres, the report accepted the need for a limited number of provincial hospital-based clinics and called for the greater development of minor clinics that included more pronounced roles for nurses and GPs (see Appendix 2).

However, this report could be criticised because despite its volume (102 pages) it rarely provided any evidence to support the effectiveness of its recommendations. Another conspicuous absence from the report (especially as the role of the Audit Commission, according to the report's introduction, was to

assess the appropriateness of government expenditure) was the striking exclusion of information about the costs of existing services, the likely costs of the report's recommendations and an in-depth assessment of the cost-effectiveness of both the existing and the proposed arrangements.

## THE PROVISION OF A MINOR INJURIES UNIT

Although minor injuries units do not provide a direct means to reduce admissions they are important in that they attempt to provide accessible care for patients with minor conditions. Several studies have suggested (opinion articles) that the timely provision of care for minor injuries could prevent their subsequent deterioration and the need for later hospital admission (e.g. Dale and Dolan, 1994).

Two case series studies have suggested that minor injury units were acceptable to patients (Garnett and Elton, 1991; Jones, 1993). However, no studies were identified by this review that presented reliable data about the effectiveness of minor injuries units to complete this task. This, in part, reflects the methodological difficulties of comparing minor injury units (which are often staffed by nurse practitioners and are designed to treat only minor conditions) with other providers (e.g. GPs), who are often more extensively trained and who provide a service to a wider clientele. That is, provider expertise and case-mix are confounders here.

Some concerns have been expressed about the safety of these units because people present to clinics with symptoms and not diagnoses. The danger is that major illness masquerading as minor symptoms might be unrecognised by providers working in these clinics (Pancheon et al., 1995). Even if workers in these units were able to treat up to 90% of patients that typically present to ED, the important issue is to ensure that the staff have the skills to recognise the 10% of patients who require more extensive treatment (Pancheon et al., 1995).

The difficulty with these units then becomes who should staff them and how to ensure they have adequate clinical support. While some authors have advocated that these units should be developed in rural areas (e.g. Garnett and Elton, 1991), others have argued that the clinics are best sited in hospitals in order to ensure that appropriate consultant back-up is available (Dale and Dolan, 1994).

The tension then seems to be between the provision of appropriate support (which usually requires that the unit should be sited in a hospital in an urban setting), or improved access for many, largely rural, patients.

A number of advantages and disadvantages associated with minor injuries units have been identified by the Audit Commission in their review of emergency services in the UK (see **Appendix 2**) (Audit Commission, 1996)

## TRIAGE

Several studies have examined the effectiveness of triage to limit unnecessary ED attendances. Triage has been suggested to be able to identify a group of non-urgent attenders at the ED who can be referred elsewhere for care (Derlet et al., 1995).

Triage attempts to identify patients with minor complaints who can either be safely required to wait longer to receive their non-urgent treatment, or could safely be discouraged from attending the ED and instead directed to a primary care physician. An example of a triage system to identify patients who could be referred to a primary care provider by an ED is presented by Johnson and Derlet (1996).

The effectiveness of triage has been assessed among people who have phoned the ED seeking advice for minor problems and those attending the department. Conflicting results have been obtained by studies that have addressed either of these two areas. Some have concluded that triage has successfully reduced ED attendance when it was applied to both telephone callers and those people who attended the department (e.g. Carew-McColl and Buckles, 1990).

A small before and after study, based at a Toronto children's hospital found that the provision of a telephone service, staffed by nurses, in the emergency department reduced the number of unnecessary ED visits (Shah et al., 1980). However, the study lacked a reliable control group and was unable to adequately conclude that the result was due to the intervention and not some other factor. In addition it was carried out in only one centre and did not use blinded assessors to determine the results of the study.

By contrast, the large, prospective cohort study by Derlet et al. (1995) was able to overcome several of these methodological deficiencies. In the Derlet et al. study, adult attenders at a US emergency department were classified as urgent or non-urgent depending upon their vital signs, the nature of their presenting complaint, or the results of a basic screening examination performed by a nurse. Over the five year period of the study a total of 31,165 adults (18% of the 176,074 participants in the study) were defined as non-urgent and were referred elsewhere.

The authors concluded that triage at the ED could safely identify a subset of patients who could be re-

ferred elsewhere without any significant adverse outcome. However, despite the more robust study design, the trial still had several significant limitations that reduce the validity of this conclusion. Although follow-up consisted of checks at neighbouring EDs and the local coroner's office it was only undertaken on a small proportion of the patients who were refused care (16%). Furthermore, there was a systematic difference between those who had received follow-up and those who did not because follow-up was undertaken by telephone. It is possible that patients without a telephone may be more likely to experience difficulty in obtaining alternative medical care, and they may therefore be more likely to have a serious adverse outcome after they had been denied care from the ED. Finally the authors claimed that the triage process was a cost-effective intervention, but they did not present the costs on which this conclusion was based. Perhaps most notable of all, the study included only a brief discussion about the legal and ethical significance of denying care to people attending an ED.

Several other studies have examined the use of criteria for refusing care to patients who have presented to a ED with non-urgent problems. Generally these studies have concluded that care cannot safely be refused at the ED.

For example, both Young et al. (1996) and Derlet and Young (1997) found that although many patients appeared to have non-urgent conditions, based on triage classifications, a small but disturbing percentage of these patients still required admission after a full clinical assessment in the ED.

Another cohort study found that their triage criteria were not valid predictive indicators of who could safely be refused treatment at the ED (Birnbaum et al., 1994).

A retrospective cohort study by Lowe et al. (1994) found that using triage did not accurately identify patients attending a US public hospital emergency department who did not require emergency medical care.

Other small cohort studies have found that patients sent away from EDs are not infrequently admitted for the same presenting problem when they have presented soon after at another department (Lowe et al., 1994; Birnbaum et al., 1994).

Ethical concerns remain about sending away patients who have presented to an emergency department for medical care.

One of the most significant problems associated with referring patients to another health care facility is that it appears relatively few people actually heed

this advice. A cohort study by Straus et al. (1983) found that most patients referred away from a ED did not comply with the instructions from the emergency department to seek care for their non-urgent condition at a primary care facility.

Shaw et al. (1990) followed up paediatric patients who were refused care in the ED and found many families were angry after care was refused and many (40%) did not subsequently seek a consultation from a primary care physician.

Although a number of guidelines have been developed to facilitate the decision to decline ED-based care, to date none of these guidelines have been proven to have adequate sensitivity and specificity in identifying which patients can safely be denied medical care in the ED (Dale et al., 1995a; Bindman, 1995). Furthermore, denying patients care at an ED does not seem to change their behaviour. Gadowski et al. (1995) found that patients denied care at EDs were just as likely to re-present with another minor illness soon after their refusal.

A possible explanation for the relative ineffectiveness of triage to safely exclude patients from care is that the methods available for the task are relatively crude and blunt and cannot reliably discriminate between an appropriate and an unnecessary ED attendance. For example, a nested case control study by Dale et al. (1995b) found both the sensitivity and the specificity of triage decisions by nurses about the urgency of a patient's symptoms were relatively poor. Dale et al. found nearly 20% of patients who had been assessed as being inappropriate to attend the ED were subsequently admitted for treatment of a serious medical condition.

Although this trial also had its own deficiencies (small sample size, low ratio of the number of cases in relation to the number of controls, and no estimate of the agreement between the nurses who had undertaken the triage), it presents a likely explanation for the largely negative results in the studies that have evaluated triage as a method to reduce unnecessary ED utilisation.

Despite the limitations with the available research, interest in telephone triage is high. In the UK, the National Health Service aims to provide a country-wide telephone advice line by the year 2000 (Department of Health, 1997).

## **IMPROVED ACCESS TO PRIMARY CARE TO REDUCE ED USE**

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A number of patient surveys have found that poor access to primary care is a major factor in why pa-

tients choose to seek care at the ED (Grumbach et al., 1993; Young et al., 1996; Shesser et al., 1991, Buesching et al., 1985). Improved access to primary care could therefore be expected to reduce ED utilisation, and research has generally found consistent results with this expectation.

However, most of the research has been based in the United States and has concerned the effects of providing low-income people with accessible primary care instead of leaving them to receive episodic care at EDs.

Most studies have found that ED utilisation was reduced by this provision of access to primary care. For example, a before and after study by Sjonell (1986) examined the effects of the introduction of a primary care health centre in Stockholm, Sweden. The study found that ED visits were reduced by 40% in relation to a 19% increase in primary care visits in the area.

Another before and after study found an increased number of primary care doctors in an area was associated with a reduction in ED attendance (Hilditch, 1980).

A quasi-experimental trial by Franco et al. (1997) found a significant reduction in ED visits, particularly among those conditions that had been prospectively defined as inappropriate, in a Medicaid, Kentucky (US) population where patients were given 24-hour access to a primary care physician.

Although most studies have examined the provision of primary care in a United States setting, other research has found that enhanced primary care access can reduce ED attendance in other countries, including Israel and Sweden (Sjonell, 1986; Porter et al., 1988).

By contrast, some research has found that improved access to a primary care physician was not associated with a reduction in attendance at the ED (Straus et al., 1983). In New Zealand, the provision of a community health centre in a small town did not change the ED use at the local hospital (Maynard and Dodge, 1983).

Aside from the two notable exceptions (Straus et al., 1983; Maynard and Dodge, 1983), it appears that the provision of primary care can reduce ED attendance, at least in the United States setting.

## CHANGES IN PRIMARY CARE DELIVERY

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Three descriptive studies have examined the relationship between various practice characteristics (the number of primary care practitioners, the availability of a female GP, the provision of appointments, and practice list size) and patient attendance rates at the ED (Hull et al., 1997; McKee et al., 1990; Campbell, 1994). The inherent rationale presented in these studies was that patients used the ED as a result of dissatisfaction with their ability to obtain treatment in primary care. No significant relationship was found between practice characteristics and ED utilisation. However, the deficiencies of the descriptive study design used in this research must be recognised.

## THE EFFECT OF CHANGES IN OUT-OF-HOURS CARE ON ED ATTENDANCE

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A key recent development in primary care has been the introduction of new services for out-of-hours GP care. Remarkably little research has been undertaken in this area. Most of the few studies have assessed the effect of commercial deputising services on ED attendance in the UK (Pancheon et al., 1995). Deputising services were defined as services where GPs contract with an agency to cover out-of-hours patient care.

A small number of researchers have examined whether patients preferentially attend a deputising service or their local ED for their after-hours medical care. The observational study by Williams (1973) found there was no increase in ED attendance in relation to an expansion of deputising services in Leicester (UK). A similar result was obtained in the cross-sectional study by Ferber and Becker (1983), who found ED attendance in certain areas of the United States that included free-standing after-hours clinics was not significantly lower than rates in corresponding areas without these facilities.

By contrast, another study found that the development of a deputising service in a region was associated with reduced ED use and it was assumed that improved access to primary care after hours had reduced ED attendance (Novak and Pross, 1983).

The results from these studies, although interesting, are difficult to generalise to the New Zealand setting over a decade since their publication. The general lack of recent evidence on the effect of new out-of-hours services on ED utilisation is surprising given that recent patient surveys have found mixed results

in relation to their preference for out-of-hours care (Cragg et al., 1997; Salisbury, 1997).

At least one conclusion can be made from the limited amount of available research: the mere provision of a deputising clinic does not ensure people will use it as a substitute for ED-based care of their non-urgent problems (Rizos et al., 1990).

## GATEKEEPING AND PRE-APPROVAL

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Several studies based in US managed care organisations have used a gatekeeping system that has provided patients with improved access to primary health care while also restricting their ability to receive care at the ED. In these studies patients were required to gain pre-approval before their ED attendance was reimbursed. Evaluations of the effect of these gatekeeping/pre-approval schemes on ED utilisation have found that although ED use may be decreased (Bonham and Barber, 1987; Gadomski et al., 1995; Hurley et al., 1989a, Franco et al., 1997) concerns remain about the safety of this intervention, because the decrease in ED use has not been found to be restricted to non-urgent cases (Gadomski et al., 1995).

### *Primary care conclusion*

In general, the provision of increased access to primary care has been associated with decreased ED use with studies that have included self-reported information e.g. (Hilditch, 1980; Novak and Pross, 1983; Rizos et al., 1990). Those that have assessed utilisation records have not found such a clear relationship between the two variables (Straus et al., 1983; Maynard and Dodge, 1983; Chan et al., 1985; Ferber and Becker, 1983).

However, it should be noted that the studies that have assessed the effect of changes in access to primary care have varied greatly in their setting. For example, many of the studies have been based in the United States which does not have a strong primary care system. It is possible that the marginal benefit of some improvement in access to primary care may be greater in areas where there is relatively little primary care.

## PATIENT EDUCATION

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Some expert opinion articles have discussed the need for more public education about the appropriate use of the ED (e.g., Bolton and Storrie, 1991). However, there is no conclusive evidence that education reduces ED attendance.

A small randomised controlled trial in the US failed to find any reduction in ED attendance following the provision of a single education session on appropriate use of the ED, allied to basic information on the self-management of several common illnesses (Chande et al. 1996). The study had several methodological deficiencies including a short follow-up period, incomplete follow-up of a significant number of participants, and the analysis being undertaken without blinding. It is also likely that one education session may have been insufficient to change behaviour.

By contrast, a mass media campaign that presented repeated messages about the appropriate use of the ED in New York City was successfully able to reduce the hospital's ED usage by nearly 14% over two years. However, it is difficult to conclude that the reduction in attendance was due to the campaign because of the quasi-experimental nature of the study and its inherent inability to control for other time-related factors that may have influenced attendance.

Driscoll et al. (1987) concluded that attempts to divert patients with non-urgent illnesses from the ED were generally a failure because of the differences in the language and culture of health care between doctors and patients. Patients and doctors do not share a common understanding of what constitutes an emergency, and it cannot therefore be expected that doctors could successfully influence patients to reduce their attendance for non-urgent conditions (Foldes et al., 1994).

It is unclear if patient education can reduce patient use of EDs for non-urgent care. An evaluation of a programme to educate patients about the benefits of primary care for non-urgent health care failed to realise any reduction in ED attendance (Chande et al. 1996). However, it should be noted that the programme did not provide patients with detailed information about what was non-urgent care, and did not change important issues that might have been even more powerful determinants of ED use, such as economic incentives and the availability of primary care centres.

Enlisting staff in the ED to assist an education programme by referring patients to primary care clinics and arranging follow-up appointments also did not lead to a significant reduction in the use of the ED (Chan et al., 1985).

## **USE OF A SOCIAL WORKER IN THE ED**

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A cohort of 1758 ED patients who received social work intervention after their presenting problem for their visit was defined as primarily non-medical was

examined in a study by Keehn et al., (1994). Keehn et al found that a statistically significant number of patients did not make another non-urgent visit to the ED within three months. The authors concluded that having a social worker present on the ED team reduced recidivism among inappropriate ED attenders.

However, the robustness of their study was undermined by their inability to know if patients had ceased attending for all problems, including serious ones, or whether they attended other venues.

Another study, by Boyack and Bucknum (1991), that described the use of social workers in the ED to help reduce unnecessary visits also consistently found the presence of social workers in an ED was associated with a reduction in non-urgent attendances. However, this study also had a number of serious limitations associated with its retrospective design, lack of a control group and small size that prevented any definitive conclusions about the efficacy of social worker intervention to reduce non-urgent ED attendances.

Some commentators have therefore argued that social worker involvement in the ED may not actually affect the appropriateness of the attendances (Lewis et al., 1994).

A small number of patients may account for a disproportionate amount of ED care (Pancheon et al., 1995). A related intervention to the provision of a social worker in the ED is the use of a trained volunteer to provide compassionate support to high users of the ED.

A Canadian-based, randomised controlled trial evaluated this intervention and found the use of volunteers reduced the number of repeat visits made by homeless adults, and also improved their perceived satisfaction with their care from the ED (Redelmeier et al., 1995). However, the randomised controlled trial did not specify the severity of illness for the visits either prior to, or after, the intervention. Therefore it is difficult to be certain that inappropriate visits were preferentially decreased. In addition, the trial did not measure whether the intervention actually attracted a larger number of homeless people to the ED that may have offset any advantage from the intervention.

## **COST SHARING/COPAYMENTS**

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Results from several studies suggest cost sharing does reduce ED use, although this reduction is not limited to non-urgent use, and the intervention can place a disproportionate burden on people in low socio-economic groups (Shaprio et al., 1986; Selby et al., 1996; O'Grady et al., 1985).

The most robust evidence of the negative effect of copayments on ED attendance comes from the large randomised controlled trial of 3539 people. The study included people between 17-61 years and found those people randomly assigned to pay part of the costs of their care were nearly one third less likely to see a physician with a minor illness than a group receiving free care (Shapiro et al., 1986). Although the study did not clearly find that the two groups differed in their likelihood that patients would attend for a serious illness, the trial did note that lower socio-economic status patients had a significantly higher prevalence of serious symptoms than more affluent patients, even though both groups were entitled to free care.

A similar result was obtained in another randomised controlled trial in the United States (O'Grady et al., 1985). This study also noted that the size of the copayment seemed to have little effect on the utilisation. In addition, the study found that the general introduction of copayments was associated with a reduction in attendance by patients across the whole spectrum of illness severity, indicating that cost sharing was a relatively blunt (although very effective) method of reducing ED use.

A quasi-experimental study by Selby et al. (1996) found that the introduction of a copayment decreased emergency department attendance among HMO members by 15%. The reduction was chiefly for conditions considered unlikely to be an emergency but a decrease in ED use was evident for all conditions. The study had a limited ability to gauge adverse outcomes from the intervention and the result cannot be generalised to vulnerable groups such as the unemployed or the elderly.

Finally, another quasi-experimental study by Cohen et al. (1996) examined ED use before and after Medicaid reimbursement for emergency visits to private physicians was suspended in Maryland (US). Somewhat unexpectedly, emergency visits were found to have increased by 22 % in relation to the cessation in Medicaid benefits, but the authors pointed out that this increase was in the context of a strong trend for rising attendance rates at the ED.

## **MEDICAL INTERVENTIONS**

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Several descriptive studies have identified that unintentional self-poisoning is a common cause of ED attendance (and hospital admissions) among children (e.g. Department of Health, 1994 and Thomas et al., 1996). A large cross-sectional study by Bond (1995) concluded that the provision of telephone advice by ED staff to parents of children who had accidentally ingested poison to use Ipecac was safe, effective and resulted in a significant reduction in ED use.

However, the study could not exclude bias as an alternative explanation for its findings. It is likely that many parents phoned for advice about trivial ingestions of poison which would have been associated with a good outcome, irrespective of whether or not medical treatment was obtained.

# Conclusions

## CONCLUSIONS ABOUT INAPPROPRIATE ED USE

- While studies that have described the inappropriate use of the ED were relatively plentiful, remarkably few studies have evaluated the health outcomes associated with alternatives to ED-based care.
- ED attendance is not included in the National Minimum Dataset and consequently no published national data exists that describes the trends in ED attendance in New Zealand.
- Although published data is not available, consistent opinion suggests that ED attendances have been increasing in New Zealand.
- No valid and reliable method exists to define inappropriate care at an ED. Clinicians, administrators and consumers have markedly heterogeneous definitions of appropriate attendance at the ED.
- A medical viewpoint of appropriateness has usually been presented in the literature. That is, patients presenting for non-urgent care that could be provided by a primary care physician are often designated as inappropriate ED attenders.
- Attendance at an emergency department by patients seeking medical care for non-urgent conditions has been labeled fiscally improvident, as it is considered to be more expensive for health funders as well as medically undesirable due to the discontinuous and unco-ordinated care that is provided. No conclusive evidence exists for either of these assertions (Franco et al., 1997).
- A large number of studies have examined the appropriateness of ED-based care in a number of settings and have produced a wide variation in their estimates of the percentage of attendances that were designated as being appropriate (this review identified that between 3% and 59% of ED attendances have been deemed to be inappropriate in the literature).

## CONCLUSIONS ABOUT THE EFFECTIVENESS OF INTERVENTIONS TO REDUCE INAPPROPRIATE ED USE

- Without a valid and reliable measure of inappropriate ED attendance, the absolute effectiveness of interventions to reduce these attendances cannot be accurately assessed.
- The evidence for the relative effectiveness of alternatives to ED-based care was found to be patchy in coverage and quality. Relatively little research has been undertaken to evaluate major new developments in primary or secondary care that have an important bearing on the interface between these levels of care. These new developments include: new deputising arrangements for out-of-hours GP care, and the provision of minor injury units located in a variety of settings and staffed by a range of different professionals (see Appendix 2).
- Most of the research that has evaluated the effectiveness of new organisational arrangements for inappropriate ED attenders has used a quasi-experimental study design rather than a randomised controlled trial methodology. Only four randomised controlled trials of interventions to reduce inappropriate ED use were identified by this review.
- Despite the general limitations of the research, some evidence was available for the effectiveness of restricted ED access and expanded access to primary care and the efficacy of cost-sharing which have consistently been found to be effective methods to restrict ED use (although the reduction may apply to all types of users and not just inappropriate users). Less robust evidence exists for the effectiveness of social workers in the ED or certain specific medical interventions
- Available (although generally poor quality) evidence suggests that the following interventions are ineffective at reducing the number of inappropriate ED attendance: triage, patient education and changes in the characteristics of GP services.
- Several major changes in service delivery such as the provision of out-of-hours GP clinics and the development of hospital-based minor injuries clinics have somewhat remarkably not been evaluated in regard to their effect on ED usage.
- Interventions to reduce non-urgent visits to the ED need to be multi-faceted to account for the

wide range of determinants that lead patients to seek care at that venue. Single interventions are unlikely to be successful whereas those that involve multiple strategies that include the patient, physician and system changes are more likely to be successful.

- A notable problem with the literature is that most of the research has been based on the provision of primary care to people in the US where an emphasis has traditionally been on specialist-based services. It is possible that the marginal gains for the provision of primary care-based interventions in the US setting may be substantially greater than could be achieved in the UK, Australian or New Zealand setting where primary care is already well established.
- Finally, it should be remembered that interventions to change ED utilisation have been driven by an increase in demand and are sponsored by supply side organisations (hospitals and the funders of ED and hospitals). It should therefore be remembered that new interventions must still provide a satisfactory service to patients. In addition, alternatives to ED-based services have no guarantee of producing overall savings in resources because it is possible that these services (for example, minor injury units) may actually service patient problems that previously would not have been presented to the health system. A crucial issue, therefore, when managing demand for primary and secondary care services is the need to furnish additional support for patients to appropriately manage their own minor health problems and appreciate when assistance may be needed.
- An alternative to focusing on the inappropriate use of the ED and developing interventions to reduce this use of the department, is to accept that many patients choose to attend the department and therefore the imperative is to expand the scope of the ED to meet the demand for non-urgent care. This could be done, for example, by allowing primary care workers (practice nurses and GPs) to staff EDs or by developing the ED as a primary care centre (Dale et al., 1996).

**Table 1. Examples of studies providing definitions of appropriate care at EDs that are urgency based along with their findings**

Author	Definition	Percentage of inappropriate visits)
Centre for Disease Control (Mitchell, 1994)	Any patient who requires attention immediately or within a few hours	55%
US General Accounting Office (Nadel, 1993)	Life-threatening or time sensitive conditions	42%
(Mitchell and Rimmel, 1992)	Patient whose condition is not acute and who is in no distress	4.8%

**Table 2. Patient surveys about the appropriateness of ED use**

Author	The most important reason why it was appropriate for the patient to attend an ED
(Hilditch, 1980)	Lack of availability of primary care professionals
(Salomou, 1994)	Conveniently available after hours
(Shesser et al., 1991)	Proximity to ED
(Wabchall, 1983)	Longer hours

**Table 3. Examples of studies specifically examining the percentage of inappropriate ED attendance**

Author	Number of patients	Setting	Method Level of evidence	Percentage of inappropriate attendances
(O'Brien et al., 1996)	892	US urban hospital ED	Case control design using case note review II-2	42-58%
(Lau et al., 1994)	595	Hong Kong	Cross-sectional survey using attending doctor to classify appropriateness III	20%
(Rubin and Bonnin, 1995)	507	Major US urban trauma centre	Cross-sectional audit using physician defined scale of urgency for diagnostic categories III	59%
(Afilalo et al., 1995)	849	Canadian adults at urban ED	Physician-assigned categories of appropriateness based on whether medical care could only have been provided at ED. Categories applied on basis of symptoms before final diagnosis known III	15% clearly inappropriate further 16% 'grey' area.
(Eagle et al., 1993)	1744	Elderly at an urban Canadian hospital	Cross-sectional study using random sample of attendances involving triage classifications of urgency III	3% clearly inappropriate but 22% uncertain
(Thomson et al., 1995)	270	Glasgow (Scotland)	Cross-sectional survey. Assessments of appropriateness by emergency physicians III	20%
(Berns et al., 1994)	166	US paediatric hospital	Cross sectional survey using DeAngeli's criteria III	35-45%
(Buesching et al., 1985)	3130	3 US community hospitals	Cross-sectional survey using US College of Emergency Physician Guidelines III	11%
(Lang et al., 1996)	1208	2 French hospitals	Cross-sectional study. Prospective definitions of appropriateness either time based, or patient needing interventions that were exclusively hospital based, applied by physicians III	35%
(Burnett and Grover, 1996)	200	Montreal (Canada) ED	Cross sectional Patient opinion of whether the ED was an inappropriate venue to present for their care III	30%
(National Health Strategy, 1992)	623	Random sample from 13 Australian ED depts and clinics	Cross-sectional study. Opinion of committee which included GP, emergency specialist and research coder III	15%
(Lowy et al., 1994)	8877	16 UK ED clinics	Comparison of 3 methods: opinion of GPs, Nuffield Provincial Hospital Trusts criteria and new ICD-based method III	23%

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# Appendix 1

**Table A1.1 Studies that have assessed inappropriate ED attendance**

Author Country	Study design Level of evidence	Sample Setting	Result/conclusion
<b>Minor injury units</b>			
(Dale and Dolan, 1994) United Kingdom	Opinion V	-	Minor injury units can reduce ED use
(Audit Commission, 1996) United Kingdom	Expert opinion V	-	See Appendix 2
(Pancheon et al., 1995) United Kingdom	Opinion V	-	Concern that major illness presenting with minor symptoms may not be recognised
<b>Triage</b>			
(Carew-McColl and Buckles, 1990)	Opinion V	Introduction of telephone triage to screen attenders at an emergency department in the UK	Extended triage reported to be successful at reducing inappropriate attendance at the ED
(Shah et al., 1980)	Quasi-experimental II-1	Paediatric hospital's ED in Toronto 2 years prior to triage system compared to 2 years after introduction	Attendance dropped by 2.8% after introduction of telephone triage for potential attenders ( $p < 0.05$ )
(Derlet et al., 1995)	Cohort II-2	Nurse triage of 176,074 adults at US ED	18% of attenders were triaged as non-urgent and sent elsewhere. Small number triaged away with high risk conditions but no fatalities were found although follow-up was only successful in 34% of cases
(Derlet et al., 1990)	Cross sectional IV	Audit of 4186 people (19% of all presentations in a year) referred elsewhere by triage nurses away from an ED after they had presented with a minor complaint	Written or phone follow-up of patients found that none needed to immediately return to an ED although 42 represented to an ED within 48 hours Only 1.3% complained about the process
(Young et al., 1996)	Cross sectional IV	6187 adults at 56 EDs in US	5.5% of the 37% of patients assessed by nurse triage as non-urgent were subsequently admitted
(Birnbaum et al., 1994) United States	Prospective cohort II-2	534 adults at US ED	1.1% (95% CI=0.4-2.4) of adults who were refused care after triage were subsequently hospitalised
(Lowe et al., 1994) United States	Retrospective cohort II-2	927 adults at US hospital ED	33% (95% CI=32-51) of the 106 patients refused care by triage were found to have appropriate reasons for visit and 4% were hospitalised
(Straus et al., 1983) United States	Case control II-2	389 people who had no regular source of primary care compared to control group of 500 people who had established a regular primary care practitioner Adults and children included in study based at Baltimore (USA)	Of the 389 people triaged away because of non-urgent conditions only 34% sought assistance at primary care office. A control group of 500 adults who did seek primary care attention after triaged away from ED still presented as frequently to ED with non-urgent conditions as non-complaint group
(Shaw et al., 1990) United States	Cohort II-2	6 month follow-up of 588 indigent children who had been denied care at a new primary-care, case management, facility	

Table A1.1 Studies that have assessed inappropriate ED attendance (*continued*)

Author Country	Study design Level of evidence	Sample Setting	Result/conclusion
<b>Triage</b>			
(Dale et al., 1995b) United Kingdom	Cohort II-2	5658 patients presenting to London ED	18.6% of 2065 patients triaged by nurses to less urgent care still needed admission or follow up
<b>Guidelines</b>			
(Buesching et al., 1985)	Cross sectional III	3,130 visits to three commu- nity hospitals classified as (in)appropriate according to guidelines produced by the American College of Emer- gency Physicians	10.8% of visits were inappropriate according to the guidelines  The following subgroups were associ- ated with a statistically significant ex- cess in the number of inappropriate visits: <ul style="list-style-type: none"> <li>• people with Medicaid</li> <li>• children &lt;5 years old</li> <li>• those unable to identify a personal physician</li> <li>• people making visits during office hours</li> <li>• unemployed people</li> </ul> The inability to identify a personal physician was the most statistically significant factor associated with inap- propriate visits (p<0.001)
<b>Access to primary care</b>			
(Grumbach et al., 1993) United States	Cross sectional III	ED in San Francisco	45% of 700 patients cited barriers to primary care as main reason for attend- ing ED
(Young et al., 1996) United States	Cross sectional III	52 hospital EDs in US	52% of patients with a regular primary care doctor reported ED attendance in relation to barrier to receiving care in primary care while 91% of patients without primary care doctor cited barriers as important reason
(Shesser et al., 1991) United States	Case control II-2	325 adults with non-urgent illnesses compared to control group of 224 patients with all types of illnesses at a Wash- ington ED	64.8% of non-urgent cases cited im- paired access to primary care as impor- tant in their use of the ED
(Buesching et al., 1985) United States	Cross sectional III	3130 visits to Illinois ED	Not having a primary care physician was most important determinant of inappropriate ED use (p<0.05)
<b>Increased primary care doctors</b>			
(Hilditch, 1980) Canada	Quasi-experimental II-1	Surveys before (1972) and after (1975) large increase in doctors in Toronto	Significant decrease in ED visits after five-fold growth in number of primary care doctors (p<0.01)

Table A1.1 Studies that have assessed inappropriate ED attendance (*continued*)

Author Country	Study design Level of evidence	Sample Setting	Result/conclusion
<b>Give patients new access to primary care doctors</b>			
(Bonham and Barber, 1987) United States	Quasi-experimental II-1	Access to primary care for Medicaid patients	Significant (40%) reduction in attendance at ED
(Porter et al., 1988) Israel	Quasi-experimental controlled trial not randomised II-1	Provision of comprehensive paediatric primary care	ED attendance significantly reduced (decreased by 50%)
(Sjonell, 1986) Sweden	Quasi-experimental Before and after II-1	Health centre reorganised to provide primary care	Significant reduction in ED attendance (40% drop), 19% increase in primary care use
(Franco et al., 1997) United States	Quasi-experimental II-1	Provision of 24 hour access to a primary care physician for 4766 patients in Kentucky	Significant reduction in ED attendance ( $p < 0.0003$ ) and inappropriate use of ED ( $p < 0.00001$ )
(Straus et al., 1983) United States	Case control II-2	389 people who had no regular source of primary care compared to control group of 500 people who had established a regular primary care practitioner  Adults and children included in the study based at Baltimore (USA)	Of the 389 people triaged away because of non-urgent conditions only 34% sought assistance at primary care office. A control group of 500 adults who did seek primary care attention after triaged away from ED still presented as frequently to ED with non-urgent conditions as non-compliant group
(Maynard and Dodge, 1983) New Zealand	Quasi-experimental II-1	Utilisation of ED assessed 3 years before and 3 years after opening of community centre at Mosgiel and compared with utilisation by residents of a similar nearby control town	No significant differences in ED usage
<b>Issues in relation to primary care delivery</b>			
(Campbell, 1994) United Kingdom	Descriptive IV	GP appointment systems and list size	No significant association between list size or appointments and ED visits
(Hull et al., 1997) United Kingdom	Descriptive IV	Number of GPs in practice number of female GPs	No significant association between the number of GPs (or number of female GPs) and ED visits
(McKee et al., 1990) United Kingdom	Descriptive IV	List size and distance to hospital	No significant association between list size and ED attendance but significant decrease in ED attendance rate with increasing distance to nearest hospital
<b>Deputising services</b>			
(Ferber and Becker, 1983) United States	Cross sectional IV	ED attendances in areas with free standing clinics compared to those without	No significant difference in attendance
(Novak and Pross, 1983) Canada	Cross sectional IV	Survey of 811 patients attending a family practitioner in Toronto	85% of the patients would have gone to the ED if no deputising service was available
(Rizos et al., 1990) Canada	Cross sectional survey IV	Survey of 321 attenders at a Canadian walk-in clinic	People attended clinic because it was convenient- i.e. close and no appointment needed (50%), most were satisfied with service (83%)

Table A1.1 Studies that have assessed inappropriate ED attendance (*continued*)

Author Country	Study design Level of evidence	Sample Setting	Result/conclusion
<b>Pre-approval</b>			
(Bonham and Barber, 1987) United States	Quasi experimental II-1	Access to primary care for Medicaid patients	Significant (40%) reduction in attendance at ED
(Gadomski et al., 1995) United States	Quasi-experimental II-1	Pre-approval required for attendance at a paediatric ED. 216 denied children compared to controls	After six months follow-up denied children made similar number of repeat ED visits as children seen at ED but significantly fewer than children seen in primary care (p=0.002). Significantly more hospital admissions amongst denied group (p=0.003)
(Hurley et al., 1989a) (Hurley et al., 1989b) United States	Quasi-experimental II-1	Managed care schemes in 4 different parts of US	Drop in ED proportion of people with at least one ED visit (between 27%-45%) for adults and children but no significant effect on utilisation patterns of ED attenders (no p values)
(Derlet et al., 1990) United States	Quasi-experimental before and after II-1	Triage used to deny care in managed care organisation	Reduction in ED use by 9.7%
(Kelly, 1994) United States	Quasi-experimental Before and after II-1	Triage used to deny care in managed care organisation	ED attendance significantly reduced by 27% - visits classed as 'non-emergency' were reduced by 68%
(Rivara et al., 1986) United States	Quasi-experimental Before and after II-1	Triage used to deny care in managed care organisation	ED attendance significantly reduced by 37% (p<0.05)
(Franco et al., 1997) United States	Quasi-experimental II-1	Provision of 24 hour access to a primary care physician for 4766 patients in Kentucky	Significant reduction in ED attendance (p<0.0003) and inappropriate use of ED (p<0.00001)
<b>Education</b>			
(Bolton and Storrie, 1991) United Kingdom	Cross sectional III	Retrospective review of attendance at a paediatric ED in 1988. Appropriateness defined on basis of whether care should have been delivered by a GP	Most inappropriate attenders are less than 3 years old, underprivileged and attend in the weekend or evening for minor complaints such as mild diarrhoea and vomiting, fever or an upper respiratory infection
(Chande et al., 1996) United States	Randomised controlled trial I	One time educational intervention given to 69 patients (61 controls)	No significant difference in ED attendance between groups over 6 months
(Foldes et al., 1994)	Descriptive study III	Review of medical records of 219 attendances at ED	Divergence in opinion about designation of what is an emergency between 2 specialists and between doctors and patients

Table A1.1 Studies that have assessed inappropriate ED attendance (*continued*)

Author Country	Study design Level of evidence	Sample Setting	Result/conclusion
<b>Social worker</b>			
(Keehn et al., 1994) United States	Quasi-experimental II-1	385 patients seen by a social worker at the ED, compared to 474 who presented prior to start of social workers	Reduction in repeat ED visits within 3 months of visit after introduction of social worker at ED from 27% to 23% (no p value)
(Boyack and Bucknum, 1991) Canada	Cross sectional study III	455 patients seen by a social worker at the ED	24 cases were provided with care outside of the hospital by a social worker
(Lewis et al., 1994) United Kingdom	Cross sectional III	Review of 699 referrals to an ED-based social worker in 1990 and 1991	Most referrals were for the social worker to arrange for other agencies to provide long term support for elderly people
(Redelmeier et al., 1995) Canada	Randomised controlled trial I	133 homeless adults -half assigned to receive compassionate contact from trained volunteers other half = control group	Significant reduction in ED visits amongst intervention group (p=0.02)
<b>Cost share</b>			
(O'Grady et al., 1985)	Randomised controlled trial	Various insurance schemes with a range of user charges for ED care	Generally ED attendance was significantly decreased by between 20%-35% (p<0.05)
(Selby et al., 1996) United States	Quasi-experimental II-1	Study examining use of ED before and after (1992 and 1993) the introduction of a co-payment by 30,276 subjects of all ages in an HMO	15% (95% CI:9.5%-19.4%) reduction in ED use after introduction of a copayment
(Shapiro et al., 1986) United States	Randomised controlled trial I	3539 adults randomly assigned to free care or co-payments	Copayment group was one third less likely to see a physician with a minor illness (p<0.04). Both groups did not differ in seeking care for serious illness (p=0.1), but prevalence of serious symptoms was higher in co-payment group (p<0.004)
(Cohen et al., 1996) United States	Quasi-experimental II-1	Before (355 visits) and after (369 visits) study of elimination of free private dental care to Medicaid recipients	21.8% increase in visits to ED by Medicaid recipients (no p value)
<b>Telephone advice</b>			
(Bond, 1995) United States	Cross sectional III	55,436 children on US Association of Poison Centres database	Provision of telephone advice to use Ipecac was associated with a reduction in attendance at an ED (p<0.0001)

# Appendix 2

**Table A2.1 Advantages and disadvantages of three main forms of minor injuries service**

Advantages	Disadvantages
<b>Nurse led, minor injuries services within ED</b>	
<ul style="list-style-type: none"> <li>• Decreased waiting times</li> <li>• Maintain flow of patients even if the 'major' area of the department is busy</li> <li>• Likely to be an emphasis on audit and training</li> <li>• Fewer building costs than stand-alone clinics</li> <li>• Improved liaison with other specialties being on-site</li> <li>• Patients retain choice of seeing a doctor or nurse</li> </ul>	<ul style="list-style-type: none"> <li>• Possibility of staff being called away to major cases</li> <li>• Protocols may be unnecessarily restrictive because doctors are always present</li> <li>• Unless nurses rotate to other jobs, they may lose their broader ED skills</li> <li>• Treatment of minor injuries will have to bear a share of high hospital overheads</li> <li>• Possibility of attracting more patients who would otherwise self care or see their GP</li> <li>• Two-tiered system: patients are not prioritised strictly according to clinical need</li> </ul>
<b>Stand alone, with medical presence</b>	
<ul style="list-style-type: none"> <li>• Public support, convenience and accessibility</li> <li>• Medical presence increases public perceptions of their safety</li> <li>• Possibility of decreased waiting times</li> <li>• Patients are given a choice to see the doctor or nurse</li> <li>• Cheaper if set up in existing premises</li> </ul>	<ul style="list-style-type: none"> <li>• Likely to be an unattractive career option for doctors and inconvenient for GPs</li> <li>• Greater possibility that seriously ill or injured patients who could not be treated properly in this setting might attend</li> <li>• Often nurses work autonomously without accreditation</li> <li>• Unlikely to be any ongoing training for nurses unless rotations with other hospitals are established</li> <li>• Likely to be a lack of continuing training and accreditation for doctors</li> <li>• ED staff costs depending on grades at which they are employed</li> </ul>
<b>Stand alone, nurse led</b>	
<ul style="list-style-type: none"> <li>• Public support, convenience and accessibility</li> <li>• May provide a facility where ED services are being closed down</li> <li>• Models are already up and running and have been shown to function well</li> <li>• Decreased waiting times</li> <li>• These units attract high calibre nurses and are good for nurse development</li> <li>• Financial benefits if existing premises are used</li> <li>• Opportunity to develop inter-specialty links</li> </ul>	<ul style="list-style-type: none"> <li>• To operate safely these need tight protocols, links to ED consultant support, consultant radiology support, audit, nurse practitioners with proven abilities</li> <li>• Patients are not given the choice to see a doctor other than by travelling</li> <li>• Nurses could lose their broader ED skills, unless rotations to major EDs are established</li> <li>• Running costs may be high</li> </ul>

From (Audit Commission, 1996)

# Appendix 3

## STUDY DESIGNS USED IN THIS REVIEW

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The study designs included in this review were:

- Randomised controlled trial
- Cohort study
- Case-control study
- Descriptive studies (including cross-sectional studies and ecological studies).

The remainder of this appendix is based on material contained in Elwood (Elwood, 1988). This is presented in the Table A3.1.

Table A3.1 Study designs used in this review

Study design	Description	Main role	Advantages	Disadvantages
Randomised controlled trial	Random selection of intervention and control arms of the study population.	Assessment of treatment	<ul style="list-style-type: none"> <li>• Controls who receives the intervention</li> <li>• Intervention and control groups should have similar characteristics</li> <li>• Allows minimisation of bias (through double blinding) and confounding (through randomisation)</li> </ul>	<ul style="list-style-type: none"> <li>• Applicability limited to trials likely to be beneficial</li> <li>• Difficulties with ethics, logistics and cost</li> </ul>
Cohort study	Observational study that follows exposed and unexposed participants to defined outcomes.	<ul style="list-style-type: none"> <li>• Useful for prognosis</li> <li>• Primary method of studying unusual or new exposures</li> </ul>	<ul style="list-style-type: none"> <li>• Good in rare exposures</li> <li>• Allows multiple endpoints to be assessed</li> <li>• Temporal relationship clear</li> <li>• Exposure assessed prior to outcome, avoiding bias</li> </ul>	<ul style="list-style-type: none"> <li>• Often requires many years of follow up (if performed in a prospective manner)</li> <li>• Needs large numbers of participants if the outcome is rare</li> <li>• Susceptible to selection bias</li> </ul>
Case-control study	Observational study that starts with an outcome event and (generally) retrospectively analyse exposures.	<ul style="list-style-type: none"> <li>• Identification of causes of a new outcome</li> <li>• Useful in evaluations of population screening</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient in terms of sample size required (particularly rare outcomes)</li> <li>• Retrospective method is rapid</li> <li>• Multiple exposures can be assessed</li> <li>• Relatively low resource use</li> </ul>	<ul style="list-style-type: none"> <li>• Unable to calculate absolute or relative risk</li> <li>• Susceptible to recall bias</li> <li>• Retrospective methods limits exposure information</li> <li>• Adequate control group may be difficult to define or obtain</li> </ul>
Cross sectional study	Makes observations at one point in time	<ul style="list-style-type: none"> <li>• Measure prevalence</li> <li>• Assessment of associations</li> </ul>	<ul style="list-style-type: none"> <li>• Relatively simple so participation tends to be relatively high</li> <li>• Representative samples of a population can be drawn</li> <li>• Methods can be standardised, reliable and single blind</li> <li>• Can be repeated using similar methods</li> </ul>	<ul style="list-style-type: none"> <li>• Does not allow assessment of causation due to lack of time dimension</li> <li>• Inefficient when prevalence or exposure is low</li> </ul>