REDUCING ATTENDANCES AND WAITS IN EMERGENCY DEPARTMENTS: A SYSTEMATIC REVIEW OF PRESENT INNOVATIONS

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PROJECT FUNDED BY THE: NHS Service Delivery And Organisation R&D Programme (SDO/29/2002)
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Foreword

NOTE:

Professor Sir George Alberti, National Clinical Director for Emergency Access, Dept of Health, has agreed to write a forward if the SDO consider it appropriate.
Acknowledgements

This research was undertaken with the support of a project grant from the NHS Service Delivery and Organisation R&D Programme (SDO/29/2002).

Roshni Mangalore of Centre for Health Service Studies undertook the work on the economic analysis.

We are grateful to the ‘Warwick Emergency Care Advisory Group’ for their comments on the early phase of this project.

- Professor Sir G Alberti
- Mr B Alexander
- Dr T Ambury
- Dr D Bell
- Dr D Carson
- Professor T Coats
- Mr M Davies
- Mr M Hake
- Mr M Hazell
- Mr R Hemmings
- Mr J Heyworth
- Ms L Holt
- Professor K Mackway-Jones (Chair)
- Ms L Nixon
- The Right Reverend Anthony Priddis
- Mr M Scott

Sincere thanks are due to all the reviewers:

Mr B Alexander
Dr T Ambury
Professor M Ardagh
Dr M Bamford
Dr S Bonas
Mr R Chauhan
Ms S Connor

Dr S Crawford
Dr D Cumarasany
Ms A Dancocks
Mr B R Disney
Dr A Docherty
Mr M Dunn
Dr O Dunn
Mr D Fatovich
Mr J Heyworth
Ms M Iwami
Miss E Jorstad
Dr G Kearns
Dr T Kippax
Dr A Lindenmeyer
Dr P Lowe
Professor K Mackway-Jones
Dr C Magee
Dr E McLeod
Mr K Murali
Mr M J O’Meara
Dr R Paw
Dr B Penhale
Ms V Poon
Mr N Raymond
Ms V Richards
Ms R A Roberts
Dr D Rolland
Mrs K Saul
Dr A Singal
Dr M Stutterford
Ms G Surr
Mrs K Tolley
Dr M Tsouroufli
Ms U Ursula
Dr A van Dellen
Dr J Wardrope
Mr R Whitfield
Ms A Wild.

We thank the Emergency Services Collaborative of the NHS Modernisation Agency and the individual contributors.
for the provision of the case studies listed in this review.
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<tr>
<td>999</td>
<td>Emergency Ambulance telephone number in UK</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>Accident &amp; Emergency (Emergency Department)</td>
</tr>
<tr>
<td>AEP</td>
<td>Appropriateness Evaluation Protocol</td>
</tr>
<tr>
<td>AMPDS</td>
<td>Advanced Medical Priority Dispatch</td>
</tr>
<tr>
<td>CCTR</td>
<td>Cochrane Controlled Trials Register</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
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<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>CT</td>
<td>Computerised Tomography</td>
</tr>
<tr>
<td>df</td>
<td>Degrees Of Freedom</td>
</tr>
<tr>
<td>DGH</td>
<td>District General Hospital</td>
</tr>
<tr>
<td>DTA</td>
<td>Decision to Admit</td>
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<tr>
<td>DVT</td>
<td>Deep Vein Thrombosis</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency Department</td>
</tr>
<tr>
<td>EMP</td>
<td>Emergency Medicine Paramedic</td>
</tr>
<tr>
<td>EMS</td>
<td>Emergency Medical System</td>
</tr>
<tr>
<td>EMT</td>
<td>Emergency Medicine Technician</td>
</tr>
<tr>
<td>ENP</td>
<td>Emergency Nurse Practitioners (Family Doctor)</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>LMWH</td>
<td>Low Molecular Weight Heparin</td>
</tr>
<tr>
<td>LOS</td>
<td>Length Of Stay</td>
</tr>
<tr>
<td>LWBS</td>
<td>Left Without Being Seen</td>
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<tr>
<td>MeSH</td>
<td>Medline Search Heading</td>
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<tr>
<td>MIU</td>
<td>Minor Injuries Unit</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
</tr>
<tr>
<td>ns</td>
<td>Non Significant</td>
</tr>
<tr>
<td>OAR</td>
<td>Ottawa Ankle Rules</td>
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<tr>
<td>OR</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>PACS</td>
<td>Picture Archiving Communication System</td>
</tr>
<tr>
<td>PDSA</td>
<td>Plan – Do- Study- Act</td>
</tr>
<tr>
<td>POCT</td>
<td>Point Of Care Testing</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
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<tr>
<td>SD</td>
<td>Standard Deviation</td>
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<tr>
<td>SDO</td>
<td>NHS Service Delivery And Organisation</td>
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<tr>
<td>SOU</td>
<td>Surgical Observation Unit</td>
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<tr>
<td>TAT</td>
<td>Test Turnaround Time</td>
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<tr>
<td>UCC</td>
<td>Urgent Care Centre</td>
</tr>
<tr>
<td>UH</td>
<td>Unfractionated Heparin</td>
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<tr>
<td>WIC</td>
<td>Walk In Centre’s</td>
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Executive summary

Reducing the waits in emergency departments is important for patients and is a government priority. In order to reduce waits the whole system must be considered. The flow of patients before arrival at the emergency department determines the workload of the department. The staffing, resources and systems within the emergency department are key to providing high quality timely care. The flow of the patient after leaving the emergency department until their return home will determine whether patients can be discharged from the department in a timely manner. Despite the present focus on emergency care in the NHS there have been no reviews of the literature to inform the present changes to reduce waits.

Objectives

To conduct focused systematic reviews to address the following questions:

- What initiatives in emergency departments have been demonstrated to reduce waiting times and attendances?
- What initiatives outside emergency departments have been shown to reduce waiting times and attendances?
- What evidence is there of the clinical and cost-effectiveness of such interventions?
- To assist providers by providing vignettes of good practice and contact details.
- To highlight areas where further research should be commissioned.

Methods

The systematic review was designed to find all articles relating to reducing attendances at emergency departments and reducing waits in emergency departments. Clear search strategies, inclusion criteria, criteria for the assessment of relevance and validity, and procedures for the extraction of data and its synthesis were established. A broad initial search was undertaken of electronic databases (BIDS(ISI), BIND, CINAHL, COIN, EMBASE, HTA, Index to Theses, LIBCAT, MEDLINE, NHS Database of Abstracts of Reviews of Effectiveness, NRR, POINT, PsycLit, PsycINFO, SIGLE, The Cochrane Library, The NHS Database of Economic Evaluations, Trip+). Key journals were manually and electronically searched, relevant web sites were searched and internet searches (BIOME, Search.Com, Google). Key researchers were contacted and adverts placed in key journals, Emergency Care Network and on internet mailing lists.

All studies were considered eligible if they had waiting time in emergency departments or attendance numbers at emergency departments as an outcome measure. After the initial search, the abstracts of all articles (or full articles if no abstract was available) were reviewed to determine if they may contain an appropriate outcome measure. The full article was then studied and if the appropriate outcome
measures were used then the article was appraised, including quality scoring. Reviewing was undertaken by a specialist in the appropriate clinical field and an appropriate academic. The information from this appraisal was synthesised into this report.

Results

A large amount of literature has been published concerning the international problem of waits and delays in emergency departments. Most of the literature is however describing the extent and opinions on the causes and does not focus on innovations to reduce waits and attendances. In this type of research the gold standard of a randomised controlled trial is often impossible and sometimes an inappropriate technique. Therefore all designs of study with appropriate outcome measures have been included.

Within the ambulance service proposals have been made to divert some low priority 999 calls to NHS Direct and to enable paramedics to either discharge patients or transport them to alternative sources of care. The literature supports the feasibility of both processes but raises concerns of the safety of such systems. In primary care there is a large programme of re-organisation, however there is little evidence of the impact that this will have on emergency departments. The presence of minor injury services and introduction of NHS walk-in centres and NHS Direct has not been shown to have any effect on emergency department attendances.

There is evidence that reduction in attendance rates amongst the chronically ill, older people and high users may be amenable to reduction via a number of educational, social and medical interventions, including the use of community based admission avoidance schemes.

Within the emergency department the key areas where innovations have reduced waits are the introduction of near patient testing and fast track systems for minor injuries. Systems of diverting people away from emergency departments (e.g. triage out, co-payment) can be effective but their safety is as yet unproven. Other areas such as the use of nurse practitioners, more senior medical staff, bed side registration and IT solutions need more study but evidence suggests they may be effective.

Surprisingly little research has been undertaken in the areas of bed management, innovations to reduce delayed discharges, working practices and workforce numbers.

The lack of consistent outcome measures and definitions in the area studied has made it difficult to combine study results and to assess their generalisability. It is however apparent that extensive research programmes in emergency care would help to inform the major changes occurring in the delivery and organisation of emergency healthcare.
Terminology

The term accident and emergency department is currently being replaced in the UK with the term emergency department, which is also used internationally. In this report we will use the term emergency department (or abbreviation ED) rather than accident and emergency department.

The term “minor” is used throughout this document to mean less severe, e.g. minor injuries/illness, rather than applicable to children.
Key points of evidence

- It is possible to divert some 999 calls to advice lines but the safety of such systems is still being evaluated.
- The role of paramedics in either discharging patients from scene or deciding on appropriate destinations has not been adequately studied to confirm its safety and effectiveness in the UK.
- There is no evidence around the effects on waiting times of general practitioners working in emergency departments.
- Primary care gatekeeping can reduce emergency department attendance but its safety is unknown.
- Walk-in centres and NHS direct have not been demonstrated to reduce attendances at emergency departments.
- Triage is a risk management tool for busy periods, it may cause delays in care.
- Triaging out of the emergency department can reduce numbers but more work is required to assess the safety of such systems.
- Co-payment systems reduce attendances but may equally reduce attendances by those requiring emergency care.
- Fast track systems for minor injuries reduce waits, ideal configurations include senior staff.
- Attendance by the elderly, those with chronic disease and those with multiple attendances may be reduced by various interventions, trials are needed in this area, including the role of social workers.
- Patient education is of unproven in most areas except chronic disease management.
- Phoning for advice before going to the Emergency Department may reduce attendances.
- Specialist nurse care in heart failure, COPD and DVT can reduce hospital admissions.
- Home support (medical and social) can reduce hospital admissions.
- Observation wards may reduce length of stay and avoid admission.
- There is a lack of evidence of innovations in bed management.
- Allowing emergency department staff to admit to wards will reduce delays.
- There is a lack of evidence about innovations to reduce delayed discharges from hospital.
- Most evidence looks at the causes of delays rather than solutions.
- Teams of staff available for unpredicted surges in activity may reduce delays.
- Rotational allocation of patients may be better than clinician self determination.
- Senior staff may reduce admissions and delays.
- Nurse practitioners are safe and effective but their effect on waits is unknown.
Safety

In some areas innovations are being undertaken where the safety has not been assessed. It is therefore vital that this assessment is made before they are widely adopted. The first two listed below are being widely introduced in the UK and therefore should be prioritised for safety assessment.

- The role of paramedics in either discharging patients from scene or deciding on appropriate destinations has not been adequately studied to confirm its safety in the UK. Some US studies suggest an unacceptably high critical incident rate but these studies are not directly applicable to the UK.
- The safety of diverting some 999 calls to advice lines, such as NHS Direct, is still being evaluated.
- Primary care gatekeeping can reduce emergency department attendance but its safety is unknown.
- Triaging out of the emergency department can reduce numbers but more work is required to verify the safety of such systems.
- Co-payment systems reduce attendances but may equally reduce attendances by those requiring emergency care. There are no studies to demonstrate the safety of such systems.
Policy

This work has been actively informing Department of Health policy throughout its production. Hence most of the innovations have already helped to inform developing policy.

Policy that is not supported by good evidence of reducing attendances:
- NHS Walk-in Centres.
- NHS Direct.
- Patient education.

Absence of evidence does not mean evidence of the negative. These initiatives have however been shown to have other advantages and benefits to patient care and the NHS.

Good evidence exists to support the following policies:
- Fast track systems for minor injury patients.
- Chronic disease case management, home support and specialist nurse care to reduce emergency admissions.

Policy areas with a lack of evidence but having expert support include:
- Bed management.
- Reducing delayed discharges.
- Reorganisation of emergency primary care.

Co-payments have been shown to reduce attendances but safety has not been assessed and they go against the current philosophy of the NHS- free care for all.

Local Decisions

Initiatives that are appropriate for local development include:

- Senior staff seeing patients at an earlier stage.
- ED staff admission rights.
- Changes to the present triage systems.
- Escalation clinical teams.
- Rotational allocation of patients on arrival.
Chapter 1 – Introduction

A. General Introduction

Waiting time has been cited as the most important cause of dissatisfaction of patients attending emergency departments. In a recent MORI survey of patients attending emergency departments reduction of the waits was the most important area for improvement. Delays have also been associated with adverse outcomes and increased violence in emergency departments.

Patients follow a complex pathway through the emergency care system, of which the visit to the emergency department may be a small component. The time a person spends within the department is dependent on many factors before, during and after their journey through the emergency department.

Patients arriving at the emergency department may have come via many routes including:

- Self referral.
- Emergency ambulance.
- General practitioner referral.
- Other health care professionals (e.g. NHS Direct, Walk-in centre).
- Other service providers (e.g. police).

The way in which all these services are provided and the ease of access of alternative services will determine how many patients attend the emergency department. The volume of patients attending an emergency department volume will be a major determinant of the waiting time, if resources (financial and personnel) are fixed.

The resources and systems in the emergency department can control the flow of patients. The common causes of delays within the emergency department process are an imbalance between resources and workload, availability of staff and tests and processes creating delays. The resources in the department need to be matched to the workload on an hour by hour basis, despite the inherent variation in that workload.

If the outflow of patients from the emergency department is obstructed this upstream bottleneck will also cause delays in the department. Lack of available beds will not only delay those requiring a bed but create a log jam effect, leading to unavailability of space, and consequent delay of other patients who can be discharged from the emergency department.

Figure 1 demonstrates the flow of patients through the emergency care system.
B. Extent of the problem

I UK

More than 15 million patients attend emergency departments in England and Wales every year. Time spent in the emergency department has dramatically improved over the last fifteen months from over 25% spending more than 4-hours to less than 10% waiting more than 4-hours total time in the emergency department. However for those needing admission, the percentage waiting over 4-hours from the decision to admit to arriving in a bed has only decreased from 10% to 6%, suggesting that most progress has been in those discharged from the emergency departments.

However it has been recognised that figures collected for national performance monitoring may be subject to inaccuracies when perverse systems are adopted to improve their performance figures.

II International

Increasing delays in emergency departments has been recognised as an increasing problem throughout the developed world. In 2001 over a third of hospital emergency departments in USA were forced to divert patients because of overcrowding and 85% of state emergency medicine chapters described overcrowding of emergency departments as a serious threat to their emergency departments. The measures of waits vary in different countries making it difficult to compare waits. The American College of Emergency Physicians has established some definitions around over crowding but these lack the rigid approach required for research purposes. Boyle and colleagues reported that emergency departments in Quebec, Canada, frequently experienced overcrowding, resulting in long patient waiting times, ambulance diversions, and both patient and physician dissatisfaction. One of the key factors for Canadian overcrowding was lack of inpatient hospital beds and the Quebec government successfully improved this situation with a $178 million, 28-component plan to increase the number of inpatient beds and decrease hospital length of stay for inpatients. In Australia diversion of ambulances away from emergency departments has become a problem in several metropolitan areas. and Taiwan University Hospital has stated that overcrowding is so severe that 4% of admitted patients actually remained in the emergency department four days or longer.

Increasingly emergency departments are organised in similar ways in USA, Canada, Australia and New Zealand, but the systems in Europe are very different. The former have a specialty of emergency medicine and these specialists are the first contact for many patients presenting with emergencies to hospital. European systems rapidly triage patients to in-patient specialties for care and have a wider system of community facilities for those with less severe conditions. Britain has more similarities with the non-European systems except it has traditionally undertaken less extensive investigation of complex medical problems, although this is changing with time. The organisation of whole healthcare systems is very different in
all these countries. Therefore it can be difficult to extrapolate changes in one system to the UK system.
C. Recent reports on emergency care in the UK

The NHS Plan\textsuperscript{134} has set a target for the NHS that “by 2004 no-one should be waiting more than four hours in emergency department from arrival to admission, transfer or discharge”.

Reforming Emergency Care

http://www.doh.gov.uk/emergencycare/reform.htm

Reforming Emergency Care\textsuperscript{136} was launched as government strategy in emergency care in 2001 by The Secretary of State. It recognised that problems in emergency departments are often the result of problems elsewhere in the system. It built on the work of previous reports, including those of the out of hours review (the Carson report), ESAT, WEST and the work of the emergency department Modernisation Programme (all available via www.doh.gov.uk).

The overcrowding in emergency departments had been referred to as “winter pressures” in the NHS in the late nineties. It has subsequently been demonstrated that winter pressures were not due to any increase in attendance at emergency departments or increase in admissions but to an increase in length of stay, particularly amongst those with cardiovascular and respiratory disease.\textsuperscript{157} Reviews were undertaken of methods used to relieve winter pressures.\textsuperscript{519}

- The current key problems of NHS emergency care in 2001 were identified in Reforming Emergency Care as:
  - Staff capacity in emergency departments is too stretched.
  - Hospitals do not have sufficient capacity.
  - Delays in discharge causing a log jam effect in hospitals.
  - The needs of elective patients compete with those for emergencies both in terms of facilities and staff.
  - Availability of diagnostic services does not match emergency care needs.
  - Patients waiting too long in the single queue system of emergency departments.
  - Demarcation of professional working practises.
  - Patients end up in the wrong part of the service.
  - The system is fragmented.
  - Standards vary across the system.

Plans to increase both medical and nursing staffing were described as well as the development of new ways of working with increased use of new practitioners and new roles such as emergency care practitioners working across the primary-secondary care sectors. Processes in emergency departments were challenged with proposals on streaming of patients both in emergency departments and other parts of the emergency care system, from this evolved the policy of introducing see and treat into the emergency departments. This is a
process of having dedicated senior staff seeing the less severe ambulatory cases in a dedicated area as a separate stream of patients in a one stop type process. It is described further in chapter 4, section C(v). The importance of speedy diagnostics and the role of the admitting specialty teams were highlighted as was the need to try to undertake more emergency work in the community rather than in the emergency department.

Importantly, Reforming Emergency Care also emphasised that there was no single solution and that local assessment was required to determine solutions. Key to all the solutions suggested was adopting solutions across whole health care communities and developing emergency care networks to support this change. To enable this work to take place the Emergency Services Collaborative was established. This programme uses a methodology of improvement that allows staff from different organisations to learn from each other and share good practice. It involves front line staff in analysing problems then leading testing, implementing and measuring changes in patient care. This is fully described at www.modern.nhs.uk/emergency.

Improving the Flow Of Emergency Admissions


The NHS Modernisation Agency’s programme on “improving the flow of emergency admissions” developed four key steps in improving delays in the emergency admission process:

- Where are we now?
- How can we match the system to the patient’s needs?
- How can we improve patient flow?
- How can we maximise staff potential?

In this way it highlighted that individual organisations have different problems. Bottlenecks for an individual reorganisation need to be identified and then solutions can be found. These solutions may be within the hospital or within the community.

Warwick Report

http://www2.warwick.ac.uk/fac/med/healthcom/emergencycare/research/idea/

This report was prepared for the Modernisation Agency to inform the Ideal Design of Emergency Access (IDEA). It produced 9 key findings:

1. The emergency care system has to deal with a significant level of demand from patients where the illnesses presented are not in themselves of a life-threatening or serious nature.

2. The demand for emergency care follows relatively predictable seasonality patterns. It is suggested that most agencies should be able to forecast demand to within useable levels of accuracy, using a relatively small number of parameters.

3. Most agencies have a reactive approach to demand seasonally, often with little awareness of the improvements to the service that might be achieved with more careful planning.
of resource levels and skill mix. Effective capacity is reduced by a reluctance to use some skill sets to their full potential.

4. The early summer months have the greatest numbers of patients requiring emergency department treatment. However, this period does not coincide with the highest demand for critical care resources because the mix of patients and illnesses changes seasonally. This is the primary cause of problems within emergency access processes during the winter months. The casemix variation is arguably the most important factor when considering medium-term capacity decisions.

5. Treatment processes are currently poor at coping with variation and this results in unnecessary delays. For many patient categories, the level of demand and process requirements are so predictable, it should be possible to design and implement faster, more efficient treatment processes.

6. Capacity bottlenecks are not always recognised and this can result in long delays for patients. Control systems should be used to highlight these problems and to maintain the flow of patients within the system. Rate limiting stages in the process can then be targeted for improvement or additional resource.

7. It is possible to identify distinct categories of patient (or segments) where well-defined and efficient treatment processes can be designed to suit the patients’ needs.

8. Many of the delays within the system occur at the interface between different agencies, both external and internal to the NHS.

9. Performance reporting systems should focus on time-based measures. Efficiency and effectiveness can be conveyed by comparing patient throughput time to the time that patients receive value-adding treatment. This measure is often referred to as the micro-JIT (just-in-time) ratio. It is the ratio of total throughput time (including delays) to value adding time (excluding delays).

Audit Commission

The audit commission originally examined emergency department services in 1996 when it found:

- Long waiting times for emergency treatment or admission.
- Poor provision for some vulnerable patients such as children.
- Poor supervision and support for junior doctors.
- Poor provision and use of information in many departments.

It re-examined emergency department services in 1998 and found that waiting times had increased despite reduced growth in numbers attending emergency departments. In 2001 they reported again and their key findings were that waiting time to see a doctor and to be admitted varied widely between hospitals and that the long waits were commoner in large hospitals and in London. Staff workloads varied considerably and there was no evidence that understaffed departments experienced longer waits; there was also poor use of emergency nurse practitioners. They could find no single answer to what was causing the delays...
Reducing Attendances and Waits in Emergency Departments

and confirmed the belief that delays are caused by a host of organisational and managerial differences as much as resources and staff levels.

Other official documents are available on the national electronic library for health’s emergency care specialist library’s emergency care management section at: http://www.nelh.nhs.uk/emergency.

Various best practice guides have been issued, including

- Arizona
- Massachusetts
- New Jersey
- American College of Emergency Physicians www.acep.org
- Department of Health checklists www.doh.gov.uk/emergencycare

The American guides have principles that equally applicable in the UK but may need modification in their detail.

D - Epidemiology of Emergency Department attendances

Many factors have been identified as affecting the use of emergency departments, including:

- Deprivation and poverty. 264 306 369 373
- Loneliness is a predictor of emergency department use, independent of chronic disease. 192
  Similarly children who have a grandmother involved in their care are less likely to attend emergency departments. 173
- Lack of a regular physician in the elderly. 476
- 2% of attendances are return visits of which 61% are due to illness related factors. 286 283 430
- The ability to read and understand health-related materials is related to a reduced risk of hospital admission. 26
- Convenience for parents. 156 355
- Ethnicity is not an important determinant. 37
- Ramadan causes an increase attendance rate in Muslims (3.6% to 5.1%). 308
- Distance from the emergency department. 156 355
- Particular gaseous and particulate pollutants have specific effects on emergency department attendance. 130 573 402 131 627
- Thunderstorms cause an increase in asthma exacerbation's. 345 82
- Warm weather is associated with higher incidence of paediatric injuries. 335
- The occurrence of a full moon has no effect on emergency department attendance or ambulance journeys. 584
- Uniform drinks licensing times has no effect on emergency department attendances. 215
- Influenza associated respiratory disease,\textsuperscript{363 514 515} especially among children and adults over 65 years.

- Non-compliance with prescribed drug treatment.\textsuperscript{411}

Many papers have described the temporal and demographic variations of emergency department attendances at single sites but few have done so across a generalisable sample.

Studies reporting temporal variations have focused on specific populations. For example, Airey and Franks\textsuperscript{1} investigated the incidence, distribution and clinical patterns of life-threatening and multiple injuries for a 12-month period. They found that patients sustaining major trauma were more likely to arrive at emergency department "out of hours" (between 18:00 and 08:00) on Fridays, Saturdays, and Mondays, and that only 28% of patients arrived with during 'office hours' i.e. 09:00hrs – 17:00hrs Monday-Friday. There was no significant difference in the monthly incidence of major trauma.\textsuperscript{1}

For patients sustaining minor injuries, most are likely to present in the late morning and early afternoon, and only 6% present in the period from 01.00 hrs to 08.00hrs.\textsuperscript{398}

Presentations for respiratory conditions such as influenza and bronchitis vary throughout the year with higher incidence reported in the winter months.\textsuperscript{615}

No differences were found in attendance patterns in respect of sex. Attendances by children under 15 years peaked in the evening between 18:00 and 19:59. In contrast, peak attendance in those over 15 years was between 09:00 and 11:59. The percentage of "out of hours" attendances in this data set was highest in the under one age group (58.5%), the 15–24 age group (57.1%), and the 25–44 age group (54.6%). The highest proportion of patients attended emergency departments on a Monday, while the percentage of weekend attendances decreased with age. In children aged 1–14 years there were more attendances in summer than winter. In those aged under 1 and over 65 there was a winter peak with December having the most attendances.\textsuperscript{158}

Using variables of day of the week, month of the year, holiday/weekend and 3 year time series it is possible to predict 65% of the variation in emergency department attendances.\textsuperscript{481} Another study which added weather factors could explain 84% of the daily variance.\textsuperscript{257}

E. What is an excessive wait?

In England, the NHS plan has defined the excessive wait as more than 4-hours total time in the emergency department (measured from the time a patient arrives until they leave the emergency department).

Internationally a variety of definitions are used and the issue is referred to as overcrowding rather than prolonged waits. The definition of emergency department overcrowding is elusive. In Canada a definition is "a situation in which demand for service exceeds the ability to provide care within a reasonable time, causing physicians and nurses to be unable to provide quality care."\textsuperscript{160} Although this definition has intuitive appeal, it is difficult to operationalise for research purposes. However, in most Canadian studies only
major cases are considered. A survey of US emergency department directors suggested five different possible definitions: patients waiting over 60 minutes to see physician, all emergency department beds filled more than 6-hours/day, patients placed in corridors more than 6-hours/day, emergency physicians feel rushed more than 6-hours/day and waiting room filled more than 6-hours/day.143

The length of time patients spend in the emergency department has long been the subject of debate. In 1989 it was argued that for patients with serious illness or injury to be kept waiting in the ED for up to 4-hours was not ‘justifiable’ and that such delays resulted in irritation for some patients and relatives. 466 It is argued that between 80-90% of patients are seen and a decision made within one hour of arrival and that “where there are repeated delays, either the staff does not understand how to do its work well, or the allocation of staff is insufficient for the workload”. 486

F. Causes of wait

Little of the time in the emergency department is spent in time that adds value to the patient experience (e.g. staff contact time, undergoing investigations). Triage takes approximately 15 minutes549 and examination and treatment 13-15 minutes549 471 for admissions the assessment period takes longer. Time for x-rays was 69 minutes and blood test had a turnaround of 77 minutes.549

Many papers have considered the causes of the waits using a wide variety of techniques. It is recognised that intuitive thinking without analysis may lead to incorrect conclusions on the causes of waits.83 305 The variety of responses probably indicates that causes vary between hospitals and may be multifactorial.

Published causes of waits include:

- Alternative levels of care in the community unavailable.517
- Access to home resources.517 168
- Closure of community hospitals.144
- Poor linkage of hospital and out of hospital services.5
- Other commitments of admitting staff.355 582

- Admitting teams demanding test results before referral.455
- Response time from admitting teams.144 179 517 142 5 629 168

- Delays in diagnostics.517 142 5 582 179 and shortage of radiologists.144
- Access to diagnostics.517 629 168
- Bed unavailability.179 455 144 582 142
- Access block / bed availability.460
- Patients held in emergency department awaiting admission.517
- Lack of agreed protocols.455
- Increased documentation requirements.582
- Inexperienced medical staff.144 455
- Physicians and their characteristics.517 306 144
- Nurse staffing and profile.  
- Hospital restructuring with fewer inpatient beds.  
- Changing role of emergency medicine.  
- Hospital bed flow, including length of stay, bed occupancy and critical care bed availability.  
- Daily total patient care time.  
- No of ambulance cases.  
- Total census of majors and increasing complexity.  
- Number of children attending.  
- Number of admissions.  
- Increased psychiatric and substance abuse attenders.  
- Overload with non urgent cases.  
- Rural vs. urban hospitals and size of hospital.  
- Other departments diverting cases.
G. Effects of delays and overcrowding

Effects on patients - clinical

A study of overcrowding of an emergency department in Spain observed a significant, positive correlation between mortality rates and weekly number of visits ($p=0.01$). Although a similar trend was also found for revisit rates, such an increase did not reach statistical significance ($p=0.06$). It is concluded that since revisit and mortality rates constitute good health care quality markers, that emergency department overcrowding implies a decrease in the health care quality. Numbers of adverse incidents increase with department workload ($p=0.02$), increased numbers of patients in the emergency department over 3-hours ($p=0.03$), total turnaround time ($p=0.02$). Overcrowding has also been attributed as the cause of communication errors resulting in medical errors, and with increasing numbers of patients, errors such as mislabelled specimens or radiology request forms also increase in frequency. Nurses in an overcrowded department reported compromised care.

An American survey reported that 33% of emergency department directors reported that a few patients experienced actual poor outcomes as a result of overcrowding. Deaths have been attributed to the delay because of overcrowding. A recent case report attributed a patient death to overcrowding. Another case in the UK resulted in death because of delays in finding a neurosurgical bed. Cases of delayed care of myocardial infarction, delayed recognition of hyperthermia, delayed care of subdural haemorrhage have all been described. A study of patients with acute appendicitis showed that those who had an emergency physician delay or delay in the surgeon performing the operation had a worse outcome. In a study in an Australian emergency department nearly 12,000 admissions were studied of whom 7.7% experienced prolonged total time in the emergency department. The mean length of stay in hospital was 4.9 days in those who experienced long times in the emergency department compared to 4.1 days in those who did not (an increase of nearly 20%). This effect was seen in all patients except those in Category 1, which implies that it is not related to sick patients needing a longer stay in emergency department. Delay in administration of antibiotics in pneumonia and diuretics in heart failure will increase length of stay in hospital. Increased average inpatient length of stay caused by overcrowding of the emergency department has been shown to result in increased costs per patient. During times of overcrowding, patients may experience prolonged pain and suffering unnecessarily because the emergency department staff are too busy to attend to them.

Effects on patients- satisfaction

Patient satisfaction is an indicator of quality of care. Trout et al., performed a literature review to identify factors associated with overall patient satisfaction following attendance at emergency departments. They found 16 studies relating satisfaction to service and patient factors. Key themes were observed. Perceived waiting time was consistently associated with overall satisfaction but little is known of the
Reducing Attendances and Waits in Emergency Departments

Relationship of actual waits and satisfaction. One study suggested that actual wait (as opposed to perceived wait) is not associated with overall satisfaction. Provision of information, and patient – carer interpersonal skills were also important factors. This dissatisfaction is reflected in an increasing number of patients who leave without being seen. The consequence of this is the potential for minor medical problems to become more serious from delay in care. Patients are less likely to leave the department without being seen if waits are reduced although studies have been variable in whether those leaving without being seen may have significant problems or not.

Patient attendance rate is recognised as being a predictor of numbers leaving the department without being seen; for every 2.8 extra patients, one extra will leave without being seen but this study did not correlate this with waiting times.

Effect on staff

The many causes of overcrowding have had a negative effect on physician productivity. Emergency physicians have attempted to fill in the gaps, as they must stretch their ability to see many patients at the same time. At a certain limit of patients, productivity declines and patient care is compromised. Staff retention and recruitment is adversely affected by overcrowded emergency departments.

Academic pursuits

Focused bedside teaching has been cited as one of the first casualties of overcrowded emergency departments when trainers are too busy to teach. However, studies have shown that the presence of residents has only minimal effect on length of stay of patients in the emergency department. looked at emergency activity on the days when residents were absent because of educational commitments. Comparing dates without residents to those with there was a longer decision to admit time (333 vs. 313 mins, p=0.003) and longer length of stay for admissions (490 vs. 445 minutes, p<0.0001) but no difference in treat and release patients. Test usage was the same. Staffing numbers were the same on both types of day. There is conflicting evidence on the effects of medical students. One prospective time series study over 86 days showed the presence of medical students did not seem to affect patient transit times, whereas another study demonstrated the median LOS decreased by 24% (31 minutes, 95% confidence interval 24 to 38) during a medical student strike (110 minutes [95% confidence interval 65 to 178] to 79 minutes [95% confidence interval 40 to 135], p<10(-4)). Other effects of the strike may have confounded the results. In a study of 1287 patients, average treatment times were not significantly different whether a medical student was present or not in an emergency ambulatory care facility. The study did examine only one physician.
Reducing Attendances and Waits in Emergency Departments

and his students. All these studies were in America and therefore will have limited applicability to other academic situations.

Ambulance diversions

The incidence of ambulance diversion has increased, especially in urban areas which affects the clinical effectiveness of all hospitals in the area. Redelmeer demonstrated that overcrowding resulting in ambulance diversion caused longer times at the scene (13.5 versus 12.4 minutes; p<0.005) and greater transport times (13.3 versus 11.6 minutes, p<0.005). But there was no evidence of increase in the rate of transport-associated deaths (0.460 deaths per 1,000 population in 1986 versus 0.464 deaths per 1,000 population in 1989; p=ns).

Financial

In funded systems, the hospital may loose revenue because of failure to admit patients to a bed and holding them in the emergency department. One study estimated the cost in America as $190 per patient waiting over 3-hours.

Some individuals believe that decreasing waiting times will increase the number of attendances to the emergency department for non-urgent conditions. An American study where the wait was reduced from a mean of 13.8 hours to 5.9 hours demonstrated no increase in return visits. As returns are a proxy measure for quality of care, this also implies that faster care is not poorer care.

H - Queue Theory and applications in health care

Queuing theory is a widely studied topic within operations research. Queuing theories started to be developed a century ago, particularly due to the work of A.K. Erlang. The basic concept relates to high volume, short transaction service systems such as telephone connections, where the system operates close to effective capacity. Variations in demand and capacity lead to occasional periods where all the demand cannot be met, causing a backlog or queue to develop even though long-term capacity exceeds demand.

Treated in its purest mathematical form, a general principle can be established that relates the utilisation of resources to system performance. Figure 2 below shows how the expected length of a queue increases with utilisation.

![Queue Length vs Resource Utilisation](image.png)
Figure 2 - The approximate relationship between queue length and resource utilisation

The graph demonstrates that a queue rapidly forms when demand variation occurs and resource utilisation is moderately high. Furthermore, once a system is designed to operate at relative high utilisation, it becomes very sensitive to short-run increases in demand or decreases in effective capacity. The assumptions built into queuing theory mean that care has to be taken with its application. The precise behaviour of a queue depends on a series of characteristics. Van Looy and colleagues structure of the elements of a queuing system as follows:

1. Arrival characteristics

Mathematical queuing models make assumptions about the pattern of arrival into the system. Depending upon the behaviour of the population entering the queuing system, arrival patterns such as negative exponential or Poisson distributions are used to represent arrival behaviour. In practice, arrival patterns are normally quasi-random. For example, some out-patient clinics smooth the arrival pattern without allocating individual appointment slots to one particular patient. In other cases, demand is “batched” because work arrives or leaves a system as a group. Generally, batching leads to larger queues.

2. Characteristics of the service

The time that a customer or patient spends with a server influences queue dynamics or queue length. In situations where the time taken to provide the service is highly variable, queue length will increase. Hence, standardisation of services tends to reduce the level of queuing.

The design of the service system implicitly defines the design of the queues that are seen. The classic queue is a single server, single queue model, where all work queues at one single stage. In most systems there are multiple servers, but the question arises of whether the queue should be split into multiple queues, each corresponding to one server. Erlang queue theory is very clear that as a rule, the greater the pooling of demand, the more effective a given system will be in minimising queues. For an illustration of this see Kolesar and Green.

3. Queue characteristics

Queue length will be affected by the way the queues behave. In sequential processes, there may be a queue in front of most stages in the process (e.g. to see doctor, to have x-ray, to be reviewed after x-ray). This impacts upon the flow in the system. The discipline in the queue is also a factor (such as if people are pushed to the front of the queue, such as with clinical prioritisation systems). Management theory also considers the change in behaviour of queue participants and staff. For example, people are known to assess both the length and speed of some queues, reneging (i.e. leaving the queue early, equating to patients leaving without being seen) or baulking (refusing to join the queue), if the queue length is deemed unsatisfactory. Similarly, behaviour can be managed by keeping
participants informed of waiting times or keeping them occupied with other tasks etc. 

Applications in healthcare

Recently, queuing theory has been more widely applied in healthcare, Preater\(^{438}\) reports his own bibliography containing nearly 150 academic papers that apply queuing theory to healthcare. There is a collection of work that relates to managing appointments, out-patient clinics and waiting lists. Recent work has focused on the use of Erlang theory to relate bed capacity to patient turn-away. This has demonstrated the positive impact of pooling resources, leading to suggestions that it is still better to keep elective and emergency care beds pooled. However, the mathematical models do not necessarily incorporate changes in system behaviour caused by such structural decisions.

The lessons from Erlang theory feature in NHS training material.\(^{394}\) Lessons from manufacturing that relate to the emergency department have recently been summarised by Walley.\(^{604}\) It is now accepted that the unnecessary splitting of work into ring-fenced groups, i.e. carve-out, causes capacity losses and longer waiting times (see [www.steyn.org.uk](http://www.steyn.org.uk) for a demonstration of the principles). In this sense, the Manchester triage system can be regarded as a queue-splitting decision that makes queues in emergency departments worse, unless other procedures change simultaneously.
Chapter 2 – Methods

Objectives

The objectives of this systematic review were to establish the evidence for innovations designed to reduce waiting times in and attendance at emergency departments, specifically:

- What initiatives in emergency departments have been demonstrated to reduce waiting times and attendances?
- What initiatives outside emergency departments have been shown to reduce waiting times and attendances?
- What evidence is the effectiveness of such interventions?
- To inform policy makers and health and social care providers of evidence-based initiatives.
- To assist providers with vignettes to illustrate innovations in place in the UK.
- To highlight areas where further research should be commissioned.

The factors that contribute to waits in the emergency department are many and complex due to interdependence with other departments, disciplines and organisations such as social care, prehospital care, primary care, radiology, and pathology. It is generally accepted that solving waits will require a system-wide approach necessitating the application of multiform initiatives. In order to retrieve all relevant articles including those from allied departments, disciplines and organisations a broad search strategy was adapted.

Expert Advisory Group

An expert advisory group was convened representing all organisations allied to emergency care including: Ambulance Service Association, Audit Commission, Royal College of General Practitioners, Emergency Services Collaborative, Out of Hours Primary Care Advisor, Faculty of Accident and Emergency Medicine, Emergency Care Strategy Team (Dept of Health), Social Services, Performance Quality and Regulation (Welsh Assembly), British Association for Emergency Medicine, NHS Modernisation Agency, Royal College of Nursing and user representation.

Inclusion criteria

We sought to identify any intervention that had waiting time in or attendance at the emergency department as outcome measures. Waiting time in the emergency department is differentially defined nationally and internationally and measures may include: waiting time to triage, waiting time to see a doctor, waiting time for results, trolley wait or total time in the emergency department. Studies that included single elements but did report data on the overall impact on total waiting time in the emergency department were excluded.

Studies focussing on accident prevention and falls prevention were not included. Articles related to length of
hospital stay that did not consider its effect in emergency care patient flows were also excluded.

Studies were included that were published from January 1985 until July 2003. No restriction was placed on country or language.

**Outcomes**

To be included in the review a study must report an outcome measure that impacts on waits in or attendance at the emergency department including: waits/delays in the emergency department, attendance/re-attendance at the emergency department, length of in-patient stay following emergency admission, emergency department admission avoidance, transfer of care following emergency admission.

**Type of study**

In this type of research the gold standard of a randomised controlled trial is often impossible and sometimes an inappropriate technique. Therefore all designs of study with appropriate outcome measures have been included. Therefore a wide range of study designs were considered:

- Randomised controlled trials (RCT).
- Quasi-experimental studies.
- Cohort studies.
- Cross-sectional studies.
- Descriptive studies.

**Search strategy**

The search strategy was devised by the research team and presented to the Expert Advisory Group for comment.

Because of the broad nature of the review topic a comprehensive search strategy was developed and cycled through a number of iterations in order to maximise comprehensiveness and precision. Searches for relevant literature both published and unpublished was undertaken on a broad range of databases (Table 1).

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In addition relevant journals were searched electronically and by hand.
Journal Search (Electronic):
- Academic Emergency Medicine
- American Journal of Emergency Medicine
- Applied Nursing Research
- Clinical Excellence
- EMS Insider
- EMS Manager and Supervisor
- International journal of operations and production management
- International Journal of Trauma Nursing
- JEMS
- Journal of Accident and Emergency Medicine
- Journal of Emergency Nursing
- Journal of management in medicine
- Journal of Professional Nursing
- Nurse practitioners
- Nursing Outlook
- Prehospital Emergency Care
- RCN Publishing
- Journal of Emergency Medicine
- Journal of Emergency Nursing
- Nurse Practitioner
- Nursing Times
- Pre-Hospital Immediate Care
- Royal Nurse
- Today’s Emergency.

Internet searches were also undertaken using the biomedical search engine BIOME http://www.biome.ac.uk, the meta-search engine Search.com (http://www.search.com and the Google search engine http://www.google.com/).

Reference lists from retrieved articles were searched. Key researchers were contacted and adverts placed in key journals, ‘Emergency Care Network’ and on internet mailing lists.

Citations were imported and stored using ProCite (version 5.0) bibliographic database. Duplicate citations were deleted from the database. All citations were allocated a unique identification number.

Journal Search (Hand):
- Academic Emergency Medicine
- Accident and Emergency Nursing
- Ambulance UK
- Annals of Emergency Medicine
- British Medical Journal
- Emergency Medical Journal
- Emergency Nurse
- Journal of A&E Medicine
Chapter 3 – Review Procedures

The titles and abstracts from all studies identified from the searches were initially sifted by one reviewer (JDF) to eliminate studies unrelated to the primary focus of this review.

Following the initial sift the title, and abstract of the remaining studies were assessed independently by two reviewers (MWC and JDF) under masked conditions. Relevant studies were those that had evaluated an intervention and where the outcome measures were:

- Waits in emergency department
- Delays in emergency department
- Attendance or re-attendance emergency department
- Length of in-patient stay following emergency admission
- Admission avoidance
- Transfer of care following emergency admission

Full copies of studies were obtained for further review if the abstract\(^1\) contained any of the relevant outcome measures listed above or where the relevance of the paper could not be ascertained. Disagreements concerning the relevance of studies were resolved by discussion between the reviewers (MWC and JDF).

\(^1\) Study/ies refers to all documents retrieved in the search whether they were journal articles, letters, reports, conference proceedings.

Data extraction

The extraction sheet was completed by two reviewers, an academic (MWC or JDF) and an expert in the relevant topic field (see reviewer list).

Data extraction sheets were prepared for all relevant studies to extract:

- **Study details:**
  - Document type.
  - Area of healthcare:
    - Emergency department.
    - In-hospital care.
    - Pre-hospital care.
    - Primary care.
    - Social care.
  - Study Type.
  - Country.
  - Language.

- **Intervention details:**
  - Nature of intervention.
  - Duration of intervention.
  - Who delivered the intervention.
  - Whether any training was needed/given.

- **Study design:**
  - Hypothesis.
  - An appropriate spectrum of patients.
  - Exclusion appropriate.
• Control group or comparison to any other system.
• Were the intervention and control groups comparable.

• Results:
  • Unit of analysis.
  • Descriptive data.
  • Statistical test.

• Generalisability:
  • Hospital type.
  • Size of emergency department.
  • Whether the intervention is restricted to certain types of hospital.
  • Whether the intervention is applicable to the UK.

• Assessment:
  • Were the methods described sufficiently to permit replication.

Results

The search strategy generated a total of 61860 studies. Following the initial sift the titles and abstracts of 3178 were reviewed and of these 334 were fully reviewed, and 109 met the selection criteria.

Analysis

Due to heterogeneity of studies in terms of outcome measures, design, intervention, settings meta-analysis was not undertaken.

The data were tabulated and only those studies satisfying the criteria for full review are included in the tables, in particular only those with a specific intervention are included. Quality, applicability to UK, presence of control group, the size of ED studied and number in study are all included in the table where they are available, to enable readers to assess the quality and generalisability of each study.

Other studies are referred to in the text if considered relevant to the discussion but should not be considered as being robust studies with appropriate outcome measures, many are epidemiological rather than intervention studies or consider a small component of the time in the emergency department that may not influence total waits. Studies quoting figures without any statistical analysis, hypothetical studies and modelling studies, and systematic reviews are also excluded from the tables.

Where Cochrane reviews were available, these were utilised and only articles published since the Cochrane review were then considered in these areas.

In addition case studies are provided to illustrate good practice (supplied by the NHS Modernisation Agency’s Emergency Services Collaborative. Further examples are available via www.modern.nhs.uk/emergency). The case studies utilised were those determined to illustrate most appropriately the key messages of that section of the study. They were selected from case studies submitted to the emergency services collaborative as examples of good practice.
Chapter 4 – Results

The results of this study have been divided into 9 sections:

A Out of hospital care
B Primary care
C Emergency department
D Patient education
E Diagnostics
F Admission avoidance
G Bed management
H Delayed discharge
I Staffing

In each section, a brief background is given of the present UK system. This is followed by a series of subsections detailing the literature in the defined areas. This text includes some relevant articles without the defined outcomes where they add to the

The section is then completed with overall conclusions and key messages. These are followed by tables of all the articles with relevant outcome measures. These tables contain some information that may not be present in the text and includes the reviewer’s quality score and other factors to enable the reader to assess applicability to their circumstances. Particular attention is drawn to the country of the study as findings may be limited by differing healthcare system organisation.

An illustrative case study is the final component of each section.

A. Out of Hospital Care

A (i) Background

When a person phones 999 they have traditionally received an ambulance response and, since 1996, this has invariably been a paramedic response.

The United Kingdom ambulance services use priority dispatch systems to determine which calls are potentially life threatening and hence determine who has a faster response because of life threatening conditions, but also it allows downgrading of some calls such that lights and sirens may not be needed in some cases, therefore increasing the safety. Research evidence about safety and accuracy of call prioritisation is limited and there is some conflict in the results. Two British studies have shown marked variances with up to 30% error rate in one study. A systematic review of ambulance dispatch and prioritisation systems, by Wilson et al., showed there was poor evidence for their safety and clinical effectiveness. The number of emergency calls received by ambulance services in the UK has risen consistently over recent years. The vast majority of patients are usually taken to Emergency departments.

In a review of the literature Snooks et al., have shown that in nine out of ten studies 30-52% of ambulance calls did not warrant an emergency ambulance response. It is recognised that the lay person lacks the knowledge and ability to assess the seriousness of the call and that communication difficulties may
Reducing Attendances and Waits in Emergency Departments

impede the ability to assess this. It has therefore been suggested that it is more appropriate to modify the response from the ambulance service in order to increase the appropriateness of care.

The changes suggested are also likely to reduce attendances at emergency departments and are:

- Diversion of non serious 999 calls to a system of nurse advice.
- Ability of ambulance crew to treat people at the scene and then discharge them.
- Use of alternative destinations to emergency department.

The alternatives for 999 cases that are neither life threatening nor serious have been summarised by Snooks et al. They conclude that the evidence supports the need for alternatives to be developed. The American National Association of EMS Physicians has issued a concept paper discussing the new models of care as discussed below.

A (ii) - Divert 999 calls to Nurse Advice

In the only UK study, a study by Dale investigated the potential impact of telephone assessment and triage for callers who present with non-serious problems (Category C calls) as classified by ambulance service call takers in a pragmatic controlled trial. During intervention sessions, nurses or paramedics within the control room used a computerised decision support system to provide telephone assessment, triage and, if appropriate, offer advice to permit estimation of the potential impact on ambulance dispatch. Of 635 in the intervention group, 330 (52.0%) were triaged as not requiring an emergency ambulance, and 119 (36.6%) of these did not attend an emergency department. This compares with 55 (18.1%) of those triaged by a nurse or paramedic as requiring an ambulance (odds ratio 2.68; 95% confidence interval 1.78 to 3.85). Patients triaged as not requiring an emergency ambulance were less likely to be admitted to an inpatient bed (odds ratio 0.55; 95% confidence interval 0.33 to 0.93), but even so 30 (9.2%) were admitted. Nurses were more likely than paramedics to assess calls as requiring an alternative response to emergency ambulance despatch (odds ratio 1.28; 95% confidence interval 1.12 to 1.47), but the extent to which this relates to aspects of training and professional perspective is unclear. The authors did advise that the acceptability, reliability, and cost consequences need to be considered further.

In a prospective cohort study, callers to an urban EMS dispatch system were studied. It was possible to predict a population of callers who could be described as being low risk of having need to attend emergency departments. However negative predicted value only reached 98%. Transfer of non-urgent 911 calls to a nurse adviser have resulted in no adverse patient outcomes whilst maintaining patient satisfaction.

The NHS Service Delivery and Organisation (SDO) Programme has commissioned research to assess the costs and benefits of managing low priority 999 ambulance calls by NHS
Direct nurse advisors, which is due to report in December 2004 (http://www.sdo.lshtm.ac.uk/pdf/evalmodels_toner_scientific.pdf).

A (iii) - Not taking patients to emergency department

A postal questionnaire study showed that 10 of 36 replying UK ambulance services had investigated non-conveyance of some groups of 999 callers and 13 reported looking at other models of care for category C patients. Only 3 services had evaluated such work. Before such systems can be instituted they need to be assessed for feasibility of systems to achieve it, safety and effectiveness.

The American College of Emergency Physicians and the National Association of EMS Physicians has issued guidance on the non-transport of patients, stating it should only occur in the presence of on-line physician direction or detailed off-line protocols supported by appropriate educational programmes.

One UK study suggested that as many as 28% cases were not transported by the ambulance service. An American study suggested that it was 26% of 911 callers. However, concerns have been expressed about the risk of litigation associated with non-transportation.

Use of standard emergency department triage is not sufficiently accurate for use as a tool to help paramedics determine whether a patient needs to be transported to hospital. A retrospective study of 500 consecutive patients who were not transported following a 999 call in the East Midlands area of the UK showed that 26% of these had been assigned an AMPDS Delta code (the most urgent category) at dispatch prioritisation stage. This study therefore demonstrates that use of prioritisation codes is not a reliable way of determining disposal of the patient. It also illustrated that the high number of falls in the elderly which do not require a 999 response can be dealt with by alternative means.

A cluster randomised controlled trial in London involved 409 cases and 425 controls. The study group were attended by ambulance crews who had had training and extra protocols to enable transport to a minor injuries unit rather than the main emergency department. The study group had no increase in the use of the minor injury unit and made no more discharges from the scene. Factors found to influence destination were distance from emergency department and minor injuries unit, time of day, presence of head injury and sex of patient. Those taken to the minor injuries had shorter ambulance turnaround times. The study therefore did not confirm that the intervention would decrease number of attendances at the emergency department.

Snooks and colleagues undertook a study of “treat and refer” protocols which allowed London ambulance crews to leave appropriate patients at home with referral or self care advice. Protocols were developed by a local team using published evidence where available and the system was developed with local stakeholders. 719 patients participated in the study, 260 in the intervention arm and 537 controls. The two groups were
demographically the same but the study group were more likely to have attended during the day on a weekday. The rate of conveyance to hospital was no different in the two groups and the intervention group had a 5.9 minutes greater job cycle time (p<0.001). This equates to 1001 extra hours of ambulance time per week if applied across the whole of London. The 9% of patients who were left at home, “according to protocol”, were subsequently admitted to hospital within 14 days and were judged by clinical reviewers to have been inappropriate use of the protocols by the paramedics. (http://www.londonambulance.nhs.uk).

Use of protocols by emergency medical technicians to determine patients who did not require treatment and transport was evaluated in the American system. The 3% of patients determined as not requiring an ambulance by on scene assessment by Emergency Medicine (Ambulance) Technicians subsequently had a critical event in the ambulance and 11% had potentially critical events according to ambulance service notes. This study was conducted in an urban emergency medical service in the United States. Paramedics triaged patients for study purposes only into whether they needed to be taken to the emergency department, to see a physician within 24-hours or not needing any physician evaluation. The records of all these patients were then subsequently reviewed. Paramedics rated that 85% of patients needed to be taken to an emergency department and 15% were not required to be taken there, of which 12.5% needed to see a physician at some point. On review the review panel determined that 9.6% of patients were under triaged, of whom 48.7% were misclassified because the paramedics misused the guidelines. 8.4% were incorrectly classified as not needing to come to the emergency department. This represented 55% of the patients categorised as triage category 3 or 4 by the paramedics. The authors therefore conclude that the paramedics using written guidelines do not reach an acceptable standard of accuracy to determine disposition of patients in the field.

In the Selden study in 1991 22% of non-transported cases were inappropriate and he reviews three other studies in the United States that have also described serious and occasional fatal outcomes. It is also of note that up to 65% of patients leaving the scene needed further help within a week, with up to 20% needing emergency medical care. A trial of treat and release protocol in Albuquerque was suspended owing to safety concerns. When such protocols were introduced in California, it was found that only a very small proportion of eligible patients were taken to alternative sources of care.

In an American study to look at whether paramedics could safely determine which patients did not need emergency transportation, paramedics completed a questionnaire for each patient they transported and the notes of these patients were subsequently reviewed to determine whether they needed ambulance transport, defined as needing care in an ambulance on the route to hospital or emergency department care, defined as needing treatment according to diagnoses that was not available in local urgent care centres. 236 patients were transported and 183 of these had their charts reviewed. The agreement between the
Reducing Attendances and Waits in Emergency Departments

Paramedics and the need for emergency department attendance was low ($k_0.47$, 95% C.I., 0.34-0.60) and agreement between paramedics and the emergency department care ($k_0.32$, 95% C.I. = 0.172 - 0.46). Paramedics recommended alternative treatment for 97 patients, 23 of whom needed ambulance transport and the paramedics recommended non-emergency department care for 71 patients, 32 of whom needed emergency care, and therefore the proportion of patients who could potentially have not been transported who actually needed emergency department care was high.241

A prospective study of consecutive patients transported by a private paramedic service required paramedics to complete a survey detailing the necessity of transport to Emergency departments for each patient. The paramedics had been informed that the patients should be designated requiring emergency department care if they were to be admitted, required surgical subspecialty obstetrical or gynaecological consultation, or required advanced radiological procedures excluding plain x-rays. 313 patients were enrolled. Paramedic assessment was 81% sensitive, 72-80%, 95% confidence intervals and 34% specific, 28-41, 95% confidence intervals. In predicting requirement for emergency department care, in 85 cases paramedics felt transport to the emergency department was unnecessary, 27 (32%) met the criteria for emergency department treatment including 18% who were admitted and 5 who were admitted to Intensive Care Unit.536

An American study evaluated the feasibility of paramedics treating minor illness and injury conditions in the field. Data from 1103 ambulance report forms was analysed to determine whether there were any high volume groups of minor conditions. Of the 115 commonest conditions suitable for paramedic in field treatment all contained 24-100% of complex conditions believed to be beyond the remit of prehospital care, requiring facilities of a hospital. It did not address whether the paramedics could identify these cases, so they could safely treat the others.279

Most UK ambulance services have protocols indicating transport of patients following treatment of hypoglycaemia. A Copenhagen study shows that these patients can be safely treated and 84% left at home if they satisfy certain criteria, although 8% needed subsequent care within 72-hours, with 5% experiencing a second hypoglycaemia and one needing hospital admission, but none suffered long term adverse outcome.4

The NHS Modernisation Agency is currently looking at developing emergency care practitioners, one of whose roles is to undertake treatment and then discharge patients from the scene. This is discussed further in section I (iv) of this chapter.

A study of community paramedics for older people with minor injuries has been commenced in Sheffield and is presently being evaluated.348

Out of Hospital Care – Conclusions
The evidence in this area is generally poor and most refers to the American system, where ambulance staff receive different training.

Diversion of 999 calls to an advice line has the potential to reduce the number of ambulance responses and therefore may affect the number of emergency department attendances, although no study has directly measured this. The studies suggest that 20% of category C calls could not receive an ambulance response but safety still needs to be confirmed with up to 1 in 10 cases thought suitable for diversion to advice still needing admission. Research is in progress in this area.

The evidence has not defined the role of ambulance crews in either discharging patients at the scene or transporting them to other destinations. The present triage and prioritisation systems in use do not detect which patients may be suitable for alternative care and high rates of error have been detected in various studies that raise concerns over the safety of such systems.

Because of the planned expansions in the roles of paramedics that are already occurring, it is important that prospective studies are undertaken to ensure the safety and effectiveness of discharging patients from the scene of incidents.

Key points

- It is possible to divert some 999 calls to advice lines but the safety of such systems is still being evaluated.

- The role of paramedics in either discharging patients from scene or deciding on appropriate destinations has not been adequately studied to confirm its safety and effectiveness in the UK.
### Table 2 - Section A (ii) Divert 999 Calls to Nurse Advice

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
</table>
| Smith WR, Culley L, et al. 2001 | Prehospital Care | Observational study Control: No n=38 non-intervention calls n=133 Intervention calls | 911 callers identified as Basic Life Support/yellow response – patients considered to be of low risk for poor medical outcome excluding:  
- extremity fractures  
- direct patient assists  
- Police involvement | Telephone Referral Program Diverting non-urgent 911 calls to a 24-hour telephone-consulting nurse. | Reduction in Basic Life Support/yellow response: Callers referred to:  
- home/self care (31%); primary  
- care (24%)  
- 911 (17%)  
- community resource (11%)  
- ED (6%)  
- urgent care clinic (5%)  
- hospital ED (4%) |
| Dale J, Higgins J, et al. 2003 | Prehospital Care | Pragmatic controlled trial n=635 Intervention calls n=611 Control calls | 999 callers identified as Category C (non-serious) excluding:  
- hoax calls  
- alarm calls  
- category A and B  
- comprehension & language difficulties  
- children <2 years | Telephone Assessment Diverting calls category C calls to nurses/paramedics for assessment, triage and advice assisted by computer decision support. | Alternative responses possible 36.6% triaged as not requiring an ambulance did not attend ED. But 9% admitted to hospital |
### Table 3 - Section A (iii) Not Taking Patients to the Emergency Department

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>London Ambulance Service NHS Trust 2002</td>
<td>Prehospital Care Emergency Department</td>
<td>Cluster Randomised Controlled Trial n=409 Intervention n=425 Control</td>
<td>Patients contacting 999 emergency service</td>
<td>Protocols to transport appropriate patients to MIUs by ambulance versus usual practice.</td>
<td>Significant reduction in total time for patients: MIU (103.8 minutes) versus ED (312.2 minutes), p=0.0001</td>
</tr>
</tbody>
</table>
Case Study 1

Role exchange to facilitate streaming in rural areas

Starting Point
There was a high number of inappropriate ambulance journeys to the emergency department of Cumberland Infirmary (Carlisle). These journeys caused additional pressure on the ability of the ambulance service to meet response time targets and increased pressure in A&E.

Impact of this change:
- The Nurse Practitioner worked in Carlisle and reduced non-urgent ambulance attendance’s to A&E by 33%. (Very small numbers however).
- As a result 4 experienced paramedics commenced an Emergency Care Practitioner Course in early 2001.
- As the four paramedics have developed their knowledge and skills we have now agreed two areas in which the paramedics can have a greater benefit.
- Supporting a rural GP Out of Hours Co-operative in the rural South Lakes area.
- Supporting an Urban GP Out of Hours Co-operative in Carlisle.
- As the roles will be introduced during October/November its impact can not yet be measured. However audit of current provision without the role of Emergency Care Practitioner shows that 10-20% of current referrals could be treated safely at home. This has tremendous benefits in a rural community like Cumbria.

Next Steps
Commence the trials which will be reviewed monthly and last until March 2003.

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B. Primary Care

In this section we will consider various initiatives by primary care within the emergency departments (e.g. general practitioners working in the emergency department) and initiatives in the community that may help to reduce the number of attendances in emergency departments (e.g. organisation of out of hours work, the effect of minor injury units and walk-in centres on emergency departments and the effect of telephone advice lines, including NHS Direct on Emergency departments).

This section has particular importance because of planned reorganisation of primary care out of hours services that is taking place in the UK at present. Fears have been expressed that patients may use the emergency department as a point of first contact for primary care, therefore increasing the number of ED attenders.

The concept of diverting non-urgent attenders away from emergency departments will be dealt with in section C(ii) of this chapter. Educational interventions to reduce attendances are discussed in section D of this chapter.

Primary care attenders in emergency departments have been cited by many as a source of problems for emergency departments. They are seen as causes of prolonged waiting times, inefficient care, staff stress and preventable costs. The issue is seen on a worldwide basis. However from a patient’s perspective, they are seeking care at what they consider the most appropriate resource in the timeliest manner. It must be remembered that the majority manage to seek their care in what the carers consider an appropriate location, despite a lack of guidance or uniformity. More emergency contacts are with the GPs (45%) than with emergency departments (27%), community nursing services (24%) or the ambulance service (4%). 79% of those attending emergency departments are self-referrals. The concept of inappropriate attendance is now being dropped in the UK and Europe preferring to look at the response that is required for these patients. However there are few studies of interventions in primary care that have looked at their effect on waits and attendances at Emergency departments. Most studies concentrate on avoiding these patients attending the emergency department with the aim of improving the care of the remaining emergency department patients and reducing their waits by decreasing the workload. An appraisal of the literature as part of the New Zealand Health Technology Assessment looked at the appropriateness of emergency department attendance and its causes.

Effects

Staff in emergency departments appear to have a negative attitude to 'inappropriate patients' believing they should attend appropriate services and that they use up excessive time and are unrewarding. This may also be responsible for the negative perceptions of general practice by emergency department staff.

Extent of problem
The incidence of the primary care attenders varies widely with papers quoting up to 6-60% in UK hospitals.\textsuperscript{377} The Audit Commission estimated the problem at 2-7% using nurses’ opinion.\textsuperscript{21} Some emergency department staff consider that over 70% of patients attending with minor ailments should have seen their GP.\textsuperscript{34} Some of this variation is due to the conceptual issue of what could be treated by a GP or emergency department doctor and what is best treated by a specific specialty. Variation may be true or may be due to differing interpretations of what is a primary care problem that either could or should be treated in emergency department.\textsuperscript{111 }\textsuperscript{332} True factors include a complex mixture of social, psychological and medical factors; inner city areas appear to have particularly high rates.\textsuperscript{377}

Some classifications depend on a definition of being able to be treated by a GP\textsuperscript{121} (e.g. need no hospital investigations), others according to urgency of care or duration of symptoms\textsuperscript{37} and others on symptom based criteria.\textsuperscript{146} Equally it has been shown that triage category does not relate well in predicting those who require admission.\textsuperscript{56} As most of the research retrospectively labels people as inappropriate on the basis of patient assessment and treatment, it is difficult to apply this to patient decision making.\textsuperscript{377}

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.\textsuperscript{180} However, it is also apparent that professionals do not agree over what types of cases should be cared for in an Emergency Department. Consensus of two physicians reviewing the notes demonstrated that there was only moderate agreement and suggested that further refinements are needed before such tools can be used to determine inappropriate emergency department visits.\textsuperscript{404} Similarly, another study looking at judging inappropriateness by the triage nurses’ assessment and by retrospective chart review show the variation in inappropriate levels from 10 to 90%. Kappa values showed poor agreement therefore limiting access to emergency department without a more valid and reliable standard could be hazardous.\textsuperscript{330} Other studies have confirmed the failure of emergency department staff to agree in case reviews.\textsuperscript{199 }\textsuperscript{180} There is however evidence that there is no higher level of primary care attendance amongst self-referrals than amongst GP referrals.\textsuperscript{13}\textsuperscript{588} This variability in perception of usage of the emergency department may account for the fact that 40% of the non-urgent cases in Montreal being referred by a health care professional.\textsuperscript{65}

Therefore the enormous variability, 6-80% regarding proportions of visits judged to be non-urgent or inappropriate is not surprising if all definitions rely completely on implicit and subjective judgements.\textsuperscript{101}

How and why people choose the Emergency Department

Many reasons are cited in the literature for people attending emergency departments with a primary care problem. This partly relates to a confusion of terminology – papers use the terms non-urgent, inappropriate and
primary care in varying roles. Reported reasons include relative distance from the emergency departments and primary care facilities, lack of awareness of other facilities, perceived seriousness or urgency of care, judgement that emergency department will give better care, poor availability of general practice out of hours, inability to attend the GP, poor knowledge of GP services, convenience of 24 hour access, time of day, parental caring experience, ethnicity, age, socio-economic status, social deprivation, homelessness and health insurance status. Presence of chronic illness has a negative relationship.\textsuperscript{101} One study in Amsterdam looked at 21 potential motives for attending emergency department for minor complaints. 403 questionnaires were administered and showed that motives relating to the GP played a small role in the patient's decision making. Two groups emerged, one with a mainly financial motive (which would not be applicable in the UK) and one who believed the emergency department had the appropriate expertise and facilities; this latter group were of a lower socio-economic group than the average.\textsuperscript{465} Studies have demonstrated that high emergency department usage occurs in the same population who have high usage of primary care, namely the socially deprived.\textsuperscript{263, 266} Thakker identified the fact that smaller practices were associated with more emergency department attendances for minor trauma.\textsuperscript{579} It is recognised that lower levels of primary care provision for individuals is associated with higher use of the emergency department.\textsuperscript{91}

Poor access to GP services has been suggested as an important cause of people attending the emergency department.\textsuperscript{181, 58} But this is not supported in the literature relating to the UK, which shows that practices with a low level of urgent appointment provision and a low number of unbooked appointments at surgery opening, have the same rates of emergency department self presenters.\textsuperscript{72}

Three descriptive studies have investigated the relationship between various practice characteristics (the number of primary care practitioners, the availability of a female GP, the provision of same day appointments, and practice list size) and patient attendance rates at the Emergency Department. No significant relationship was found between practice characteristics and emergency department utilisation. However, the deficiencies of the descriptive study design used in this research must be recognised\textsuperscript{72, 263, 355} but proximity to emergency department was an important determinant.\textsuperscript{268} When patients attending an American emergency department were interviewed 45% said difficulty in access to primary care was their reason for attending the emergency department and 38% were happy to visit primary care within 3 days instead.\textsuperscript{222} Access to primary care may be difficult for some groups, accounting for higher rates of emergency department attendance amongst tourists, commuters, those who have recently moved and the homeless.\textsuperscript{270} At University College London non-residents account for 48\% of attenders with 4\% being homeless.\textsuperscript{415} Whereas a few miles away, 71\% of emergency department primary care attenders are registered with a GP.\textsuperscript{608}

However ease of access by telephone did not change rate of emergency department attendance.\textsuperscript{126} In Sweden
an improved primary care access and availability of greater range of services decreased A & E attendances.\textsuperscript{545}

It appears that the most important factors are the perceived appropriateness of the condition for emergency department, emergency department's accessibility and GP availability but there is a major deficiency in most of the research in that they have all been retrospectively labelled by medical personnel.\textsuperscript{52}

Analysis of the 1998 national health interview survey in America showed that poverty, lack of insurance, younger age, male gender, minority ethnicity or ethnicity all predicted identifying Emergency departments as their usual source of healthcare.\textsuperscript{605}

Concern over symptoms is an important reason for using the emergency department.\textsuperscript{631}

The manner in which primary care was provided (based on how local the service was provided) and distance from hospital were key determinants of emergency department usage in a Spanish study of 15,290 patients using a logistic regression model.\textsuperscript{35}

Out of 217 patients interviewed, only 15 had contacted their GPs and 89 considered the severity or their perceived need for x-ray meant they needed emergency department.\textsuperscript{544}

Patients' choice between emergency departments and general practitioner out of hours centres appears to be related to a perception that waiting times may be greater at out of hours centre, although actual time was shown to be less. Once patients have used the GP out of hours centre they are more likely to use it again. Education needs to be targeted at young adults, unemployed and white people who appear to use emergency department services more than other groups for primary care.\textsuperscript{443} It is recognised the patients who are dissatisfied with their usual source of care or perceive access barriers are more likely to attend the emergency department for a non-urgent condition.\textsuperscript{502} Ethnicity, lack of insurance and education are not associated with non-urgent use.\textsuperscript{426}

**Interventions to reduce primary care attendances at emergency department**

Various methods have been published including:

- The role of GPs working in emergency department.
- Primary care interventions in emergency department.
- Regular primary care provision.
- Role of GP as gatekeeper.
- Improved access to primary care.
- Organisation of primary health care.
- Telephone triage (see section B (iv)).
- Education (see section D).
- The effects of co-payments (see section C (iv)).

A Kings Fund review was undertaken to assess whether and to what extent
primary care based emergency services can substitute for traditional hospital emergency department models of emergency care and the results of the review were that expanding primary care services caused a marked reduction in emergency department utilisation.\textsuperscript{469}

If primary care was reorganised there were concerns over certain aspects of primary care organisations, such as appointment systems, deputising, single-handed practitioners or primary care emergency centres. They may be unpopular, patients that may inadvertently increase pressure on Emergency departments but the evidence behind these seems largely unfounded.

Integrating primary and hospital care can result in substitution. All studies found that there was a lower use of diagnostic investigations by GPs and fewer referrals to secondary services. By reorganising acute care by the use of minor injuries services there did not appear to be any significant difference in emergency department attendance usage.

B (i) - GPs working in emergency department

Many studies have looked at comparing general practitioner and usual medical care in Emergency departments but few have looked at the effect of GPs on length of stay in the Emergency Department. If it is accepted that primary care attenders will attend emergency departments, then there is a strong argument to adjust the system so that the response is appropriate to the patient rather than adjusting patient behaviour to fit the system.\textsuperscript{377}

A postal questionnaire has revealed that there is a wide variety of different models of provision of primary care within the emergency department and there is some confusion over whether these services aim to improve emergency department based care or to divert it to general practice. There is minimal information on how this affects waiting time.\textsuperscript{185}

Studies have shown significant differences in the care given by GPs and emergency department doctors for primary care attenders\textsuperscript{120, 378} although studies may not have fully accounted for the seniority of the doctors.\textsuperscript{99} It is also known to be cost effective to utilise GPs in the emergency department.\textsuperscript{123} These studies did show decreased resource utilisation but did not however show whether they reduced waiting times. A descriptive study in London using nurse practitioners to run a primary care unit within the emergency department showed that 40% of patients were seen by the nurse practitioner within 30 minutes. It did not record total length of time in department or how it affected the number of patients attending the emergency department.\textsuperscript{33} One smaller study has shown similar or increased resource utilisation by GPs working in an Emergency Department.\textsuperscript{195} The primary care provided within an emergency department is however not analogous to that provided by the patient's own GP as the latter has access to full health records and has continuing care facilities. However, providing a primary care service in emergency department has been shown to increase the numbers of primary care attenders to the emergency department...
with a consequent increase in waiting times of 14% in the long term in America.\textsuperscript{300}

A single contact with a general practitioner working in an emergency department does not appear to have a long-lasting effect on health service use and in particular on subsequent emergency department attendance (relative risk 0.58-1.02).\textsuperscript{390} However, brief focused interventions have been shown to have lasting effects in other settings.\textsuperscript{446}

**B (ii) - Interventions in Primary care**

Continuity of primary care may decrease the number of emergency department attendances. A cross-sectional study across 5 Emergency departments in America looked at patients with chest pain, abdominal pain and asthma. Analysis of a questionnaire done at the time of presentation to the hospital revealed that absence of a regular physician (GP) was an independent predictor of presentation for non-urgent visits (odds ratio 1.6, 95% CI 1.2-2.2).\textsuperscript{426} In Florida, another study showed the relationship between regular primary care and reduced use of the emergency department for non-urgent problems (85.8% vs. 78.4%, p<0.05).\textsuperscript{223} A study of older people showed that those with a regular relationship with either a primary (Odds Ratio 0.47) or secondary care doctor (Odds Ratio 0.58) had a decreased usage of emergency care, regardless of illness severity.\textsuperscript{476} The study excluded members of any health care organisation. The emergency department utilisation by children was studied with respect to their enrolment in a health maintenance organisation in America. Those with high continuity of care were less likely to attend the emergency department than those with low continuity of care (relative risk 1.54; confidence interval 1.33-1.75).\textsuperscript{91}

However, another study of infants in America revealed that early linkage with the primary care system did not result in a decreased risk of emergency department use\textsuperscript{299} but incomplete routine well-child screening does decrease the risk of emergency department attendance (relative risk 1.6; 95% confidence interval 1.4-1.98).\textsuperscript{226}

In America systems have required the primary care physician to authorise any non-emergency attendance at the emergency department. At a children’s hospital this was reported to result in a decrease of 23% in attendances, with 25% in self-pay patients but a 6% increase in non-paying, with no change in admissions.\textsuperscript{24} As the NHS is a non-pay system, this suggests that contacting primary care physicians may have little effect on paediatric emergency department attendances in the UK. Another American study demonstrated an overall fall of non-urgent visits from 41% to 8% by using primary care gate keeping in an American study.\textsuperscript{184} Further study, by Hurley, required patients to gain permission from the GP before any non-urgent use of the Emergency Department, linked with the insurers. It recorded large decreases in emergency department attendance up to 45% in adults and 37% in children.\textsuperscript{266}

However concerns have been expressed over gate-keeping as the reductions in children’s attendances have not only been in non-urgent cases and do not appear to affect long term emergency department attendance.\textsuperscript{188} In the 237 children refused care there were
Reducing Attendances and Waits in Emergency Departments

no adverse outcomes and there was no effect on subsequent emergency department usage.\textsuperscript{188} There is further discussion of the use of co-payments to reduce emergency department attendances in section C (iv).

Several studies have found that poor access to primary care is a major factor in why patients choose to seek care in the emergency department.\textsuperscript{222, 631, 529, 63} Most of the research looking at primary care access has been based in America and may therefore not be applicable to the NHS. A before and after study found an increase in the number of primary care physicians in an area resulted in a reduction in emergency department attendances.\textsuperscript{250} A trial by Franco and colleagues\textsuperscript{184} found a significant reduction in emergency department visits where patients were given 24-hour access to a primary care physician, in a Medicaid system in America. This effect was most marked but not exclusive to non-urgent cases. Similarly a retrospective analysis of children’s emergency department attendances in Carolina showed a decrease of 24\% (p<0.001) for all cases and a fall of 37\% (p<0.001) for non-urgent cases, following introduction of 24 hour primary care access.\textsuperscript{429} A before and after study by Sjonell\textsuperscript{545} examined the effects of the introduction of a primary care health centre in Stockholm, Sweden. The study found that emergency department visits were reduced by 40\% in relation to a 19\% increase in primary care visits in the area. One study in Glasgow showed that the introduction of out of hours centres had no effect on new attendance numbers at the emergency department although there was a significant decrease in the number of non-urgent patients.\textsuperscript{569} This latter decrease was matched by an increase of urgent patients. Some studies have however found that improved access to a primary care physician was not associated with a reduction in attendance at the emergency department\textsuperscript{571} or hospital readmission for the severe chronically ill.\textsuperscript{614} Establishing an urgent care centre resulted in people who had attended the urgent care centre once subsequently decreasing their emergency department usage by 48\% (p<0.001). The location of the UCC relative to the emergency department is not described.\textsuperscript{385} A new community health centre in a small town in New Zealand did not change the emergency department use at the local hospital.\textsuperscript{349} People failing to attend their primary care follow up after an emergency department attendance were more likely to reattend the emergency department.\textsuperscript{310, 311, 551} This has led to the suggestion that guaranteed appointment times may be better than asking the patient to arrange an appointment.\textsuperscript{310}

Different models of care in General Practice produce different outcome e.g. we know that patients are more satisfied with care from their own general practitioner than from deputising services.\textsuperscript{356}

A key development in primary care has been the introduction of new services for out-of-hours GP care. Very little research has been published on the effects of this change. The impact of co-operatives on emergency departments was assessed as part of a health technology assessment.\textsuperscript{227} Interviews revealed concerns of emergency department staff about the potential increase in workload but the effect was expected to be small. It was felt that co-located co-operatives would promote joint working. The study did not however
look at actual changes. A study comparing co-operatives with deputising services showed that co-operatives had a higher admission rates but Cragg showed no significant difference with a similar study in a different city suggesting that local factors may be more important than the organisational structure.

A small number of researchers have examined whether patients preferentially attend a deputising service or their local emergency department for their after-hours medical care. The observational study by found there was no increase in emergency department attendance in relation to an expansion of deputising services in Leicester (UK). A similar result was obtained in the cross-sectional study by who found emergency department 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 emergency department use and it was assumed that improved access to primary care after hours had reduced emergency department attendance.

The general lack of recent evidence on the effect of new out-of-hours services on emergency department utilisation is surprising given that recent patient surveys have found mixed results in relation to their preference for out-of-hours care.

The use of a co-located out of hours centre and emergency department is theoretically an opportunity to remove the responsibility of choice from the patient to the health care providers. The patient decides they need medical care and therefore contacts one location. This location can provide all types of emergency care.

There is some anecdotal evidence that out of hours centres may cause a decrease in primary care attenders at emergency departments. One study of a co-located but independent service showed persistent inappropriate attendance attributable to lack of knowledge (80%) of the new system and incorrect perceptions of relative waiting times. Of the 48 patients attending the GP co-operatives out of hours centre, based in the same building as the emergency department, 35 (72.9%) had found out about the GP emergency service on the day of the attendance and 81.3% were first time attenders. One other study supported the lack of knowledge of primary care centres for excess attendance in emergency departments.

The reasons for patient’s choice between emergency department and primary care for minor injury and illness are complex. In the UK system, there is little evidence that changing provision of primary care services will alter patient flow. Availability of information or advice before arrival in emergency department has the potential to ensure the patient is seen by the most appropriate health carer. Financial disincentives work in some countries but are not appropriate within the present NHS.

The use of General Practitioners in emergency department has some short term benefits but may reinforce the care seeking behaviour and increase
Reducing Attendances and Waits in Emergency Departments

Many new models such as co-location of out of hours centres are being developed but research evidence is not yet available to support these developments.

Further change is likely with the onset of the new general practitioner contract, it is important that these are properly evaluated for their effects across the whole system.

B (iii) - Walk-in Centres and Minor Injury Units

Very few articles have been written assessing the impact of minor injury units. Minor injury units have been shown to be acceptable to patients. They can provide effective evidence based care for a local population but services provided and standards are highly variable. There is some evidence that they can provide a locally responsive and accessible service. Patients have been shown to be able to determine whether their needs are appropriate for a minor injury unit. A study of minor injury units demonstrated that half their patients stated they would have otherwise attended emergency department. The use of minor injury units has provoked debate about whether minor injuries are the role of emergency department specialists, with some holding the view that all minor injury should be seen in consultant led departments.

Minor injury units are often established as part of a service reconfiguration but these have not been extensively studied. Centralisation of services in one city from two hospitals to one for adults did not result in increased waiting times for admission but did cause an increased time to see the clinician in emergency department. The waiting times at the associated minor injury unit that replaced one emergency department were very short. SDO have just commissioned a project on service reconfiguration and this will address the effects on access to emergency care.

In a questionnaire survey and notes review of 267 adults presenting to the emergency department, patients were classified by the suitability of the presenting health problem to be managed by alternative immediate care services or only by emergency department, and also by the likelihood, in similar circumstances, of patients presenting to other services given their reasons for seeking emergency department care. Using objective criteria, it is estimated that 55% (95% confidence interval 50% -62%) of the health problems presented by a non-urgent population attending emergency department are suitable for treatment in either general practice, or a minor injury unit, or a walk in centre or by self care after advice from NHS Direct. However, in almost one quarter (24%) of low priority patients who self referred, emergency department was not the first contact with the health services for the presenting health problem. The reason for attending emergency departments cited most frequently by the patients was a belief that radiography was necessary. Taking into account the objective suitability of the health problem to be treated elsewhere, and the reasons for attending emergency department given by the patients, it is estimated that, with similar health problems, as few as 7% (95% confidence interval 3% - 10%) of the non-urgent emergency department population may be expected to present
to providers other than emergency department in the future.  

A before and after observational study undertaken in the UK looked at the rates of emergency general practitioner consultations and the attendance rates at out of hours services, minor injuries units and emergency departments before and after the introduction of an NHS walk-in centre. A second similar town was used as control over the same time period. The change in GP emergency consultations did not differ between the two towns, however attendance at a local minor injury unit was higher in the town having the walk-in centre. Non-ambulance attendances at the emergency department fell less in the town having the walk-in centre than in the control town. It was therefore concluded that although NHS walk-in centres did not affect the workload greatly of GPs they did have an effect on the local minor injuries unit of increasing workload which was thought to be probably related to the fact that it was situated in the same building.  

The change of service provision in Edinburgh resulted in the creation of a minor injury service after an emergency department was closed. The initial report revealed that it caused a 5% decrease in attendances at the remaining emergency department with a 24% fall in attendances for those living in the direct vicinity of the minor injuries service. Six months later the decrease in attendances at the emergency department was 6% and for local people was 14%. One unit reported that its creation caused an increase in workload in the whole system rather than simply diverting work away from the local emergency department.  

In a study of minor injury services in London using teleconsultations it was found that they were performed in approximately 3.6% of cases and most concerned patients with fractures. It was shown that the telemedicine allowed local decision making in the majority of cases and that over a four-year period the number of patients referred to either the general practitioner or the main hospital had halved from 75% to 38%. However, the study was not designed so that it was able to differentiate between the effects of telemedicine and the effects of increasing experience of the staff and the maturity of the service.  

As part of the national evaluation of NHS walk-in centres, Salisbury conducted a study of eight general practices, an emergency department and an out-of-hours provider close to each of ten walk-in centres in the year before and after the centre opened. There was a small decrease in emergency department attendances that was not statistically significant. In 2003 a series of new walk-in centres adjacent to Emergency departments was announced and will be analysed for their effect on emergency department attendances.  

Study of the walk-in centres in London by the Kings Fund, confirmed that they were developing links with the local emergency departments but there were still issues with direct referrals to admitting teams. The study did not look at the impact of the centres on the emergency departments.  

B (iv) - NHS Direct and Nurse Telephone Advice
NHS Direct was established in 1998 to provide healthcare information and advice to the public through a telephone helpline and associated on line service. It received 5.3 million calls in 2001-2002. Amongst its objectives were to decrease the numbers of attendances at emergency departments by giving advice to the public on appropriate (and alternative) sources of care, by handling out of hours primary care calls and by receiving non-emergency 999 calls.

By diverting advice calls to NHS Direct, emergency departments can save time for emergency department staff. One study showed of 979 diverted from an ED department to NHS Direct 59% of calls were given health information, of the remainder 28% went to ED, 1% were directed to 999 and therefore also potentially went to emergency department, 27% were directed to self care and the remainder advised to contact their GP in varying time scales. The study demonstrates that the work of 979 calls in a three month period was transferred from the emergency department to NHS Direct but the study cannot determine the change in workload.\(^9\) In another unit, the introduction of NHS Direct caused a reduction by 72.6% of calls for advice being dealt with by the Emergency Department, therefore freeing up staff for other duties.\(^{275}\)

A telephone nursing triage service was introduced in Quebec. Structured interviews were conducted with 850 patients who were waiting in either hospital emergency rooms or walk-in medical centres. Amongst those who were at the emergency centre, 56% were advised to consult a walk-in centre, 28% their family doctor and only 12% at the hospital emergency room. It appears that using the telephone system was significantly related to the duration of the health problem (over 2 days), a new health problem or being used as a walk-in rather than an emergency centre. It appears therefore that in Canada the advice given is only loosely taken.\(^{304}\)

Calls to NHS Direct were studied over a 24-month period in 3 areas of England and their associated GP co-operatives. During the study period NHS Direct received 68,500 calls from a population of 1.3 million, of which 22% were out of hours. There was no significant change noticed in the trend of use of emergency departments or ambulance services during this study period. There were only small changes in use of general practice from an increase of 2% a month before the introduction of NHS Direct to -0.8% afterwards, relative change of -0.29%, 90% confidence intervals, -4.2% to -1.5%.\(^{376}\) A similar system in Canada was studied and noted that few users of emergency departments make use of the telephone system (17%) and they only loosely follow the advice. Only 12.8% of those who had used the telephone advice system had been advised to go to the emergency department.\(^{304}\) Use of a telephone advice system in a Scottish Primary Care emergency centre resulted in an increase in referrals to emergency department from 1% of calls to 3% but did have benefits in primary care units with slightly more patients being dealt with solely over the telephone and fewer having a shorter wait. There was no statistical analysis in the study and some outcome measures were ambiguous.\(^{570}\) Reorganisation of out-of-hours general practice in Denmark brought about mandatory telephone triage by GPs and county based health centres. This change in system brought about an increase in the number of
people attending emergency departments but the continuing increase was constant and the regression model showed that it was not related to the reforms. Use of nurse telephone consultation calls can reduce the overall workload of general practitioners by 50%, whilst allowing callers faster access to healthcare information. It did not however show any significant change in the attendance rate at the local emergency department or in admissions and attendances at hospital, other adverse outcomes were not assessed.

If a nurse telephone triage is used rather than standard management of requests for same day referrals it can reduce the number of same day appointments with general practitioners, but results in busier routine clinics and a small but significant increase in out-of-hours and emergency department attendances.

A similar system now operates in Australia but evaluation of its effect on emergency departments is still underway by Curtin University of Technology. http://www.curtin.edu.au/health/index.htm
Primary Care – Conclusions

There has been a large amount of work demonstrating that significant numbers of patients attend emergency departments with non-urgent or primary care problems, although figures vary widely for a variety of service and methodological reasons.

Some hospitals have introduced General Practitioners into emergency departments but studies have not assessed the effect this has on delays.

Studies have shown that those who have good access to primary care are less likely to use the emergency department but equally that high users of primary care are also high users of emergency departments. American systems of authorising access, except in true emergencies, does reduce attendances but safety has not been demonstrated.

Walk-in centres and urgent care centres (e.g. minor injury services) have the potential to divert patients away from the emergency department, but this has not been demonstrated in studies yet. Similarly nurse manned advice lines, including NHS Direct, have not been shown to change the number of people attending emergency departments, although they have freed up staff time who previously answered such calls in emergency departments.

With the changes in provision of out of hours primary care, it is important that they are fully evaluated for their effect across the whole health care system, including the effects in emergency departments. Such studies needs to determine the impact of changes in primary care provision on emergency department attendances and also analyse new initiatives that bring together the provision of primary and secondary emergency care.

Key points

- There is no evidence around the effects on waiting times of general practitioners working in emergency departments.
- Primary care gatekeeping can reduce emergency department attendance but its safety is unknown.
- Walk-in centres and NHS Direct have not been demonstrated to reduce attendances at emergency departments.
### Table 4 - Section B Primary Care Interventions

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gadomski, Perkis, et al. 1995</td>
<td>Primary Health Care Paediatric Emergency Department</td>
<td>Cohort study  n=216 intervention - not authorised for visit  n=193 control - age match comparison</td>
<td>All children not authorised to emergency department care  ED Size: 17,500 p.a.</td>
<td>Diverting Managed Care Medicaid Patients  Referral to primary care</td>
<td>Only 57% saw their primary care provider following referral. No difference in subsequent ED use between authorised and non-authorised ED care. No adverse health outcomes were recorded.</td>
</tr>
<tr>
<td>Sjönell G 1986</td>
<td>Primary Health Care Emergency Department</td>
<td>Observational study  Study district n=44911 – study district  n=48749 – control district</td>
<td>All inhabitants  ED Size: NK</td>
<td>Primary Health Care Centre Establishment of Health Centre increasing primary health care resources by 50%</td>
<td>ED visits decreased 40%</td>
</tr>
<tr>
<td>Franco SM, Mitchell CK, et al. 1997</td>
<td>Emergency Department Primary Care</td>
<td>Cohort study  n=4,766 - study period  n=2,798 - control period</td>
<td>All children attending ED  ED Size: 4,766 p.a.</td>
<td>Primary Care Physician Access Improved 24-hour primary care access. Primary care gate-keeping</td>
<td>Significant reduction in ED attendance (10% to 7.6% - p=0.0005). Non-urgent visits reduced (41% to 8% - p&lt;0.00001).</td>
</tr>
<tr>
<td>Piehl MD, Clemens CJ, et al. 2000</td>
<td>Primary Health Care</td>
<td>Cohort Study  Historical control n=28663 medicaid patients  n=34,079 non-medicaid patients</td>
<td>Children aged 0-18 years Excluded: -children without ICD-9  ED Size: 54,742 p.a.</td>
<td>Decreasing ED Use by Medicaid Patients Ensuring children had their own GP with 24-hours access (Institution of Carolina Access Program)</td>
<td>Significant reduction in ED attendance for children on the program 24%/158 monthly rate per 1000 33.5 pre intervention to 25.6 post intervention (p&lt;0.001).</td>
</tr>
<tr>
<td>Study</td>
<td>Applicable to UK: Yes</td>
<td>United Kingdom</td>
<td>Survey</td>
<td>Control: No</td>
<td>n= 1,206 pre-introduction</td>
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<td>Stoddart D, Ireland AJ, et al.</td>
<td>569</td>
<td>Emergency Department Primary Health Care</td>
<td></td>
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<tr>
<td>ID</td>
<td>Domain</td>
<td>Study Design</td>
<td>Study population</td>
<td>Intervention</td>
<td>Findings/Conclusion</td>
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<td></td>
<td>Creation of a minor injury service</td>
<td>Decrease of 5% in attendances at local ED with a 24% reduction in attendances for those living in the direct vicinity of the minor injuries unit.</td>
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<tr>
<td></td>
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<td></td>
<td>Creation of NHS walk-in centre</td>
<td>Minor injury service attendance rate ratio increase 1.22 (95% CI 1.12 to 1.33) Less marked fall in ED attendances than in control area (rate ratio 1.17, 95% CI 1.03-1.33)</td>
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<td>Introduction of a nurse-led minor injury clinic (walk in service and telephone advice) Open 09:00-21:00hrs</td>
<td>Overall 5% reduction in attendances at local ED Large variation in attendance at local ED by postcode area.</td>
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</table>

Table 5 - B (iii) Walk-in Centres and Minor Injury Units
### Table 6 - B (v) NHS Direct and Nurse Telephone Advice

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Griffiths B &amp; Collier H 2000</strong>[^219]</td>
<td>Emergency Department</td>
<td>Observational Study Control: No N=979 callers</td>
<td>Patients telephoning the emergency department for advice - 3-month trial (July, August &amp; September)</td>
<td>Telephone triage Advice call to the emergency department redirected to NHS direct.</td>
<td>27% advised self-care 43% advised to visit General practitioner.</td>
</tr>
<tr>
<td>Applicable to UK: Yes United Kingdom</td>
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<tr>
<td><strong>Velsted P &amp; Christensen MB 2001</strong>[^602]</td>
<td>Primary Health Care</td>
<td>Time-trend study Historical control</td>
<td>Community population: 630,000</td>
<td>New out-of-hours general practice service including telephone triage by GPs and the setting up of county-based health centres.</td>
<td>Mean rate of contact increased significantly from 0.1722 (1988-1991) to 0.191 (1992-1997) (p=0.0002). Rise in emergency department attendances was already occurring and was not related to the reforms.</td>
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<tr>
<td>Applicable to UK: Yes Denmark</td>
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<td><strong>Lattimer VA, George S, et al. 1998</strong>[^314]</td>
<td>Primary Health Care Emergency Department</td>
<td>Randomised Controlled Trial n=7184 intervention n=7308 control</td>
<td>Patients using out-of-hours service during study times: Monday: Friday - 18:15hrs to 23:15hrs Saturday - 11:00hrs to 23:15hrs Sunday - 08:00hrs to 23:15hrs Serving population: 97,000</td>
<td>Telephone nurse led consultation service using decision support software.</td>
<td>50% of calls were managed with nurse telephone advice No increase in attendance at ED in 3 days following consultation Nurse phone consultations did not produce significantly more adverse outcomes than usual out-of-hours system No significant change in the attendance at local ED</td>
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<tr>
<td>Applicable to UK: Yes United Kingdom</td>
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<tr>
<td>Richards DA, Meakins J, et al. 2002</td>
<td>Primary Health Care Emergency Department</td>
<td>Interrupted time series (N=4685) n=3452 intervention triage n=1233 control standard management</td>
<td>All patients requesting same day appointment after offer of routine appointment by receptionist during study period.</td>
<td>Telephone advice service with computerised management protocols (six experienced nurses).</td>
<td>Significant increase in ED visits for patients in triage 0.033 intervention compared to standard management 0.010 (p&lt;0.001).</td>
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Applicable to UK: Yes
United Kingdom
CASE STUDY 2

Streaming to Primary Care

Patients attending the emergency department are assessed at the point of triage and a decision is made as to whether their needs are most appropriately met by emergency department medical staff, an A&E nurse or a member of the primary health care team (PHCT). An experienced member of the nursing team who also helps the patient to access the services needed or where appropriate, provides nursing care or treatment, or directs the patient to self-care.

Audit has shown that nurses are practising safely and making correct judgements. Waiting times for minor injuries rarely exceed 2-hours – patients treated by nursing staff are seen within minutes rather than hours. There is a reduced incidence of patient complaints and Nurse’s report increased job satisfaction.

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C. Emergency Department

The studies reported in this section are related to clinical, structural and procedural changes introduced in emergency departments. Literature has not been found on cultural attitudes and changes in emergency departments, which affect waits and attendances.

The NHS Service Delivery and Organisation (SDO) Programme has commissioned research to investigate organisational factors influencing waiting times in the emergency department which is due to report in May 2005:
(http://www.sdo.lshtm.ac.uk/pdf/access_mason_scientific.pdf).

C (i) - Registration and administration

A quasi-experimental design study comparing patients who were triaged and then went to reception or vice versa showed they were more likely to report to the reception in the first place and they reported a better understanding of this system. There was no case reported where patients in triage category 1 or 2 suffered an adverse outcome because of any delay with attending reception first. Door to triage time was however slightly reduced in the triage first, with 10 minutes then and 13 minutes if reception was undertaken first (p<0.001) It is unlikely that this change is of any operational significance.

One study looked at simplifying the registration process on entry to the emergency department. The changes involved use of laptops to enable bedside registration, which was undertaken simultaneously with triage and partial registration of only essential details before triage and a system to ensure full details were obtained later during a “waiting period”. These changes reduced the arrival to physician time from 42.3 minutes to 22.5 minutes with only 0.3% having incomplete registration. The study did not give details of methods and no statistical analysis was available to determine the significance of the change. Another unit reported a reduction from 25 minutes to five minutes for the registration process when undertaken at the bedside but methods and analysis were not reported and it appears this was associated with better patient tracking systems. Wireless laptops have also been successfully used but no papers were found undertaking full evaluation. Another prospective cohort study of bedside registration of all non-fast track patients found that this process had no effect on emergency department transit time for critically ill patients but did reduce time for other patients from 59 minutes to 42, 44, 50, 53 and 48 minutes in consecutive months (further statistical analysis was not available).

Getting patients to start completing their own records as part of the sign-in process was used at one New Jersey hospital. This was seen to decrease triage time and saved 10-15 minutes per patient on overall flow. The study methods were not described.

Staff in an American Level 2 trauma centre developed new admission forms. This reduced the documentation time from 22 minutes to 4 minutes. No details of the previous documentation were given but a sample of the new flow
Reducing Attendances and Waits in Emergency Departments

sheet showed use of tick boxes on a 2-page form. Another prospective randomised study used a series of templates in 1228 patients. There was no significant decrease in emergency physician total evaluation time with the use of templates. Templates may however improve the quality of notes.

A prospective study by Witt looked at the introduction of a transcription service. A direct observation time and motion study was undertaken measuring the documentation time. Dictation was notably faster than writing (155 seconds versus 220 seconds, p<0.0002) and the total productivity of the department improved by 3.8% (from 2.20 patients per physician per hour to 2.28, p<0.05). Legibility and completeness of notes also improved. Introducing compulsory transcription may not lengthen the patients stay. Another study compared traditional transcription via tape to voice recognition software in 47 sets of case notes. Accuracy was comparable (99.7 vs. 98.5%) and turnaround time was better with the voice recognition software (3.65 minutes vs. 39.6 minutes).

Use of computer monitoring of progress through the emergency department is feasible and undertaken by some units. Patient on-screen tracking systems have been described. Use of an electronic tracking board rather than a white board resulted in fewer patients waiting over 6-hours (4.4% vs. 3.7% but no statistical analysis) associated with improved patient satisfaction. Use of real time data is more reliable than staff perceptions of when an emergency department is becoming overcrowded. It is recognised that successful organisations have the information to act on changes in real time. Live information using statistical process control enables early decisions to be made. Electronic white boards have been used to improve patient tracking but their effects on waits have not been assessed.

Using a computer simulation it was possible to design a central transporting team of porters and nurse to help transfer patients on a hospital site. It was found to decrease delays but was not trialled in the emergency department. Requests were made using the IT system rather than phones with an average time to dispatch of 6 minutes.

In summary, the evidence in the area of registration and documentation is poor. There is weak evidence that bedside registration, self-completion of forms by patients and transcription of notes may accelerate the process in the emergency department.

C (ii) - Triage and initial assessment

Triage was introduced into UK emergency departments in the mid-eighties as a risk management tool to prevent patients with time critical illness waiting an excessively long time for care. A variety of 3 or 5 level triage systems are used around the world. The 5 level systems have demonstrated a high degree of accuracy and inter-rater reliability. In 1992 the government introduced the Patients Charter which stipulated that all patients “will be seen immediately and their need for treatment assessed.” The effect of this initiative was to isolate the triage nurse from the patient flow which Read cites as the main contributory factor in the resultant
increase in waiting times. Although others have stated it was due to the nursing time of triage being taken from patient care. Studies have claimed to demonstrate that triage reduces waits in the emergency department. However these studies have all incorporated the prioritisation component of triage with other interventions (e.g. test ordering). The effects of triage nurse ordering of x-rays and tests in discussed in section E (iii).

A study comparing patients who were triaged with those not triaged showed that patients in the triage group waited longer than those in the no triage group in all 4 of the priority categories but it was most marked in triage category 1 and 2 patients suggesting therefore that those in most urgent need may have had their care delayed by triage. Only 48% of the triage group had complete records. In another smaller study of triage it was shown that triage delayed the waiting time for non-urgent patients to see both the nurse and the doctor but the study did not look at urgent cases. In a comparison between 1986 without triage and 1988 with triage it was shown that time to see a doctor was unchanged, but time to an initial assessment was reduced. However the study did not present adequate data or allow comparison of the two years. In the second year studied the department saw more patients but staffing and training differences are not known. Others have argued of the important clinical safety net function of triage when there are delays in the system.

In redesigning triage in an emergency department, a process of advanced triage, one system was adopted which allowed the triage nurse to initiate diagnostic protocols for frequently occurring medical problems based on physician approved algorithms. These were developed for abdominal pain, eye trauma, chest pain, gynaecological symptoms, substance abuse, orthopaedic trauma, minor trauma, paediatric fever and paediatric emergencies. Following a comprehensive educational programme the advanced triage was initiated. After one year the evaluation was undertaken which showed that the average length of stay was found to be 46 minutes less than the patients who went through the standard triage system, with the greatest saving for those being in the urgent category where there was a saving of 76 minutes. The components of time where there was most saving was the patients’ length of stay after physician assessment, presumed to be due to the fact that diagnostic results were already available at this stage in the advanced triage group however this study had no statistical analysis and it is not clear how the random selection of 250 studied were selected. In another system of advanced triage, a triage nurse could initiate diagnostic protocols according to algorithms. In the emergency patients there was a time saving of 40 minutes in the total length of stay, in the urgent category there was a time saving of 74 minutes and in the non-urgent there was a time saving of 10 minutes. Overall, there was an average time saving of 46 minutes within the department against a normal total length of time of approximately 200 minutes.

Development of a specific mental health triage scale and its implementation showed that mean emergency waiting times and transit times were reduced and a reduced number of mental health patients waiting to be seen also occurred. This was accompanied by
education of both emergency department and psychiatric department with a greater understanding of each other's perspectives. A two-tiered trauma response was developed whereby the most severe trauma was seen by a surgical based trauma team, the next tier was an emergency medicine supervised trauma alert with senior personnel from the emergency department. Those patients who were categorised into the new (second) trauma alert group had a significant reduction in their length of stay by 139 minutes. Overall the length of stay was reduced from 289 minutes to 241 minutes. The system therefore demonstrated that those with urgent (as opposed to emergency or routine) care needs had their care times reduced by this new system. 

In summary, if the only purpose of triage is to prioritise patients then it may delay care, but if it adds extra value by initiating investigations or treatment then it may save time. It may however provide a clinical safety net at busy periods.

C (iii) - Triage Out

"Triage out" is the system whereby after people arrive at the emergency department they are redirected to an alternative source of care, usually from triage.

Emergency departments have traditionally offered care for all who present. However it is realised that many who present to the emergency department do not have emergency needs. By reducing the numbers of patients seen in the emergency department, then waits will reduce if resources are maintained. One way of reducing numbers being treated in the emergency department is to redirect those patients who do not have any emergency needs. Some disagree with this principle because it is considered that the patient has the perception of urgency or that emergency departments should act as a safety net. The Society for Academic Emergency Medicine has written a position statement on the ethics of triage and, in particular, on triaging out of the emergency department. If the principle of “triage out” is to be adopted then its acceptability to patients, its safety and its efficacy must all be assessed.

The willingness to wait for a clinic appointment rather than going to the emergency department was assessed for 6 conditions in 5 hospitals in 2757 patients. A third of patients were willing to wait in a non-emergency setting. Those most likely to be prepared to wait were older people and those without a regular primary care provider. It was found that 20% were willing to wait up to 24-hours and 6% up to 48-hours. The study looked at patients with conditions with potential for severe illness (abdominal pain, chest pain, hand lacerations, head injury and vaginal bleeding) whereas many of those who would be triaged out would have simpler conditions; this study may therefore underestimate the willingness to defer care. In one study 89% of GPs agreed that their patients should be sent back to their surgery if they attend the emergency department with a non urgent problem and 73% still agreed if the patient was attending for a second opinion.
In a randomised controlled trial, Washington et al., studied 156 patients who were referred to a next day primary care clinic according to criteria (all were abdominal, respiratory or musculoskeletal conditions). The self-reported health status of those deferred to clinic was no different from those seen immediately, although the power of the study would not detect a one day additional period of infirmity at home.

As a result of overcrowding a hospital developed a programme of referring certain types of patients not needing emergency care and sent them to other sources of care. In the three-year study 15% of patients were refused care and referred elsewhere. Letters and calls to referral clinics, 8 local emergency departments and the coroner's office identified no patients who had been grossly mis-triaged and only "insignificant" adverse outcomes were identified. Follow-up of 3,740 individuals triaged away was performed by telephone. This indicated that 42% of persons received care elsewhere the same day and 37% within 2 days and 22% decided not to seek any other medical care. A group of 1.6% sought care at other emergency departments for their minor complaints.

But another study showed that up to 1% of patients suitable for triage out were subsequently admitted. Use of standard triage systems with acuity as the determinant is not sufficiently sensitive to identify those needing emergency department care and one third of those designated suitable for triage out would have been inappropriate. Referral to primary care did not result in subsequent less usage of emergency department.

Triage out of the emergency department by a nurse showed that 15% were referred elsewhere. No significant adverse outcomes were detected by telephone follow up and coroners' notes review. Only 16% sought care at another emergency department.

A prospective study looked at the use of a screening examination by a triage nurse to determine whether patients were eligible to be seen in the emergency department. Patients with vital signs within a specific category or with one of 50 minor chief complaints were refused care in the emergency department and referred to off-site clinics. In the first 6 months 19% of ambulatory patients were referred off-site, 84% were referred to off-site non-University clinics and 15% were referred to a University affiliated hospital-based clinics. Follow-up letters and telephone calls identified no patients who needed re-triage to an emergency Department. Of 41 patients who returned to the emergency department within 48-hours none had a deterioration of their condition. The authors conclude therefore that it is safe to selectively triage people out of the emergency department to reduce the workload within the department.

In a study of paediatric patients a study in Memphis showed that 61% of the 748 studied were triaged out of the emergency departments. 31% of these were sent to community health centres, 17% to physician's offices and 13% advised on self-care. There was a high rate of recovery but the significance of this cannot be judged because of absence of any comparator group. Kelly demonstrated that emergency department attendance could be
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Reduced by 27%, or 68% of non-urgent cases, using a triage out system. In a Swedish study, the triage nurse redirected any patients with a non-urgent problem to more appropriate care, 27% were considered appropriate for care elsewhere and 84% of patients agreed to referral following the advice. Patient satisfaction with such a system was equal to that in a normal emergency department referral pattern. In another Swedish study 38% of adult attenders were triaged out, follow up by looking at emergency department notes revealed no adverse outcomes. A greater number could have been triaged out if there had been increased capacity in primary care. There was however, no follow up of other adverse outcomes.

Driscoll concluded that attempts to divert patients with non-urgent illnesses from the emergency department were generally a failure because of the differences in the language and culture of health care between doctors and patients. In summary, studies show that 15-27% of patients can be triaged out with only 1% dissatisfied but only a third may be willing if asked. General practitioners were happy with the concept in the one study found. However up to a third may be triaged out inappropriately, up to 1% may be subsequently admitted, and up to 1.6% may attend another emergency department but many studies reported no adverse outcomes. There were however no prospective studies in the UK of such systems.

C (iv) - Co-payment and financial systems
It is recognised in America that there are significant variations on how people use emergency departments and this is associated with their financial responsibility for “unnecessary use”. Those with responsibility for partial or full payment were associated with less non-urgent attendances at the emergency department. The percentage of non-urgent cases varies from 61% with welfare insurance to 13% with Medicare insurance. But no causal link has been established. Many co-payment schemes are linked with primary care gate keeping, which has already been discussed in section C (iv).

A prospective survey was performed after the introduction of a new fee for service managed care programme in a paediatric emergency department. A convenience sample of 200 patients less than 2 years old receiving primary care at the walk-in centre were enrolled. Six months after the introduction of the fee for service paediatric emergency department visits for minor illness had decreased significantly for the fee for service group (68%, p=0.001) but not for the capitated plan group (82%, p=0.92). However at one year the utilisation rates were similar to those of the initial phase, suggesting that introduction of a new plan temporarily led to fewer visits to the paediatric emergency department for minor illness but within one year had reverted to their prior utilisation habits.

Selby et al., examined the use of emergency department before and after the introduction of co-payment systems by Kaiser Permanante, a control group not affected by co-payment systems was utilised. After adjusting for age, sex and socio-economic status the use of emergency departments declined by 14.6% more than the control groups (p<0.001). Visits for other urgent care did not increase. The decline was most marked in the non-emergency cases. The study did not detect any adverse outcomes but accepts the study design was limited in this respect and its ability to detect changes in disadvantaged groups. Mortality was not changed nor was the number of potentially avoidable admissions.

In a randomised trial of 3973 patients, O'Grady found that co-payments reduce attendances but the size of the payment seemed to have little effect but some reduction in attendances occurred across all severity groups, indicating the potential risks of such systems. Without any cost sharing the attendances for less serious diagnoses increased three times as much as visits for more serious conditions. With no cost sharing, emergency department visits for less serious diagnoses increased by three-fold.

It has been reported that introducing a system of free payment for care if the wait to be seen was more than 30 minutes resulted in 67% of patients being seen and treated within 2-hours, however details were not given of the interventions behind this although fast track systems were included. In New Jersey a system of ‘be seen under 30 minutes or your money back’ was instituted and acted as a catalyst to several changes, including reducing triage time. The initial assessment may however be short but does not start the process of test ordering.

In Ireland, a system was introduced whereby those not eligible for free health care were given financial disincentives (IR£6) to attend emergency department
before the general practitioner for minor conditions. A retrospective analysis revealed that this resulted in a small reduction in fee paying patients attending for non-emergency conditions (a fall from 45.3% to 44%; 95% confidence interval -0.6—1.9%) but the overall workload of the emergency department was unaffected.\(^{379}\)

Requiring pre-authorisation for reimbursement of emergency department care has now become common practice with managed care organisations in the United States. A review was undertaken to assess whether adverse outcomes occurred because of this. Of 143 cases reviewed 29 cases were found which had been denied emergency department payment. Adverse outcomes were found in four cases (14%) including meningococcal septicaemia, ruptured ectopic pregnancy, hypoglycaemia, cardiac arrest and ruptured duodenal ulcer and there were also four cases at increased risk and 21 cases of near miss. Those at increased risk included epiglottitis, myocardial infarction, ruptured ectopic pregnancy and delayed treatment of septic arthritis. Near miss included a large variety of conditions, but in particular various sources of sepsis and intra-abdominal bleeding and psychiatric conditions. It was therefore concluded that in this small study there were a significant number of adverse outcomes related to managed care gatekeeping.\(^{630}\)

However a study of patients seeking emergency care because of myocardial infarction did not have delays because of modest ($25-100) co-payments. The length of time from onset of chest pain to presentation was no different in those having to pay co-payments than those not (135 vs. 137; 95%CI of difference – 19 to +16 minutes). This study only looked at people enrolled in one health maintenance organisation.\(^{338}\)

Co-payment systems are often associated with systems of preauthorisation for attending the emergency department which have been discussed in section C (iv).

Financial incentives have also been applied to emergency departments, in Australia a system of bonus payments to emergency departments for fulfilling their triage related waiting time targets was shown to produce a sustained change over 3 years. The number of occasions when ambulance bypass occurred decreased from 600 to 100, although as there were set criteria for this it may have been related to a change in threshold. However the number of patients waiting longer than 12-hours showed a non-significant decrease.\(^{71}\)

In summary, co-payment systems have a demonstrable ability to reduce attendances. The greatest impact is in non-urgent attendances at emergency departments. However, there is also evidence that it reduces attendance of urgent cases and one study suggesting potentially life-threatening cases may be diverted away, therefore the safety of such systems must be questioned. Use of free care if delays occur has been used as an internal incentive within the hospital to encourage more rapid care.

C (v) - Fast track for minors

Canadian health technology assessment commissioned a review of fast track systems\(^{628}\) published in 2003.
It concluded that emergency department fast track systems appeared efficient, cost-effective, safe and satisfactory for patients. Low acuity patients were confirmed as being seen quicker.

It has been suggested that emergency departments experience congestion mainly when staff are diverted to care for high acuity patients. Clinical priorities often mean that those needing the earliest care often need the longest time interventions. If a system slows down because of increased workload or inadequate resources (e.g. staff or cubicles) then those with the lowest acuity will start to experience prolonged waits. According to operations research theory average waiting time in a system utilising one queue can be reduced by attending to the users with the shortest time requirements. Fast track systems were therefore developed to ensure that certain groups have their care expedited. The minors fast track is an organisational system designed to prevent excessively long waits for those with lesser injuries and minor illness.

Fast track systems for “minor” patients have been described for many years. In 2003, the NHS Modernisation Agency encouraged the national use of fast track systems using the “see and treat” principles (also available at http://www.modern.nhs.uk/esc/8237/See&Treat.pdf).

It is not known how widely this has been adopted, but it is known that there are many different models of staffing and the number of hours that fast track systems operate is highly variable (Dept of Health, unpublished data 2003).

The key principles of all these systems is that ambulant patients with non-urgent conditions are treated in a dedicated area by dedicated staff with the competence to make discharge decisions and wherever possible, one person should undertake this care to prevent multiple handovers of the patient between professionals.

The introduction of see and treat has provoked great debate suggesting that its introduction was a management decision, without scientific assessment, risks senior staff burn out and could delay other cases, although this was disputed. American experience of staff, who were initially concerned that quality of care would diminish, was that they changed to support it as they saw satisfied patients and received more compliments.

Modelling using a serial subtraction of various interventions showed that 29% of patients were discharged after clinical assessment but without any specific treatment or investigation. The methodology has the potential bias of using routinely coded data. Of these patients 15% were conveyed by ambulance, 3% had already consulted primary care and 11% were children.

A UK study, in 1993, using a consultant at the triage desk demonstrated that 34% were given advice only or a simple treatment and discharged from the triage room, with an average time in the department of less than 5 minutes. The average time for all the patients triaged in this way was “about 50 minutes”, compared to one hour eight minutes without the consultant at triage. This study was only a small sample and data
was not described in detail with little statistical analysis.\textsuperscript{74}

In Copenhagen it was noted that 30\% of attendances could have been dealt with by an “older and more broadly educated colleague” without needing any further investigation or treatment.\textsuperscript{435} A UK study using routinely collected data showed that when a separately staffed stream was developed for ambulatory patients the risk of waiting more than one hour to see the doctor decreased by 30\% and this was increased to 50\% with increased presence of consultants in the department but the generalisability of the study is limited by the mainly trauma casemix of the unit studied.\textsuperscript{109}

An American interrupted time study looked at positioning a senior doctor at the triage desk. This doctor was additional to normal staffing. This person expedited care by rapid evaluation for diagnostic studies, basic therapeutic interventions and by moving serious patients to appropriate areas. They were not provided with detailed instructions or protocols. Comparing similar days when faculty triage was undertaken with those not there was a significant decrease in total time in the emergency department of 82 minutes against the original background of 445 minutes across all patients (p=0.005). The savings were seen in both admitted and discharged patients. The other staffing on these days was not significantly different. It was also noticed that the number of patients leaving without being seen halved to 8\%. The changes could however be partly due to the increased staffing level as well as the system change.\textsuperscript{419}

In a randomised trial whereby fast-tracking was undertaken on alternate days patients in specific groups were designated to be treated by a fast-track team. When the fast-tracking was not undertaken then the staff were used within the emergency department. The median length of stay was 36 minutes for fast-tracked patients compared with 63 minutes for the control group. The application of fast-tracking decreased the emergency department length of stay and improved satisfaction for these patients. There were no complications or hospitalisations to any other hospital.\textsuperscript{292}

A randomised controlled trial introduced 2 extra staff who were randomised between normal emergency department duties and running a rapid access clinic. When all patients passing through the emergency department were analysed the waiting times to be seen by a doctor showed no difference in triage category 2 and 3 patients, with a difference of several minutes for 4 and 5 patients. The time spent in the emergency department showed no difference in Category 2 and 3 but showed a 20-25 minute advantage in categories 4 and 5 for those using the rapid assessment clinic.\textsuperscript{14}

In another system, a rapid assessment team was developed whereby a doctor and triage nurse saw the patient before the expiry of their waiting time according to national triage. The doctor would undertake a rapid assessment, undertaking a focused history and examination, deciding on early investigation and treatment. If the patient was unstable they would be passed over to another doctor. In an interrupted time series study, using this system resulted in more rapid initial assessment of the
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Patient across all triage categories (59% within target compared to 39% when no team was working, p<0.001) except Category 1 patients. The median length of stay was unchanged.\textsuperscript{216}

In a British unit where triage was replaced with a direct consultation with either nurse practitioner or senior doctor a study demonstrated an increase in the patients seen within one hour from 52% to 75% without an increase in staffing. There was no analysis of the time other patients spent within the department.\textsuperscript{532}

One hospital noted an improvement of 75 minutes in the average length of stay after introducing a fast track system for patients not requiring extensive treatment but the paper gave insufficient information to determine if this is generalisable.\textsuperscript{472} A service evaluation in North Tyneside used a before and after design to assess a system whereby low priority patients were assessed using decision support software. They demonstrated that of 2696 emergency department attenders, 27% could be discharged home after this assessment in an average of 36 minutes the overall time for all patients in the emergency department was reduced by an average of 36 minutes. There was no detailed statistical analysis or description of the two groups so it is not possible to assess the generalisability or applicability of this study.\textsuperscript{392}

An American study showed that patients were very satisfied with care rendered by physicians' assistants in a fast-track system and that few patients would be willing to wait longer in such a setting to be seen primarily by an emergency physician.\textsuperscript{112} An American study of 126 patients demonstrated that overall satisfaction was more strongly associated with perception that the wait was shorter than expected than with the actual estimated wait. Efforts to improve emergency department patient satisfaction may therefore be better focused on improving the patients' perception that waits intervals are short rather than simply just shortening the waiting intervals per se.\textsuperscript{244}

An interrupted time series study using the classical PDSA approach developed a set of guidelines for fast tracking of non-urgent cases over several cycles and had dedicated registration nursing and medical staff. This reduced mean total time for non-urgent patients in the emergency department from 5 hours 57 minutes to 1 hour 47 minutes but no tests of significance were undertaken. No assessment was made as to the effect on other patients in the emergency department.\textsuperscript{153}

A study in a paediatric unit looking at a fast-track for ambulatory paediatric patients showed an average length of stay of 28 minutes shorter in fast-track than in the main emergency department. The groups were comparable for age, clinical condition, ethnicity and insurance status and vital signs but were not randomised; the fast track did not operate at night when illness profile and parental anxiety may differ. Fast-tracking was undertaken by a Board Certified paediatrician with a registered nurse, rather than emergency department staff.\textsuperscript{228} In another study, Simon examined a paediatric fast track system for triage accuracy and turnaround times. During a 9-month period 2,243 patients in the fast track system had a quicker turnaround time than the aggregate of all patients seen in the emergency department (107 [95% confidence interval 0, 245] minutes versus 149 [95% confidence interval 0,
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341] minutes, p<0.01). Their total turnaround time was also less than that for patients with similar acuity levels seen during the hours that the fast track system was not in operation (120 [95% confidence interval 0, 300 minutes], p<0.01). Only 63 of the 2,243 (2.8%) patients initially assigned to fast track were found to have higher acuity levels than suspected at initial triage and all cases were appropriately cared for in the fast track area. The study did not however use a matched control group, so findings must be limited for this reason.337

Saywell undertook an economic evaluation of fast track systems and showed that in his hospital the system did not cover all its costs but the systems still continues. This is likely to be because it was developed for reasons other than cost-effectiveness. However, this analysis undertakes a conservative approach to analysis of costing with many employment costs considered as truly variable costs for the emergency department. Equally some of the time estimates appear low e.g. two minutes to triage a patient. This study was in a centre where only 8% went through the fast track system, much lower than in other studies referenced above. The study also does not account for the beneficial effects that a fast track system may have on the overall functioning of the emergency department. Therefore this article may give an outline to how people should consider cost effectiveness of fast track systems but does not supply a generalisable answer.336 A Saudi Arabian study diverted medical staff to the triage area. This reduced the mean waiting time from 58 minutes to 25 minutes (p<0.005) but the paper did not allow comparison of the control and study groups and it did not look at the effect on other patients from whom the doctor was diverted.346

Many of the studies supporting minors fast tracking have significant weaknesses but all demonstrate improvements in waiting times. None of these studies showed any adverse effects from introducing fast track although many did not look at the effect on other patients in the emergency department. Those that did consider this aspect found no longer waits in the more major cases. Another potential disadvantage of such systems is stated to be the potential for increasing attendances of minor cases as access is improved. There is no evidence to support or refute this. Although some departments studied instituted fast track with no extra resources, it is unlikely that this is generalisable. However, studies above demonstrate that waits may be more effectively reduced by investing extra staff in a fast track system than in simply increasing the overall workforce.

There have been many studies of fast track systems, including several randomised controlled trials, however none of these have been in the UK system. The evidence suggests that fast track does reduce waits of non-urgent patients and are safe and satisfactory to patients. Various models of fast tracks are available using medical and nursing staff. There is a need to assess the optimal system and which is effective in the UK system.

C (vi) - Other fast tracks

Fast track systems have also been developed for patients with fractured
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...neck of femur, strokes and acute myocardial infarction (see section F (iii) of this chapter). There are no quality studies of these fast track systems. The three studies found all have major flaws and do not show what effect they had on other patients or on the emergency department as a whole.

Fast-tracking protocols were developed for patients with hip fractures. A review of 104 patients showed in the first phase that many patients spent more than 2-hours in the emergency department. After implementation it showed that the transfer time was reduced from 2-hours 45 minutes ± 57 to 1 hour 32 minutes ± 41 minutes (p<0.001).

Another system of fast-tracking with proximal neck of femur resulted in a decrease in the admission time from 4.5 to 2.5 hours, however patients were excluded if there was no identifiable orthopaedic bed which would then result in an increased time of just over 4 hours but subsequent non-availability of beds caused the length of stay of patients to increase by 40% in one of these studies, clinical consequences were not mentioned. In a similar system Finlayson found the major delays were in performing the x-ray and junior orthopaedic staff resisting admission directly to the ward.

A group of 50 patients with hip fractures admitted to a hospital in Manchester via the emergency department were studied prior to the introduction of a fast-track hip fracture protocol. The 16 patients admitted via emergency department following the introduction were then studied. The new protocol included a trauma co-ordinator who liaised with emergency department staff to reduce the transfer times. The system only operated during daytime Monday to Friday. On arrival of the patient the co-ordinator was informed and ensured that all radiological and haematological investigations were done promptly and that admission to the ward was undertaken rapidly. The orthopaedic admitting team would then see the patient on the ward. Introduction of this new system reduced the median emergency department to ward transfer time by 43% from 7 hours 4 minutes (range 2 hours 46 minutes to 14 hours 50 minutes) to 4 hours (range 1 hour 8 to 11 hour 58, p<0.0001). There was no significant change in the emergency department to ward transfer time for patients transferring out of hours when the co-ordinator was not present.

Fast Track for Strokes

An American study instituted a system whereby members of a stroke team were all given pagers that were activated by the emergency department staff as soon as the patient arrived in the department with a stroke. They prospectively studied the response time and the treatment interval for patients who were treated using this system. It was only a small study with only 12 patients available for analysis, representing only 12% of those patients as seen in the emergency department for stroke during the study period. Mean time to evaluation by the stroke team was less than 5 minutes and mean time to treatment was 30 minutes. This was a significant improvement (p<0.05) in consultation times but the difference in time to treatment completion was not significantly improved. They did not study the total time in the emergency department for stroke during the study period. Mean time to evaluation by the stroke team was less than 5 minutes and mean time to treatment was 30 minutes. This was a significant improvement (p<0.05) in consultation times but the difference in time to treatment completion was not significantly improved. They did not study the total time in the emergency department for stroke during the study period. Mean time to evaluation by the stroke team was less than 5 minutes and mean time to treatment was 30 minutes. This was a significant improvement (p<0.05) in consultation times but the difference in time to treatment completion was not significantly improved. They did not study the total time in the emergency department for stroke during the study period.
for stroke patients. In this institution it was found that use of the emergency department as the site of treatment abbreviated the care.590

Fast track systems for fractured neck of femur patients and those with strokes have been described and evaluated, however no controlled trials have been undertaken to determine their effectiveness or their effect on other patients utilising the Emergency Department.

A fast track system for psychiatric patients whereby a small cadre of nurses were specifically trained to undertake psychiatric assessment resulted in those patients 44% less time. Details of the study and its design were not available.162

C (vii) - emergency department clinical changes

A wide variety of changes to clinical procedures were found in this review. However time in the emergency department was a secondary measure in most studies with clinical outcome as the primary measure. Thrombolysis, heart failure, DVT and hospital at home issues are covered separately in section F of this chapter.

Use of three care pathways in paediatric conditions presenting to an emergency department in an interrupted time series study showed that admission rate could be reduced three-fold to 9% with a two-fold reduction in length of stay. The waiting time to see a doctor in the emergency department was also reduced by 29 minutes. The impact on the total time in the emergency department was not calculated.62

Development of a clinical pneumonia pathway resulted in a decreased time to antibiotics. This was studied using a retrospective chart review of groups 3-months prior to the pathway implementation, 9-12 months after implementation and 33-36 months after implementation. The mean time from arrival to antibiotic administration decreased from 315 minutes pre-pathway to 167 and 174 minutes one year and three years post-pathway introduction respectively (p<0.001) with an increase in the number of patients receiving their antibiotics within the emergency department. Hospital length of stay was also decreased, as was mortality.357 Various other studies have shown that protocols can reduce the time to antibiotics in children, reducing from 142 minutes to 105 minutes in one study526 and from 5.0 hours to 3.2 hours (p=0.04) in another study.385

A randomised controlled trial was undertaken in a paediatric emergency department whereby children with simple lacerations either had topical anaesthetic applied at triage or a placebo. Those who had a topical anaesthetic (n=161) had a reduced median treatment time (77 versus 108 minutes; 95% confidence interval of 15 to 47 p=0.0019). There was no difference in any other clinical outcomes but only 40% of cases who had topical anaesthesia applied required suturing.439 Sedation with ketamine or midazolam increases the length of stay for patients requiring minor laceration repair.318 Another retrospective study of 120 patients demonstrated an increase length of stay of 17.1 minutes (p=0.03) for those having midazolam sedation.390 In a study looking at the use of oral
diazepam, oral and intranasal midazolam for the sedation of children under six for laceration repair it was noted that oral diazepam resulted in longer recovery time (53.9 +or- 16 minutes compared to 48 +or- 12 minutes) when compared with intranasal midazolam. However this was not clinically significant.171

A study of stapling of lacerations involving 45 patients having stapling and 43 having suturing showed that there was no significant difference in the study groups but that stapling resulted in shorter wound closure times (65 versus 397 seconds, p<0.0001) and overall shorter times for wound care and closure (395 versus 752 seconds, p<0.0001). It was also noticed to be less expensive.280 Use of tissue adhesive is now widely undertaken but time savings have not been published.

Use of a burn triage protocol such that immediately on arrival they were triaged directly to an out-patient burns clinic or a burns centre without registering in the emergency department meant that 73% of patients could be directly referred to the burns centre. The average emergency department visit time for these patients reduced to 44 minutes in those going through the emergency department subsequently.50

The use of inhaled corticosteroid after emergency department discharge is associated with a significant reduction in the risk of subsequent emergency department visits for patients with asthma. Patients using inhaled steroids had 45% fewer return visits, adjusted relative risk of 0.55 95% CI 0.44-0.69.539 A Cochrane review has confirmed that a short course of oral corticosteroids following assessment for an acute exacerbation of asthma significantly reduces the number of relapses.483 The type of therapy used in asthma may affect the length of stay in the emergency department. One study compared continuously nebulised albuterol with albuterol plus ipratropium in a prospective randomised double blind placebo controlled trial. The patients given the combination therapy had a greater improvement in their respiratory flow rate and the odds ratio for admission with combination therapy was 0.88 (95% confidence interval, 0.28 to 2.8). The immediate length of stay in emergency department was 35 minutes shorter for those receiving combination therapy (216 versus 245 minutes, p=0.03). However when adjusted for the initial peak flow there was no statistical significance (p=0.26).

A comprehensive programme of emergency department staff education, aggressive medication interventions, use of standard regimes, patient follow-up and patient education resulted in a decrease in emergency department utilisation of 25% but data did not specify any other figures or undertake any analysis.352 Another similar programme in children included attendance at a specialist clinic and caused a non-significant reduction in emergency department attendance (32 vs. 46 patients reattending, p=0.11) but the mean number of visits was significantly less (0.1 vs. 0.3, p=0.01).238

Use of preventative medication in a migraine management regime has been demonstrated to reduce the use of other migraine medication as well as reducing
number of visits to physicians' offices and emergency departments.  

C (viii) - Frequent attenders

The characteristics of those attending emergency department have been described in chapter 1. Of particular interest is a small group of patients who account for a disproportionate number of emergency department visits. Studies suggest that 3-4% of patients may account for 12-20% of the emergency department visits per annum. Understanding the characteristics of these patients may help to reduce their attendances. A Swedish study interviewed ten adult patients who had visited the emergency department 6–17 times in the previous 12-months. The frequent emergency department visitors perceive pain or other symptoms as a threat to life or to personal autonomy and revealed difficulties with adverse life circumstances and medical, psychological and/or social problems, including alcohol or other substance misuse. Occasional referrals from the emergency department to a psychiatrist seem not to lead to any continuous change in the patients' health seeking behaviour. Satisfaction with care becomes adversely affected when the patients perceive that the staff classifies their use of the emergency department as inappropriate or when their symptoms are belittled.  

An American study which undertook cross-sectional intake surveys, medical chart reviews and telephone follow up looked at the predictors and outcomes of frequent emergency department attendances. A total of 2,333 records were completed (67.5% of potential total). The demographics predicting frequent use included being a single parent, single or divorced marital status, high school education or less and income of less than ten thousand dollars in 1995. Health status predictors included hospitalisation in the preceding 3-months, high ratings of psychological distress and asthma. Health access predictors included identifying an emergency department or hospital clinic as a primary care site, having a primary care physician and visiting a primary care physician in the past month. Choosing the emergency department for free care was the only health preference predictor of heavy use. Illness severity measures were higher in the frequent visitors but they were not an independent predictive on the multi-variant model. The outcomes correlating with heavy use included increased hospital admissions, higher rates of emergency department return visits and lower patient satisfaction.  

An American study compared 100 frequent attenders (those attending 4 plus times in one year) with a similar number of non-frequent attenders who were matched for sex, age and triage category by undertaking interviews in the emergency department. The results showed that frequent attenders also made more visits to their General Practitioner in the past year (median of 12 versus 3). They also made more use of public health nursing, community welfare services and social work, addiction counselling and psychiatric services, as well as spending more nights in hospital than the control group. In the general health questionnaire their scores were higher, indicating poor mental health and they also had lower levels of social support.  

A retrospective study of adults with more than 10 visits to a University Hospital
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emergency department showed that 76 patients made over 1,000 visits, corresponding to 1.2% of the total workload. Of these, 46% had been evaluated in 3 or more emergency departments in the year's study. Medical problems accounted for the majority of their emergency department visits in 55% of people. Of those making more than 10 visits in one year 58% had psychiatric or substance abuse problems. Of a teaching hospital, 134 frequent attenders completed a survey, 73% did have a usual source of medical care. Only 27% said they had difficulty in seeing a primary care physician. Existing or recurrent medical problems were cited as the reason for the visit by 60% by the study group. 72% of responders believed their chief complaint was moderately or very serious, 59% thought they needed immediate attention. Participants had a 28% admission rate to hospital, compared with 16% for the general emergency department population. The study group was more likely to be black patients who have medical aid as their primary insurance and less likely to have workers’ compensation insurance.

In one interventional trial for frequent attenders, patients who were admitted 3 or more times in a year were recruited to a prospective study whereby a personalised healthcare programme was established. This resulted in a 45% decrease in admissions and a 50% decrease in visits to the emergency department. Patients attending another emergency department of one hospital more than 5 times in a year were assigned to a psychiatric social worker who used a case management model of care. The median number of emergency department visits decreased (5 vs. 9, p<0.01) as did emergency department costs and general hospital costs. Alcohol use, drug use and homelessness all decreased in the intervention group. The study was a time series with no control group, so could not account for the natural history of such cases. Another study using the case management approach to frequent users showed that those in the study had a combined emergency department usage of 616 visits (median 26.5) and this reduced to 175 (median 6.5 visits after the intervention, detailed analysis was not described. In this study case management was decided by a multi-disciplinary group and was co-ordinated by a social worker. However another case management approach in a randomised controlled trial of patients, with more than 10 visits per year, did not show any improvement. However this intervention was simpler and mainly consisted of an established plan of care within the emergency department, after a psychiatric or social work intervention.

A study in Canada of the homeless who could communicate were randomised to receive compassionate care. 133 consecutive adults were randomly assigned. Following the intervention there was a 28% reduction in emergency department attendances (95%CI 14-40) and a decrease in return rate of 20% (95%CI 3-30).

Older people (>65years) wait longer in emergency departments and are at particular risk of reattendance with 9-16% readmitted within one month, 27% in 90 days and 33% within 6-months. Simple triaging screening tools have been developed to detect older emergency department patients who are at increased risk of emergency department use. A presence of 2 or more risk factors from a list of 5 items demonstrated a relative risk of 1.7 (95

66
Reducing Attendances and Waits in Emergency Departments

A concurrently controlled trial of 543 patients in an American system compared usual primary care with care supplemented by social care home visits, education and development of a risk reduction plan, followed by regular monitoring by a nurse and social worker, with at least monthly team meetings. This resulted in static admission rate for the control group and an increasing rate of 0.34 to 0.52 (p<0.05) in the control group (thought to be the natural history of the age group); there was also a significant fall in visits to the doctors surgery. It has been suggested that more involvement by geriatricians in emergency department care may decrease attendances.

Miller undertook a non-randomised cohort study of 770 patients (after many exclusions, with 375 in the study and control groups) whereby a geriatric nurse clinician undertook a 30 minute structured interview and then advised on future care and arranged appropriate follow up. There were trends for fewer subsequent visits to emergency departments (0.26 intervention vs. 0.39 control, p=0.06). However time in the emergency department was increased (292 mins vs. 231, p=0.001). No other health outcomes changed. The authors suggested that this might be because presentations at the emergency department were for late stage disease that is less amenable to treatment.

Use of a dedicated falls and syncope day case unit was assessed in Newcastle. In a retrospective analysis, the opening of the new unit resulted in a decrease in length of stay of patients with falls from 10.9 days to 2.7 days and lower emergency activity. A system of reviewing elderly patients medication every six months by a pharmacist and giving education, reported by Catellier et al., resulted in a decrease in emergency department attendances and after correcting for other factors the risk was reduced by 23% at six months (p=0.08) and 58% at twelve months (p=0.001). The study was a time series with no control group without intervention. It was not clear how patients were enrolled but only included those with a low income and it excluded some people because they were members of a small racial minority.

Social care interventions in the emergency department have been described in section C (ix).

Sending a series of letters to parents of children who regularly attended emergency department for acute illness had no effect on subsequent attendance. Another study supplying parents with pamphlets and video material about common illnesses and injuries was utilised to attempt to reduce attendance at the emergency department. No effect was demonstrated in the population of 118 interventions compared to a control group.

Other interventions and studies about frequent attenders relate to those with chronic disease and older people and are covered in sections C (ix), D and F.
C (ix) - Social Care in emergency department

As well as its effect on delayed discharge of care (see section H), the role of social services can have a direct effect within the emergency department. The impact of social care on emergency medicine has recently been summarised, the authors highlighted that most of their conclusions were based on cumulative small studies. The aim of projects to introduce social workers into emergency departments is to facilitate safe discharge home either directly from emergency department or following admission. The use of social workers in emergency department is seen as positive by patients and staff.69

Brady et al.,49 have demonstrated that elderly patients with unmet social needs are commonly encountered in Emergency departments. 16.9% of patients over 60 years had social needs and half of these were not recognised by the physician. UK studies have recognised that there is inadequate social screening of patients.48 These patients had higher reattendance rates. Graffeo et al.,214 suggested that a simple screening tool (only two questions) can detect high risk elders, who have unmet social needs. Early discharge can be facilitated by undertaking a questionnaire on admission which resulted in earlier referral to social work and other support services.416 A Scandinavian study revealed an extra 33% of patients whose social needs had not been recognised, identified by use of telephone follow up.412 Although this was not repeated in an Israeli telephone follow up study.559

In a French study47 in an inner city hospital, 1.2% of all attenders at the emergency department, representing 6.85% of admissions, required a social intervention. This resulted in housekeeping help (34.5%), arranging residential/nursing home care (28%), help to disadvantaged groups (23.5%) and help with health insurance (10%). In 82% of cases seen the intervention resulted in an alternative to hospital admission. This implies that 5.6% of all admissions were preventable. A Canadian study by Boyack et al., demonstrated that 11.6% of emergency department patients needed social work assessment and that 5% of admissions could have alternatives to admission if seen by a social worker. It also demonstrated a decreased rate of non-urgent attendances but the study is limited by its small size and lack of a control group.47 Use of two teams, one based in the community and one based in the hospital, which were based in the hospital, which were based in the emergency department was aimed to facilitate home care. The authors reported reduced length of stay (1.7 days vs. 6.3%) and readmission rates (1.2% vs. 1.5%) but no statistical analysis was reported.237

Gordon demonstrated that social workers covering the emergency department 24-hours per day in an US emergency department can be economically beneficial, with greater advantages in larger departments, when looking at decrease in return visits, prevention of admissions only for social reasons and saving in other staff time.210 The applicability of this study to the UK is limited by the variation in costing healthcare.

One UK study concluded that the presence of a social worker provided
care to a previously ignored group and helped relieve medical and nursing staff time. The study had no control group and purely measured numbers of intervention and no outcomes. However a trend to increasing referrals resulting in social worker support and decreasing use of community care services was noted.

The patients seen by social workers in an emergency department were older and more acutely ill than the other attenders at the emergency department, those most commonly seen were the elderly, adolescents and children under 5 years. They spent an average of one hour with each patient. This study also noted a reduction in the demands on medical and nursing staff to arrange home care, nursing home placement and other social services facilities.

Telephone follow up of patients has been shown to reveal inadequacies in home support for elderly people that may require simple advice, referral to the GP or a visit. It is recognised that 6% of elderly patients discharged from emergency departments are admitted within 14 days after deterioration. This system does therefore have potential for initiating interventions that could potentially decrease the number of return visits to the emergency department as well as improving the quality of care.

In a study of 177 patients attending an emergency department who were eligible for a supported discharge, 121 were entered into a support programme, 68% were more than 65 years old and 54% lived alone. Patients were very satisfied with the service and 50% required no further service but 20% were readmitted. The study did not have any control group and therefore it is impossible to assess the true impact.

Another scheme in the UK developed a joint initiative between four GP practices, a health authority, a community Trust and the local social services department. A nurse co-ordinator and six support workers offered a 24 hour service which reduced emergency admissions, cut the length of hospital stays and improved home support. It is recognised that improved liaison between the emergency department and community services can reduce the return rate to the emergency department.

In Copenhagen, a trial of three monthly scheduled medical and social preventative interventions was shown to reduce the number of emergency medical calls from older people. The intervention group had increased distribution of aids and more modifications to their homes.

Social work students nearing graduation have been used as liaison personnel between medical staff and emergency department patients. This was found to improve patient satisfaction.

In a study of 295 older people with chronic illness, those having monthly meetings with doctor, nurse and pharmacist had fewer emergency department visits (0.65 vs. 1.08 visits p=0.005). Developing a practice guideline for the care of falls in elderly patients which included health information and a one-off educational intervention directed at primary care providers failed to reduce the incidence
of subsequent falls or emergency department attendance. But a community support scheme using care attendants was able to reduce subsequent hospital readmission. This randomised controlled study involved 903 patients and showed that intervention patients had a 5% readmission rate compared to 12% in the control group. This study did not look at emergency department usage. However regular education interventions in another study have been reported to reduce over-utilisation of the emergency department.

In a Swedish study 189 patients were referred from the emergency department to primary care. Over the next twelve months the proportion who returned decreased from 48% the year before the study to 42% the year after compared to an increase from 41% to 51% in a control group (p<0.01). Of these patients, 7% account for 45% of the visits and this subgroup showed no change in their presentation rate. Amongst repeat attenders, 80% given help by the hospital social worker had decreased attendance rates at emergency department.

An American study looked at seven different models of intervention by social care professionals in the emergency department and its effect on reuse of the emergency department (defines as return to the emergency department within 3 months. After introduction of the scheme the return rate of individuals reduced from 26.9% to 22.9% and the proportion of attenders who were “returners” reduced from 42.3% to 27.6%. The greatest decline in reuse was seen where the social work team used a proactive intervention strategy. However strategies were not determined randomly and reflected patient needs. Knowledge of local community resources was considered critical to their effectiveness but this was not supported by evidence. There was no follow up at other sources of medical care.

However, social care provision is not a substitute for either medical or nursing care. A recent report has highlighted four cases where patients admitted to the emergency department received necessary social care provision but no further medical assessment of their underlying condition.

Social care issues are also covered in the sections on
- Admission avoidance (Section F).
- Patient education (Section D).
- Delayed discharge (Section H).
- Social care supporting discharge (Section F (v)).
C (x) - Altering patient perception of waits

Patients who are kept informed, were kept occupied whilst waiting and felt involved in their care have higher satisfaction perceptions.\(^{386}\)

In a French study it was shown that there was insufficient information provided on waiting time and reasons for delay and that this was a cause of people’s perception of waiting time being extended.

A telephone questionnaire revealed that patients’ perceptions of technical quality of care were more important than perceived timeliness of care or bedside manner in determining patient satisfaction.\(^{457}\)

A study of 776 patients treated in an emergency department were sent a questionnaire 2-4 weeks after admission. This showed that only 22% could accurately estimate the waiting time to see a physician. More respondents over-estimated than under-estimated, with nearly half over-estimating. In contrast, the total waiting time was accurately estimated by over a third of respondents, with a quarter of the respondents over-estimating. Accuracy was when the actual time was in the same 15-minute time band as the perceived. The over-estimate may be for several reasons, most notably is that unoccupied time will always feel longer than occupied time. Anxiety makes the wait seem longer and waiting alone will feel longer than group waiting. The difference between the two components of the wait may be due to the fact that pre-process waits, i.e. before anything active starts often feel longer than in-process waits (in this case after having been initially seen until discharge).\(^{340, 586}\)

An American study utilised a video tape, lasting approximately 6 minutes and describing what could be expected within the emergency department, and services available, to patients and families and possible delays were explained. Those who saw the informational video tape had significant improvements in scoring on questions about level of anxiety and appropriateness of any delays that occurred.\(^{110}\) It has also been shown that an informative brochure decreases the anxiety level of patients.\(^{389}\) Nelson et al., suggested a formulation of such a leaflet.\(^{389}\) Other distractions whilst waiting have been described but not evaluated.\(^{490}\)

A prospective randomised trial was undertaken to determine whether provision of clinical information to patients during their emergency department visit improved their perception of clinical care. 619 patients were entered into the study and in the intervention group the research assistant periodically provided patients with information regarding process and medical information at 15-minute intervals. On departing they were asked to fill out a validated questionnaire. There was no difference in the two groups in their demographics, their actual waiting time or their actual length of stay. However the perceived length of stay was significantly shorter, 92.6 versus 105.5 minutes (p=0.03). And also the number of patients who rated the physician as excellent or very good was significantly higher in the intervention group, 87.1 versus 80.0 (p=0.03).\(^{593}\)
Emergency department – Conclusions

The evidence in the area of registration and documentation is poor. There is weak evidence that bedside registration, self-completion of forms by patients and transcription of notes may accelerate the process in the emergency department. The use of IT solutions in patient tracking has been described but not evaluated. Triage is universally used in emergency departments but if its only purpose is to prioritise patients then it may delay care, although it can provide a clinical safety net at busy periods. However, if it adds extra value by initiating investigations or treatment then it may save time. Some units use triage as an opportunity to redirect up to one third of patients; patients and their doctors are usually happy with this but up to a third may be triaged out inappropriately, up to 1% may be subsequently admitted and up to 1.6% may attend another emergency department. However many studies reported no adverse outcomes. There were however no prospective studies in the UK of such systems. Co-payment systems also have a demonstrable ability to reduce attendances. But the safety of such systems has not been established.

There have been many studies of fast track systems, including several randomised controlled trials, however none of these have been in the UK system. The evidence suggests that fast track does reduce waits of non-urgent patients and are safe and satisfactory to patients. Various models of fast tracks are available using medical and nursing staff. There is a need to assess the optimal system and which is effective in the UK system, but studies suggest that the earlier the person is seen by a senior person, the shorter their stay in the emergency department. Other fast track systems, e.g. for patients with fractured neck of femur, have not been adequately studied.

A wide variety of clinical initiatives have been shown to speed up care in the emergency department including use of local anaesthesia at triage, wound closure techniques. Others have been shown to reduce reattendance rates, such as use of steroids in asthma. Some initiatives increased length of care, e.g. use of sedation for suturing, but also improve quality of care.

A small number of frequent attenders account for a large workload of emergency departments. Various studies have looked at their characteristics but there are few interventions that have been tested. In those with chronic disease and in the elderly, there is stronger evidence with a variety of medical, social care and pharmacy interventions being shown to reduce reattendance, such studies need to be undertaken in the UK. A variety of studies in the UK and abroad have confirmed that social workers working in the emergency department can reduce admissions. However most of the studies are small and have inherent weaknesses in their design.

Key points
• Triage is a risk management tool for busy periods, it may cause delays in care.

• Triaging out of the emergency department can reduce numbers but more work is required to assess the safety of such systems.

• Co-payment systems reduce attendances but may equally reduce attendances by those requiring emergency care.

• Fast track systems for minor reduce waits, ideal configurations include senior staff.

• Attendance by the elderly, those with chronic disease and those with multiple attendances may be reduced by various interventions, trials are needed in this area, including the role of social workers.
CASE STUDY 3

Multi-Disciplinary Improvements

Summary of Improvement:
- A reduction in overall waiting times demonstrated by an increase to 98% from 82% of patients seen within 4 hours attending accident and emergency.
- Multi-disciplinary team (including GP, ENP, A&E consultant, x-ray and reception) to identify constraints, which resulted in faster assessment by an average of 20 minutes in all groups.
- Major patients assessed and treated in a timelier manner.
- A realisation that a more focused approach to minor conditions frees resources for major condition management.

Changes Made:
- The primary change was eliminating triage.
- Now: Minor conditions are seen by the first available professional (nurse or doctor) within 15-30 minutes of arrival. Nurse and/or doctor treat to their abilities to discharge or refer, assessing, treating, initiating investigations (x-ray, bloods etc) or administering analgesia if required.
- A comprehensive assessment for major conditions was instituted, including an early investigation initial assessment pathway carried out by nurses for patients defined as ‘major’.
- Better resource allocation, via identifying an area for early initiation
Reducing Attendances and Waits in Emergency Departments

- Pathology identified neutral cost methods of eliminating the batching of samples, which had caused huge delays.

- Trained up the nursing and healthcare team for venepuncture, cannulation, ECG and Plethysmography training for healthcare assistants, empowering individuals along the patient pathway.

- Nurses apply the use of Patient Group Directions, enabling them to administer medication to patients under agreed criteria with specific conditions.

- Doctors were trained in basic dressings, dispensing medicines, applying slings etc and giving follow-up information, reducing handoffs.

- An extra nurse was allocated as a coordinator for improving patient flow and encouraging the new ways of working between 0800-1600.

**Implementation Advice:**

- Empower individuals to act as soon as clinically appropriate, driven by a nurse consultant and modern matron.

- Teach new junior doctors to adopt new working practices as soon as possible.

- Act on problems as soon as they arise, implement solutions as soon as feasible.

- Establish a flexible escalation policy, tailored to local working arrangements.
• Make even small changes: place kit in more user friendly areas; get more keys cut to reduce the time taken to find keys for drugs; make trays for notes to keep paperwork together; set up a new location board with tracing times.

Next Steps:
• Emergency Nurse Practitioners are training up at a recognised institution supported by clinical practice and will return to the A&E. Initially they will be focused on minor illness and injury patients but with direct referrals for other conditions being developed.

• In-depth assessment by nursing teams of major patients planning investigations and working with specialist teams to optimise patient journey.

• Improve management of chest pain patients by initially assessing chest pains, faxing ECG to CCU and setting up thrombolysis in A&E.

• Direct referrals to speciality for certain conditions by nurses to nurses and doctors: this has commenced with eye problems - any patient attending with an eye problem other than a chemical injury can have an assessment by a nurse or doctor, and is sent straight to the ophthalmic practitioner the same day during working hours.

• Reduce planned and unplanned returns to A&E by care pathways to primary care teams.

• Link with medical assessment and surgical assessment to train nurses to work up patients in a more timely manner.

• Develop wound care service and management of early sprains and strains by nursing staff working with physiotherapy and GP practice teams and direct referral to eye practitioners.

• Development of Emergency Care Technicians which will enable the access to investigations for diagnosis to happen at the earliest point.

• Conversion of locum to Trust-grade posts – to practice at senior house officer level, working shifts.

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<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodacre S, Morris F, et al. 2001</td>
<td>Emergency Department</td>
<td>Nonrandomised study n=1,850 intervention triage first n=1,522 control usual presentation - reception first</td>
<td>All ambulatory patients presenting to ED in the time periods: Monday-Friday 10:00-14:00hrs &amp; 17:00-21:00hrs Saturday &amp; Sunday 12:00hrs-20:00hrs Friday, Saturday, &amp; Sunday 10:00-02:00hrs October and November 1999 ED Size: 75,000 p.a.</td>
<td>Comparison of presentation protocols: 1. Reception first - patients registered before being seen in triage. 2. Triage first – (current practice triage preceded registration)</td>
<td>Significant reduction in Arrival-booking-assessment time interval for ambulant patients, if seen at reception first: Reception First (12.9 minutes), Triage First (15.8 minutes) (p&lt;0.0001). Satisfaction greater with Reception First (79.6%), Triage First (48%).</td>
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## Table 8 - C (ii) Triage and Initial Assessment

<table>
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<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
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</thead>
<tbody>
<tr>
<td>George S, Read S, et al. 1992</td>
<td>Emergency Department</td>
<td>Nonrandomised study (N=5954) n=2515 intervention - triage n=2522 control - no triage</td>
<td>All patients presenting to ED between: 08:00hrs and 21:00hrs for six weeks. Exceptions: patients attending by appointment. ED Size: 60,000 p.a.</td>
<td>Nurse triage vs. no triage: Nurse triage group assessed by trained triage nurse and assigned to triage category (1-4). No triage group – assessed informally by nursing staff after registration at reception.</td>
<td>Significant increase in median waiting time (first attendance to medical treatment) for nurse triage group for category 1 &amp; 2 patients, 16 mins to 26.5 minutes and 37.5 mins to 46 minutes respectively. No significant difference in median waiting time for category 3 &amp; 4.</td>
</tr>
<tr>
<td>Ryan B 1995 #1389</td>
<td>Emergency Department</td>
<td>Observational study n=4548 intervention - formal triage n=5575 control - informal triage</td>
<td>50 randomly chosen patients from target hospital (N4585 from categories 2 &amp; 3) ED Size: Medium</td>
<td>Formal triage system: 1. see immediately 2. semi-urgent 3. delay acceptable</td>
<td>Formal triage did not reduce waiting times for non/semi-urgent patients.</td>
</tr>
<tr>
<td>Mallett J &amp; Woolwich C 1990</td>
<td>Emergency Department</td>
<td>Observational Study n=1027 intervention - triage n=822 historical control – pre-triage</td>
<td>ED department – inner London ED Size: NK</td>
<td>Introduction of triage nurse</td>
<td>Time taken to be seen by a doctor or nurse 81.4% (seen within the hour) pre introduction of triage compared to 52.6% post triage introduction (p&lt;0.001).</td>
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## Table 9 – C (iii) Triage Out

<table>
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<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
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<tbody>
<tr>
<td>Derlet RW, Nishio D, et al. 1992</td>
<td>Emergency Department</td>
<td>Cohort study (N=136,794) N=21,069 intervention – triage out Control: No</td>
<td>Adults attending ED Three year study. ED Size: 60,000 p.a.</td>
<td>Triage out by protocol</td>
<td>A group of patients can be safely triaged out: 15% triaged out, no adverse outcomes detected. 22% did not seek medical care. 1.6% sought care at another ED.</td>
</tr>
<tr>
<td>Birmbaum A, Gallagher EJ, et al. 1994</td>
<td>Emergency Department</td>
<td>Cohort study (N=534) Control: No</td>
<td>Adults attending ED ED Size: 50,000 p.a.</td>
<td>Triage out by protocol</td>
<td>Could not validate the protocols to triage out. 1.1% of triage out patients were hospitalised.</td>
</tr>
<tr>
<td>Rivara FP, Wall HP, et al. 1986</td>
<td>Emergency Department</td>
<td>Cohort study (N=748) Control: No</td>
<td>Selected children attending over one week (1 week to 17 years old) attending during day time ED Size: &gt;40,000</td>
<td>Triage out by protocol</td>
<td>61% of the 748 studied were triaged out: -31% to community health centres -17% to physicians offices 13% -self care</td>
</tr>
<tr>
<td>Kelly KA.</td>
<td>Emergency Department</td>
<td>Cohort Study Control: No</td>
<td>ED patients ED Size: 2700 per-month following intervention</td>
<td>Triage out by protocol</td>
<td>ED attendance reduced by 27%, attendance of non-emergency cases was reduced by 68%</td>
</tr>
<tr>
<td>Lowe RA, Bindman AB, Ulrich SK. 1994</td>
<td>Emergency Department</td>
<td>Cohort study (N=927) Control: No</td>
<td>All non-emergency ED patients ED Size: 78,000 p.a.</td>
<td>Triage out by protocol</td>
<td>Guidelines were not adequate to allow triage out 33% (95%CI=32-51) of triage out patients were appropriate visits.</td>
</tr>
<tr>
<td>Washington DL, Stevens CD, et al. 2000</td>
<td>Emergency Department</td>
<td>Cohort study (N=1,187)</td>
<td>Adults attending ED</td>
<td>Triage out by protocol</td>
<td>Criteria can be used for determining patients suitable for deferred care</td>
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<tr>
<td>Applicable to UK: Yes</td>
<td>Emergency Department</td>
<td>n=226 intervention – deferred care</td>
<td>ED Size: 30,000 walk-in-visits p.a.</td>
<td>Control: No</td>
<td>19% met criteria for deferred care No adverse incidents were detected</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>Control: No</td>
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### Table 9 - continued

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<th>ID</th>
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<th>Study population</th>
<th>Intervention</th>
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<tbody>
<tr>
<td>Straus JH, Orr ST, et al. 1983</td>
<td>Emergency Department</td>
<td>Cohort Study</td>
<td>Adults attending ED with no regular source of primary care</td>
<td>Referral to primary care from triage</td>
<td>No reduction in ED utilisation amongst those enrolled in primary care.</td>
</tr>
<tr>
<td>Derlet RW &amp; Nishio D 1990</td>
<td>Emergency Department</td>
<td>Cohort study (N=22,390)</td>
<td>Adults attending ED</td>
<td>Triage out by protocol</td>
<td>Triage out can be safely performed. -19% triaged out. No adverse outcomes. -1.3% dissatisfied</td>
</tr>
<tr>
<td>Derlet RW, Kinser D, et al. 1995</td>
<td>Emergency Department</td>
<td>Cohort Study (N=176,074)</td>
<td>Adults attending ED</td>
<td>Triage out by protocol</td>
<td>Triage out can be safely performed. 18% of attenders triaged out. No adverse outcomes detected.</td>
</tr>
<tr>
<td>Hansagi H, Carson B, et al. 1997</td>
<td>Emergency Department</td>
<td>Cohort Study</td>
<td>Patients attending ED between 08:00hrs-17:00hrs Monday-to-Friday (4-weeks trial) Excluding: • children &lt;16-years and patients -attending by ambulance.</td>
<td>Assistant nurses triaged patients into urgent or non-urgent categories. Non-urgent category patients were seen by a nurse-adviser, a registered nurse who provided medical advice, advice on alternative sources of health care, make an appointment with appropriate health care providers.</td>
<td>The nurse-adviser interviewed 21% (n=454) of patients attending in the trial arm, 11% (n=192) were referred to alternative sources of health care.</td>
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Table 10 - C (iv) Co-Payment Systems

<table>
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<tr>
<th>ID</th>
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<th>Study Design</th>
<th>Study population</th>
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<th>Findings/Conclusion</th>
</tr>
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<tbody>
<tr>
<td>Chande VT 1997</td>
<td>Emergency Department</td>
<td>Observational Study (N=200)</td>
<td>Child ED attenders in different insurance schemes</td>
<td>Introduction of new fee for service plan.</td>
<td>At six months fee usage reduced attendance from 86% to 68% (p=0.001). No reduction in non-fee group. 12-months no significant difference.</td>
</tr>
<tr>
<td>Selby JY, Firman BH, et al. 1996</td>
<td>Emergency Department</td>
<td>Nonrandomised Study</td>
<td>ED attenders affected by Co-payment</td>
<td>Introduction of $25-35 co-payment</td>
<td>Co-payment for ED use was associated with 15% decline in ED use, mostly with non-emergent conditions</td>
</tr>
<tr>
<td>Murphy AW, Leonard C, et al. 1997</td>
<td>Emergency Department</td>
<td>Observational study</td>
<td>ED attenders affected by Co-payment</td>
<td>Removal of a perverse financial incentive to attend ED rather than primary care</td>
<td>A small reduction in non-urgent attenders occurred. GMS-ineligible patients decreased from 45.3% to 44% (95% CI - 0.6 to -1.9%).</td>
</tr>
<tr>
<td>O'Grady K, Manning WG, Newhouse JP, Brook RH. 1985</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial (N=3973)</td>
<td>ED attendances &lt;62 years</td>
<td>Introduction of co-payments</td>
<td>Significant reduction in ED attendance 20%-35% (p&lt;0.05)</td>
</tr>
</tbody>
</table>

Notes:
- Applicable to UK: No
- United States
- United States
- Ireland

ED Size: NK
ED Size: NK
<table>
<thead>
<tr>
<th>Cameron PA, Kennedy MP, et al. 1999</th>
<th>Emergency Department Observation Study Historical control</th>
<th>Patients attending ED in 21 hospitals ED Size: 700,000 p.a. (21-hospitals)</th>
<th>Introduction of Emergency Service Enhancement Program (ESEP) - a bonus payment to hospitals to improve emergency access</th>
<th>Significant reduction in ambulance diversions &lt;100 pre introduction of ESE compared to 600 post introduction (p&lt;0.001). Significant improvement in waiting times for triage category 2 &amp; 3 patients (p&lt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable to UK: Yes Australia</td>
<td></td>
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</tr>
</tbody>
</table>


### Table 11 - C (V) Fast Track for Minor Injury Patients

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooke MW, Wilson S, et al. 2002</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=13,918)</td>
<td>All minor injury patients attending ED during 10 week period. ED Size: 68,000 p.a.</td>
<td>Setting up a separate stream for minor injury care</td>
<td>Separate minor injury stream significantly decreased the number of trauma patients waiting over an hour. % patients waiting less than 30 mins 35.4% (pre) – 44% (post) (chi=103.34 p&lt;0.0001).</td>
</tr>
<tr>
<td>Applicable to UK: Yes</td>
<td>United Kingdom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New TD 2000</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=2,696)</td>
<td>All ED attenders ED Size: 52,000 p.a.</td>
<td>UNAS assessment nurse advice/ triage service/ minor injury facilities. Algorithm tools (computerised) as aid to decision making</td>
<td>ED LOS: UNAS self-care discharges – 36 minutes UNAS non-self-care discharges – 75 minutes A&amp;E – 100 minutes</td>
</tr>
<tr>
<td>Applicable to UK: Yes</td>
<td>United Kingdom</td>
<td>Historical control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partovi SN, Nelson BK, et al. 2001</td>
<td>Emergency Department</td>
<td>Nonrandomised Study</td>
<td>Patients using ED on eight Mondays 09:00hrs to 17:00hrs. ED Size: 52,000 p.a.</td>
<td>Faculty triage at trauma centre— an ED faculty member added to the regular triage area staff</td>
<td>Faculty triage offers moderate reduction in LOS - Waiting time reduced from 445 mins to 363 mins (reduction of 82 mins).</td>
</tr>
<tr>
<td>Applicable to UK: Yes</td>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ardagh MW, Wells JE, et al. 2002</td>
<td>Emergency Department</td>
<td>Nonrandomised Study</td>
<td>All ED attenders ED Size: 65,000 patients p.a.</td>
<td>Rapid cases seen by separate doctor and nurse team alternate weeks, extra staff used in main ED other weeks</td>
<td>Significant reduction in ED LOS for: -triage category 4 for RAC period 34.5 minutes compared to 42.7 Non-RAC period (p=0.004) -triage category 5 for RAC period 34.3 minutes compared to 45.4 Non-RAC period (p=0.02) No significant for triage categories 2 and 3 patients</td>
</tr>
<tr>
<td>Applicable to UK: Yes</td>
<td>New Zealand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Domain</td>
<td>Study Design</td>
<td>Study population</td>
<td>Intervention</td>
<td>Findings/Conclusion</td>
</tr>
<tr>
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</tr>
<tr>
<td>Grant S, Spain D, et al. 1999 216</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison</td>
<td>Patients attending ED between July-October 1997</td>
<td>Rapid Assessment Team (RAT) comprising triage nurse and doctor</td>
<td>Significant reduction in median LOS 32 minutes compared to 50 minutes in the same period the previous year (p&lt;0.001)</td>
</tr>
<tr>
<td>Docimo AB, Pronovost PJ, et al. 2000 153</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison</td>
<td>Non-urgent ED users</td>
<td>Creation of a fast track system and new triage guidelines for patients with minor injuries</td>
<td>Placing non-acute in fast track significantly decrease total LOS in ED to 1-hour 47 minutes (M)</td>
</tr>
<tr>
<td>Simon HK, McLario D, et al. 1996 537</td>
<td>Emergency Department</td>
<td>Cohort study</td>
<td>Paediatrics with a low triage score</td>
<td>Fast track clinic</td>
<td>Significant reduction in ED LOS for paediatrics fast track 107minutes compared to 149 minutes for all other patients in ED (p&lt;0.01).</td>
</tr>
<tr>
<td>Bond PA 2001 46</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison</td>
<td>All non-urgent patients attending the unit</td>
<td>Setting up of Physician/Nurse assessment/treatment area for non-urgent patients.</td>
<td>Reduction in ED waiting time 58 to 25 mins-not a statistical test analysis.</td>
</tr>
</tbody>
</table>
### Table 12 - C (vi) Other Fast Tracks

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Reduction in mean transfer time to the ward 2 hours 45 minutes ± 57 pre-intervention to 1 hour 32 minutes ± 41 to 1 hour 32 minutes ± 35 to 4 hours 10 minutes (p&lt;0.001). The number of patients transferred within 1-hour increased from 3 out of 104 (pre-intervention) to 24 out 90 (post-intervention).</td>
</tr>
</tbody>
</table>
- Suspected hip fractures were assessed by ED SHO  
- Patients with hip fractures but no other medical injuries or acute medical problem were fast tracked to the ward.  
- Patient with isolated hip fracture fast tracked within one hour of arrival. | |
| Ryan J, Ghani M, et al. 1996 | Emergency Department | Prospective Audit (N=30) | Older Patients with fractured neck of femur ED Size: 54,000 p.a. | Fast track protocol | Reduction in time from ED to ward from 4.5 to 2.5 hrs (p<0.001) |
| Charalambous, Yarwood, et al. 2003 | Emergency Department | Pre-post intervention comparison | Patients with hip fractures – presenting Monday to Friday 7:30-17:00hrs. ED Size: 96,000 p.a. | Trauma co-ordinator. Informed of the arrival in ED of patients with suspected hip fracture. Trauma co-ordinator liaises with key departments and services (radiology, haematology, ward, portering) to ensure timeliness of patient journey. | Reduction in median transfer time from ED to ward (7hr 4min pre-intervention to 2hr 46mins post intervention). Increase in the number of patients with hip fracture in a ward bed within 3 hrs (4% pre-intervention to 39% post intervention). |
| Dunn J 1989 | Emergency Department | Observational Study | Acute Psychiatric patients attending ED ED Size: NK | Institution of a ‘Fast track’ nurse managed system for psychiatric assessment of patients attending ED | Reduction in ED Psychiatric evaluation from 108 minutes to 48 minutes Also reduction in chance of violence |
Table 13 - C (vii) Emergency Department Clinical Changes

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browne GJ, Giles H, et al. 2001</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison</td>
<td>Paediatric patients with gastro-enteritis, asthma, or croup</td>
<td>Use of clinical pathways for gastro-enteritis, asthma and croup in children clinical pathway</td>
<td>Clinical pathways keep children out of hospital, decrease readmission rates, reduce length of stay with a 30% reduction in waiting times (32.9 versus 17.5 p&lt;0.001).</td>
</tr>
<tr>
<td>Gill JM, Reese CL, et al. 2000</td>
<td>Emergency Department</td>
<td>Survey (N=121)</td>
<td>Children with lacerations &lt;10-years of age</td>
<td>Midazolam sedation versus no sedation</td>
<td>Midazolam increased LOS in the ED. LOS Control=116.7 minutes, p=0.03</td>
</tr>
<tr>
<td>Brandt CP, Coffee T, et al. 2000</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison</td>
<td>Burn patients in ED referred to outpatient burn clinic</td>
<td>Triage protocol referring minor burns (&lt;15% surface) to burn clinic</td>
<td>Triage protocol reduces LOS in ED 103 minutes versus 44 minutes</td>
</tr>
<tr>
<td>Sin DD &amp; Man SF 2002</td>
<td>Emergency Department</td>
<td>Retrospective case note review</td>
<td>Asthma patients on a govt-sponsored drug plan</td>
<td>Use of inhaled steroids after ED discharge</td>
<td>Users of inhaled steroids had 45% less relapses requiring an ED visit (adjusted risk ratio 0.55, 95%CI 0.44-0.69)</td>
</tr>
<tr>
<td>Harish Z, Bregante AC, Morgan C, et al. 2001</td>
<td>Community</td>
<td>Randomised Controlled Trial</td>
<td>Asthma patients aged 2-17 years</td>
<td>Specialty Clinic Care</td>
<td>No significant reduction in total ED attendance. Mean number of visits for individual decreased (0.3 versus 0.1, p0.01)</td>
</tr>
</tbody>
</table>
Reducing Attendances and Waits in Emergency Departments

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamboa Antinolo F, Gomez Camacho E, et al. 2002</td>
<td>Hospital</td>
<td>Cohort Study</td>
<td>Patients with more than 3 admissions in a year</td>
<td>Hospital consultation and subsequent telephone access</td>
<td>Personalised health plan reduces health needs 50% reduction in ED visits, 26% decrease in hospital days.</td>
</tr>
<tr>
<td>Catellier DJ, Conlisk EA, et al. 2000</td>
<td>Community Pharmacy</td>
<td>Cohort Study</td>
<td>Patients =65 (June 1994 - May 1996)</td>
<td>Senior PHARMAssist Program. Review of medication regimes by pharmacist every 6-months</td>
<td>Decrease in ED visits. Probability of an ED visit was reduced 23 at 6-months (OR=0.77, p=0.077) and 58% at 12-months (OR=0.42, p&lt;0.001)</td>
</tr>
</tbody>
</table>

Table 14 - C (viii) Frequent Attenders
<table>
<thead>
<tr>
<th>Study ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study Population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller DK, Lewis LM, et al. 1996 (367)</td>
<td>Emergency Department</td>
<td>Nonrandomised Study (N=770)</td>
<td>Older patients attending ED with acute illness on alternate days from 12:00-20:00 hours, February – December 1992</td>
<td>Evaluation by Geriatric nurse clinician to identify medical, dental and social problems. Recommendations to patient, family, attending ED physician, follow-up services arranged.</td>
<td>Non-significant (p&lt;0.1) decrease in visit to ED trial (0.26) control (0.39). Significant (P&lt;. 001) increase in time in ED trial (292 minutes) control (231 minutes).</td>
</tr>
<tr>
<td>Redelmeir DA, Molin J, et al. 1995 (450)</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial</td>
<td>Homeless patients who were: not psychotic, inebriated, able to speak English</td>
<td>Significant reduction of 28% in ED attendances for intervention (95%CI 14-40, p&lt;0.01) and a decrease in return rate of 20% (95%CI 3-30, p=0.02)</td>
<td></td>
</tr>
<tr>
<td>O'Shea JS, Collins EW, et al. 1984 (408)</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial</td>
<td>Children (=18-years) with acute illness attending ED more than 4 in a 2 years</td>
<td>Parents were sent three letters emphasising the importance of continued health care for children and providing information about community and hospital ambulatory paediatric services</td>
<td>No significant reduction in attendance at ED</td>
</tr>
<tr>
<td>Rosenberg EE &amp; Pless IB</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial</td>
<td>Children with more than 2 visits in previous year</td>
<td>Pamphlet and video presentation</td>
<td>Intervention group had ED visit rate of 0.43 compared to 0.52 (p=NS)</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>-----------------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Applicable to UK: Yes Canada</td>
<td>n=118 intervention</td>
<td>n=128 control</td>
<td>ED Size: 15,000 p.a.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 15 - C (ix) Social Care in the Emergency Department

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boyack VJ &amp; Bucknum AE 1991</td>
<td>Emergency Department Social Care</td>
<td>Cohort Study (N=455)</td>
<td>Patients presenting to emergency department</td>
<td>Quick Response Team comprising physician nurses and social worker.</td>
<td>Twenty-four acute admission deferred.</td>
</tr>
<tr>
<td>Coleman EA, Elertsen TB, et al. 2001</td>
<td>Primary Health Care Emergency Department</td>
<td>Randomised Controlled Trial (N=295)</td>
<td>Older people =60 with frequent hospital usage and chronic disease</td>
<td>Monthly home visits with GP, nurse and pharmacist.</td>
<td>Intervention resulted in reduction in ED attendance (0.65 vs. 1.08 visits, p=0.005).</td>
</tr>
<tr>
<td>Keehn DS, Roglitz C, et al. 1994</td>
<td>Emergency Department</td>
<td>Cohort Study (N=1,758)</td>
<td>Older people</td>
<td>Seven different models of intervention by social care professionals in the emergency department</td>
<td>Reattendance reduced from 26.9% to 22.9% The greatest decline in reattendance for proactive intervention strategy.</td>
</tr>
<tr>
<td>Baraff LJ, Lee TJ, et al. 1999</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=1,399)</td>
<td>Patients =65 attending the emergency department with falls.</td>
<td>Practical guidance on falls reduction given to ED physicians to improve their understanding.</td>
<td>No reduction in falls or hospital admissions - 18% pre-intervention and 21% post-intervention (p=0.162).</td>
</tr>
<tr>
<td>Hansagi H, Alleback P, et al. 1989</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=454)</td>
<td>Patients with non-urgent conditions</td>
<td>Referral to primary care from triage if condition not urgent</td>
<td>Significant reduction in ED visits in the intervention group (48% to 42%) compared to an increase in the control (41% to 51%) (p&lt;0.01)</td>
</tr>
<tr>
<td>Hansagi H, Alleback P, et al. 1989</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=192)</td>
<td>Patients with non-urgent conditions</td>
<td>Referral to primary care from triage if condition not urgent</td>
<td>Significant reduction in ED visits in the intervention group (48% to 42%) compared to an increase in the control (41% to 51%) (p&lt;0.01)</td>
</tr>
</tbody>
</table>

Applicable to UK: Yes Canada

Applicable to UK: limited United States

Applicable to UK: Yes United Kingdom

Applicable to UK: Yes Sweden

ED Size: NK

ED Size: 3-EDs 372,197 p.a.

ED Size: 90,000 p.a.

Serving population: 317,000

N=146 intervention

n=149 control

n=146 intervention

n=149 control

n=385 intervention

n=474 comparison

n=759 post-intervention

n=1,140 pre-intervention

n=192 intervention

n=107 control group:
### Table 16 - D Patient Education

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murphy AW, Plunkett PK, et al. 2000</td>
<td>Emergency Department</td>
<td>Cohort Study (N=4459)</td>
<td>Patients using ED in triage categories 3 and 4 between Aug 1993-October 1994; ED Size: NA</td>
<td>Employed a GP to treat triage category 3 (Semi-urgent) and 4 (delay acceptable) patients in ED.</td>
<td>No reduction in ED reattendance following single contact with GP - 42% of patients reattended at least once within 2-years of index visit.</td>
</tr>
<tr>
<td>Johnston BD, Rivara FP, et al. 2002</td>
<td>Emergency Department-Level I Pediatric Trauma Centre</td>
<td>Randomised Controlled Trial (N=631)</td>
<td>Adolescents attending ED with injury; ED Size: NK - Urban</td>
<td>Behaviours change counselling with social worker exploring injury related risk behaviour versus routine ED care Behaviours including: seat belt use, bicycle helmet use, drink-driving, driving with an impaired driver, binge drinking, carrying a weapon</td>
<td>No significant differences in injury rate over the 6-month follow-up period although more likely to use seat belts and cycle helmets.</td>
</tr>
<tr>
<td>Grossman LK, Rich LN, et al. 1998</td>
<td>Paediatric Emergency Department</td>
<td>Nonrandomised Study (N=700)</td>
<td>Medicaid funded children attending with non-urgent conditions; ED Size: NK</td>
<td>Case management group: information from health care professionals, assistance with making an appointment, support provided for 3-months post index ED visit. Minimal intervention group: - clerical assistant about the importance of GP.</td>
<td>Significant reduction in attendance at 6-months for the case management group 14.5% and 11.5% for the minimal management group (p&lt;0.01).</td>
</tr>
</tbody>
</table>
D. Patient Education

Education of patients as to what types of condition are appropriate for emergency department is widely advocated and government campaigns are run regularly.\textsuperscript{141} Educational programmes have had some success in reducing attendances at the emergency department. An early study stressing the importance of a telephone call before attending caused a drop from 29% to 18% in "inappropriate" emergency department attendance.\textsuperscript{37}

Hobday suggested that more education is needed on the role of GP and emergency department.\textsuperscript{255} These campaigns hope to reduce the workload of Emergency departments. However, a questionnaire study of 117 trained emergency department nurses, using case vignettes, revealed a wide discrepancy in what staff believed was appropriate for emergency department.\textsuperscript{217}

Self-management education of COPD patients showed no effect of self-management education on hospital admissions and emergency room visits.\textsuperscript{372}

In a Cochrane review of education of adults with asthma twelve trials were included. In one study, limited asthma education was associated with reduced emergency department visits (reduction of -2.76 average visits per person per year, 95\% confidence interval -4.34 to 1.18).\textsuperscript{198} A systematic literature review was undertaken to assess whether asthma education leads to improved outcomes in children who attended an Emergency Department. Eight trials involving 1,407 patients were included. In all, the education was provided either by nurses or researchers. Compared to the control group, education did not reduce subsequent emergency department visits (four trials, relative risk 0.87, 95\% confidence interval 0.372, 2.08, hospital admissions five trials RR=0.74, 95\% confidence interval 0.382, 1.46 or unscheduled doctors visits 5 trials RR=0.74, 95\% confidence interval, 0.492, 1.12). A subgroup analysis did not reveal any differences for either the scale of the intervention or the timing of the intervention and recruitment.\textsuperscript{197} In another study, 27 patients who presented with asthma were asked to complete a questionnaire exploring the attitudes and self-efficacy of their care using a validated questionnaire. This demonstrated that attitudes and self-efficacy rather than knowledge had the most significant impact both on treatment compliance and on the number of emergency department visits and hospitalisations.\textsuperscript{508} On the basis of the published trials, there is no firm evidence to support the use of asthma education for children who have attended the emergency department for asthma as a means of reducing subsequent emergency department visits, hospital admissions or unscheduled doctor visits. Some trials appeared to show clear evidence of benefit, but reasons for differences between these and the negative studies is not clear. More research is required.\textsuperscript{223}

A study looking at behaviour change counselling offered to injured adolescents enrolled 631 patients and had a 75\% follow-up rate by 6 months. The behaviour change counselling produced an increased use of seatbelts,
relative risk of 1.34 (95% confidence interval 1.00 - 1.79), an increase in use of bicycle helmets, relative risk of 1.81 (95% confidence interval 1.02 - 3.18). However it did not have any affect on other behaviours and produced no change in likelihood of needing medical attention in the next 6 months.\textsuperscript{272} Another education programme for adolescents who had presented to emergency departments with self-destructive behaviour managed to reduce the number of emergency admissions and increase early help seeking.\textsuperscript{150}

A prospective trial in a paediatric emergency department in Ohio gave Medicaid families information about the importance of primary care provision and provided assistance with making an appointment. The health professional then continued to work with the family for up to 3 months in improving their access to primary healthcare. This decreased the emergency department attendances by 11.1% over the next six months but there was no difference in utilisation beyond 6-months up to 24 months. This intervention may however not be applicable in the UK NHS system.\textsuperscript{220}

Nearly 7,000 households were mailed with a booklet informing them about common non-urgent conditions and encouraging use of alternatives to emergency care. It did not significantly reduce the attendance at Emergency departments.\textsuperscript{448}

Single contact with a GP in the emergency department without a specific education strategy has been shown to be ineffective in reducing subsequent attendances However this study was in a fee paying system and so may not be applicable elsewhere.\textsuperscript{380}

**Patient Education – Conclusions**

The effects of patient education have been highly variable; no studies of leaflets had an effect. Education of those with chronic disease has been more successful. More research should be undertaken to find out the reasons for the variability before further mass publicity schemes are launched.

**Key points**

- Patient education is of unproven in most areas except chronic disease management.
- Phoning for advice before going to the Emergency Department may reduce attendances.
E Diagnostics

E (i) - Laboratory Tests

Waiting for results of tests is recognised as one of the four commonest reasons for patient delays in the Emergency department. Emergency physicians believe that delays in laboratory results often delay treatment and admission. The same study reported that laboratory control of specimen handling and rapid transport times were key issues. Studies have undertaken root cause analysis of laboratory delays as the process from taking a blood sample until delivery of results to the clinic is a complex process involving ordering the tests, collecting the blood, delivering it to laboratory, analysing it, reporting the results and delivering the results to the clinician. One study showed that the root causes of delays were laboratory assistant availability, the rate when repeat samples were needed, the volume of tests for patients being admitted to hospital and the order processing time. This however is likely to be highly variable between different institutions but may form a basis for individual organisations to analyse where changes are most needed. A Belgium study showed laboratory tests added an extra 81 minutes to emergency department turnaround time.

Reducing these delays can have several strategies:

- Reducing those needing tests.
- Reducing the delivery time of the specimen to the laboratory.
- Performing the tests and making results available more quickly.

- Reducing the delivery time of the result to the clinician.

In one study of 256 patients, 53% of patients in an emergency department had blood tests requested but their expected disposition was not altered by the results of the blood tests in 87%, but staff were poor at prospectively identifying those who would be admitted irrespective of the results (sensitivity 44%, specificity 72%). Having nurses taking bloods rather than residents reduced the emergency department length of stay by 49 minutes (258 mins vs. 307 mins, p<0.05) in a randomised trial.

Point of care testing has been shown to deliver results within 2 minutes and has good accuracy, including cardiac markers. However, another study suggested that resources required to establish a dedicated stat laboratory in the emergency department would be more beneficial if directed toward reducing the preanalytic delays. A systematic review has been undertaken of point of care testing and emergency department application. It concluded that compared to central laboratory models, point of care testing decreased the total test turnaround time (the interval between the time a test is ordered and the time a treatment decision is made). However when point of care testing is compared with near site satellite laboratories the improvement in total test turnaround time is less marked. There is however discrepancy in whether a decreased total test turnaround time results in a decreased length of stay. A randomised controlled trial was undertaken to examine the use of point of care testing in an emergency department and the extent to which it resulted in differences
Reducing Attendances and Waits in Emergency Departments

In 7% of cases there was change in management that was considered to be critical, with decisions made 74 minutes earlier when point of care testing was used for haematological tests and 86 minutes earlier for biochemical tests. There was however no difference between the groups and the amount of time spent in the department, the length of stay in hospital and the admission rates.  

A randomised controlled study in Canada showed a median stay that was significantly shorter in those randomised to a point of care testing, particularly in those who were destined to be discharged home but not in those destined to be admitted. A prospective non-randomised clinical study by Sands showed point of care testing reduced length of stay by 17% and physicians reported that treatment would have commenced earlier or changed in 9.5% of cases. However the various systems in hospitals are important in this situation in that total test turnaround time is made up of several components from the time the blood is taken to arriving at the lab, analysis being undertaken and the result being returned. The turnaround time also varied according to delivery systems, near-patient systems needing no delivery system and therefore turnaround times of 5 minutes. Those using portering systems had turnaround times longer by 58 minutes and those with pneumatic systems 49 minutes. However in this study the results did not directly relate to shortened length of stay as the total patient waiting time was significantly different among the 3 groups and the authors believe that the impact of external factors such as bed availability and other tests were important. This study did not give details of methodologies or statistics. It appears therefore that point of care testing can eliminate the majority of pre- and post-analytical delays. The establishment of a point of care satellite testing laboratory that can undertake pregnancy testing, urine dipstick, and cardiac markers resulted in a decreased length of stay for those patients requiring these tests of 41.3 minutes (p=0.006). A prospective trial of point of care testing by non-laboratory staff analysed 15,000 visits and it demonstrated acceptable accuracy for hand-held devices. However it failed to demonstrate any change in length of stay in any patient sub-group and the authors therefore considered it unlikely that routine use of hand-held point of care testing devices in a large emergency department was sufficient to decrease length of stay.  

When looking at laboratory turnaround time it was found that the therapeutic time was only 1-2 minutes shorter for bedside testing compared with satellite lab and 9-14 minutes shorter in a satellite lab compared to a centralised lab. In point of care testing samples (median 5 mins) was significantly faster (p<0.05) than using the laboratory with porters (median 58 mins) or using a vacuum system (median 49 mins). However the shorter turnaround time did not result in reduced patient waiting time because other factors had a greater impact. Introduction of an air tube system and a results printer in the emergency department, without any point of care testing, resulted in a 26 +/- 3 minute saving in transport time and 18 minute saving in results accessing (but analysis was limited and not described).  

Using a broad range of continuous quality improvement techniques, the turnaround time in a laboratory was reduced by 62% along with cost savings. This process involved...
streaming tests into “stat”, “ASAP” and “routine”, and process redesign to eliminate unnecessary steps. Another study showed that streaming was not necessary if complete system automation including the use of robotics was introduced.  

In a retrospective observational study of over 3,000 emergency requests for biochemistry tests including over 1,800 medical admissions an assessment was made of the proportion of the biochemistry tests that were accessed via a ward terminal within one or three hours of becoming available. Only a quarter of emergency department requests were seen within one hour of being made available, a further 15% within the next two hours. The authors suggest that the use of terminals therefore may slow down the process compared to telephone requests for tests. The study is unable to differentiate the reason for staff not accessing the tests, which may reflect the proportion of urgent tests that are not truly urgent, or alternatively may be because of the additional hurdle in obtaining results via a ward terminal as opposed to their previous system within the hospital of results being telephoned. They therefore suggest that the use of local printers to high intensity areas may be better at ensuring results are appropriately delivered. The number of times a person logs on looking for results can be reduced by having test status with continuous updating, on the live clinical information system.  

E (ii) - Imaging  

Approximately 35-50% of emergency department attenders require some form of imaging. The majority require plain x-rays of limbs or chest. A Belgium study showed x-ray investigations added an extra 40 minutes to emergency department turnaround time. Innovative use of data has enabled some emergency departments to reduce the x-ray cycle time and improve patient satisfaction. The data was used to help track patients and therefore identify delays, resulting in a revamped x-ray process cutting the cycle time by more than half and with consequent shorter length of stay for all emergency department patients. But studies of such innovations have not been published.  

There is extensive literature describing the reductions in waiting times resulting from the ordering of x-rays in an early stage of the emergency department process. This is usually by the triage nurse, so that the patient has already had the x-ray undertaken by the time they see the clinician who will make the definitive clinical management decisions. This is described in section E(iii).  

American systems often require reporting by a radiologist before the patient was seen again by the emergency physician. This adds 70-90 minutes to their transit time compared to letting the emergency physician see the films directly. The report gives no details of how these figures were obtained. Although the UK system has always had direct viewing, it is important to bear this figure in mind for future quality improvements in reporting.  

Implementation of the Ottawa knee Rule for ordering of x-rays after acute knee injury resulted in a relative reduction of 26.4% in the number of patients referred
for knee x-ray compared to a relative reduction of only 1.3% in the control group (p<0.001) in a trial of 3,907 consecutive adult patients. This caused a reduction in time spent in emergency department in the non-fracture patients (85 minutes versus 118 minutes). A before and after study of 2342 patients with ankle injuries, demonstrated that the introduction of the Ottawa ankle rules reduced the number of x-rays taken and those not having x-rays spent less time in the emergency department (80 minutes vs. 116 minutes, p<0.0001). In a small prospective study of 152 patients, use of the Ottawa ankle rules by nurses was not shown to decrease the time a patient spent in the emergency department compared to the previous system of physician ordered x-rays. However in the system studied it was acknowledged that the radiograph turnaround was not the rate limiting step.

McNally undertook a prospective trial of the use of posters to increase the uptake of guidelines for ordering x-rays. He showed that the posters caused a decrease in referral for skull x-rays and abdominal x-rays but not ankle and cervical spine x-rays. But the study was criticised because the outcome measured was the proportion of patients referred for particular x-ray which is not the same as the proportion of patients managed in accordance with guidelines. The follow up of patients who did not undergo radiography appeared inadequate and was not detailed; the reduction in the proportion of patients undergoing radiography therefore may have been inappropriate. It is therefore important to remember that a reduction in radiograph numbers may not be the same as improvement in quality of care.

Introduction of a picture archiving communication system (PACS) was studied whereby 10 CT studies were each looked at by residents on a film system and on a work station system. The average time required to transmit the images was reduced from approximately 40 minutes to 16 minutes using the archiving system. The actual interpretation times were comparable. It is therefore suggested that if a system has a delay because of the need to print and transport images to an on-call radiologist this could be reduced by a PACS system. A three and a half year study looked at the effect of changing to a filmless image management system on the time required to produce x-ray images in the Emergency Department. A regression model was developed that explained 22% of the variability in the time. The model predicted a time saving of 23 minutes per patient from notification of the need for x-ray until the image availability by the implementation of PACS. A delay of 4-6 minutes per patient was caused by inexperienced technologists and a delay of 18-27 minutes by the arrival of a serious trauma case. A small interrupted time series study looked at using automated pager notification of when films were available on a PACS system rather than doctors looking for results. The total time in the emergency department changed from 6:34 hrs to 5:32 (p<0.05).

Use of CT scanning in patients with non-traumatic abdominal pain obviated the need for admission in 17% of patients with abdominal pain judged by clinical examination. It also reduced by a half the number actually needing immediate surgery. A large number of these
changes were in the diagnoses of suspected appendicitis.\textsuperscript{473}

**E (iii) - Nurse Ordering of x-rays**

Nurse ordering of x-rays and lab tests according to guidelines has a moderate to substantial clinical correlation with physician ordering but over-ordering was markedly increased without presence of the guidelines.\textsuperscript{520} No studies have been found that correlate nurse ordering of laboratory tests with delays in emergency care. Nurses can order x-rays appropriately\textsuperscript{321} and interpret them as well as senior house officers.\textsuperscript{361}

A UK randomised controlled trial of nurses ordering of x-rays in 1833 patients showed there was a 14 minute saving when the nurse ordered the x-rays at triage against a background of 51 minutes when a doctor ordered the x-ray at time of first examination (p<0.001). X-rays were restricted to those in the distal limbs. Radiographers were not blinded and could change the area x-rayed when ordered by nurses. However this benefit was largely lost because of the increased referral rate by the nurses with no overall difference in the proportions of relevant abnormalities. (a non-significant saving of 4 minutes). The training levels were different in the 4 hospitals and it is noted that one hospital had greater training input and their reduction in time was greater.\textsuperscript{589}

Nurse requesting of x-rays was studied in another prospective randomised controlled trial of 675 patients. There was a 36% time reduction from time of triage to time of treatment decision in the nurse requested group (102.7, CI 96.4-109.0 to 65.5 minutes, CI 60.5-70.5). Triage nurses requested fewer x-rays than doctors (8% less; p=0.002) having a higher positive hit rate therefore triage nurse x-ray system appears to speed up the process of walking wounded patients.\textsuperscript{325}

In an Australian prospective trial of 175 patients, Parries reported that patients having triage initiated x-rays showed no significant reduction in transit times, it was thought this was due to the transit time being dependent on other factors and the existing good x-ray system. The trial was restricted to ankle and wrist injuries and was randomised according to date of presentation and the trial was not blinded. Also the study noted that only 77% of those in whom an x-ray was ordered by a nurse had it performed before the review by the doctor.\textsuperscript{256}

Lee studied 934 patients but they were not randomised to nurse-ordering and the control group was “a random selection” of cases outside the study group in the study period. The standard was case review by the doctor of the need for an x-ray as well as presence of a fracture. There was no significant difference in the ordering of x-rays by the nurses and the nurse ordered x-ray group had an average of 18.5 minutes less total emergency department time (p<0.001) but this was severely reduced to only a 2.5 minute advantage if a procedure was also needed (p<0.005).\textsuperscript{321}

A non-randomised controlled study of 193 patients undergoing extremity and skull x-rays at Changi Hospital showed an average time saving of 24.5 minutes on total time in the emergency
department compared to a matched control group (p=0.001), with appropriate ordering in over 99%. The control group were “randomly selected” and information did not allow comparison of control and intervention groups for comparability.69 This prospective non-controlled study of 579 "randomly selected" patients (but not randomised) suggests that nurses are capable of requesting appropriate x-rays, avoiding unnecessary ones and with this the actual time a patient spends in emergency department is reduced The mean time savings ranged from 8.5 minutes for ankle x-rays to 60.5 minutes for knee injuries but no statistical analysis was undertaken. Data quality was poor with only 30% data completion rate and inclusion criteria were not clearly stated. Ability of the nurses was assessed by the emergency department physician who managed the patient but the level of seniority of this physician was not recorded.336 A UK study of nurse ordering of x-rays ‘saved 29 minutes’ but does not state if this was an average over all attendances or only those on whom x-rays were ordered. No details of any of the differences in care of patients who had nurse ordered x-rays were given.127 Another UK study investigated using the Ottawa ankle guidelines at triage. The study was not randomised as it was a retrospective case control study. It demonstrated that emergency nurse practitioners using the Ottawa ankle rules at triage resulted in faster transit times than in a traditional system whereby the doctor ordered an x-ray. The time from assessment to discharge decreased from a mean of 98.52 minutes to 73.59 minutes (p=0.001) and of total time in the emergency department of 81.25 minutes to 81.25 minutes (p=0.001).3

A prospective randomised control trial with clear inclusion and exclusion criteria is still required in this area to determine whether x-rays at triage are of benefit but should also includes developments in fast track systems that mean the delay from triage to decision maker may be significantly reduced removing the advantage of triage ordered investigations and potentially creating a delay in the process.

E (iv) – Emergency department performed imaging

A recent review of the use of ultrasound in UK emergency departments highlighted that ultrasound is now increasingly being used by emergency department staff but that most of the literature emanates from America. The review confirms a wide variety of uses including assessment of abdominal trauma, abdominal pain, renal colic and musculo-skeletal disorders and describes the training requirements.52 Most work has addressed the clinical safety and effectiveness, however the papers below have also addressed the issue of whether ultrasounds undertaken by staff in the emergency department reduce the patients time in the department.

The use of transvaginal ultrasonography in the assessment of patients with pelvic pain or vaginal bleeding in the first trimester of pregnancy was assessed. When the emergency physicians undertook transvaginal ultrasonography the mean time in the emergency department was 165 minutes. When it was undertaken by an obstetric consultant the mean time was 235 minutes (p<0.0003). In this series of 84 patients there was no difference in
detection of ectopic pregnancies or other critical incidents.\textsuperscript{64}

A prospective observational convenience sample of women in early pregnancy was studied using a multi-variant model. Among the 115 patients those who underwent sonography had a decrease median length of stay compared with those who received sonography by a radiologist or obstetric consultant (60 minutes versus 180 minutes, \(p<0.001\)). The obstetric consultation was associated with an increase in length of stay of 60 to 170 minutes (\(p<0.001\)) and was most significant in patients with a viable intrauterine pregnancy, and was not seen in those with abnormal pregnancies. This was attributed to the fact that the latter group needed urgent consultations. Sensitivity of the test was 94\% and specificity of 100\%. No patient had an adverse outcome as a result of emergency physician performing tests.\textsuperscript{530} A retrospective notes review study demonstrated the emergency physician demonstrating a live foetus on ultrasound decreased the patients stay in the Emergency Department, particularly at night (reduction 59 mins, \(p=0.0001\)). However the radiology group was not randomised and included cases where the emergency physician was uncertain.\textsuperscript{59}

Doppler ultrasound, for detecting deep venous thrombosis, can be also undertaken by emergency physicians. Emergency physician dopplers resulted in quicker disposal of the patient than radiologist doppler (90 mins vs. 200 mins, \(p<0.0001\)). The emergency physicians and radiologist disagreed on diagnosis in one case in the 70 studied (\(k=0.95\)).\textsuperscript{583}

**Diagnostics – Conclusions**

Many studies, including several randomised controlled trials, have shown that results are made available earlier using point of care testing or satellite laboratories based in the emergency department. Those failing to show decreased overall time in the emergency department have been because of other factors such as bed availability, causing the delays. As these methods have been shown to be safe and reliable their introduction into emergency department would appear to be appropriate. Delivery of results has been poorly studied but there are suggestions that simply having electronic reporting may delay results delivery.

In imaging the use of guidelines seems to have a variable effect but generally reduces delays. Nurses ordering x-rays also appears to have benefit over usual triage processes but may have been superseded by fast track systems and therefore may need re-evaluation. Performance of ultrasound scans by emergency department staff can result in quicker scans but numbers undertaken in trials are small and the increased workload for emergency department staff, if widely adopted, may increase delays for other staff.
Key points

- Point of care testing / satellite laboratories produces quicker results.
- Nurse ordering of x-rays may speed up processes where fast track does not operate.
- Emergency department staff undertaking ultrasounds may reduce delays for those individuals.
- Results delivery needs more investigation as some IT solutions may delay it.
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<tr>
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<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendall J, Reeves B, et al. 1998</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial (N=1728) n=860 intervention n=868 control</td>
<td>ED attenders patients having laboratory tests</td>
<td>POCT for blood, biochem, blood gases</td>
<td>POCT improves speed of decision making – no significant effect on LOS or long-term clinical outcome.</td>
</tr>
<tr>
<td>Murray RP, Leroux M, et al. 1999</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial n=93 intervention n=87 control</td>
<td>ED attenders patients having laboratory tests</td>
<td>Point of care tests vs. laboratory based tests</td>
<td>Significant reduction in ED LOS for POCT, median LOS 3-hours-28 mins compared to 4 hrs 22 mins for the laboratory group.</td>
</tr>
<tr>
<td>Sands VM, Auerbach PS, et al. 1995</td>
<td>Emergency Department</td>
<td>Nonrandomised Study (N=960)</td>
<td>ED attenders requiring blood tests</td>
<td>Patients had simultaneous POCT and laboratory testing</td>
<td>POCT tests were available 31-43 minutes earlier depending on the test and modelling showed that a reduction of 17% in ED length of stay could be achieved by POCT.</td>
</tr>
<tr>
<td>Parvin C, Lo S, Deuser S, Weaver L, Lewis L, Scott M. 1996</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison n=2067 intervention n=1818 control 1 n=1100 control 2</td>
<td>ED attenders patients having laboratory tests (5-weeks)</td>
<td>Introduction of hand-held POCT device in ED testing: ▪ Na ▪ K ▪ Cl ▪ glucose ▪ Blood urea nitrogen</td>
<td>Point of care testing did not make any impact on patient waiting time in ED.</td>
</tr>
<tr>
<td>van Heyningen C, Watson ID, Morrice AE. 1999</td>
<td>Emergency Department</td>
<td>Randomised Controlled Trial n=130 POCT n=191 porter n=192 pneumatic tube</td>
<td>ED attenders having laboratory tests</td>
<td>POCT</td>
<td>POCT reduces laboratory results turnaround time but not patient waiting time.</td>
</tr>
<tr>
<td>Authors</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=369)</td>
<td>ED attenders patients have blood tests</td>
<td>POCT satellite laboratory in ED testing:</td>
<td>Reduction in test turnaround time of 87%</td>
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<tr>
<td>Lee-Lewandrowski E, Corboy D, et al. 2003</td>
<td>United States</td>
<td>n=316 POCT n=271 pre-POCT</td>
<td>ED Size: 70,000 p.a.</td>
<td>▪ blood glucose ▪ human chorionic gonadotropin ▪ urine dipstick ▪ creatine kinase-MB ▪ troponin tests</td>
<td>Significant reduction in ED LOS 41 minutes (p=0.006) - for patients who underwent: pregnancy testing, urine dipstick, and cardiac markers tests</td>
</tr>
</tbody>
</table>
### Table 18 – E (ii) Imaging

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<tr>
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<tr>
<td>Stiell IG, McKnight RD, et al. 1994 166</td>
<td>Emergency Department</td>
<td>Nonrandomised Study (N=2342) n=1,250 Intervention n=1,092 control</td>
<td>Adults attending the ED with ankle injuries. ED Size: 60,000 p.a. (2-hospitals)</td>
<td>ED physicians implementing OAR</td>
<td>Significant reduction in ED LOS no radiography (80 minutes vs. 116 minutes p&lt;0.001) Reduction of 28% for ankle radiography</td>
</tr>
<tr>
<td>Fiessler F, Szucs P, et al. 2002 177</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison (N=132)</td>
<td>Adult ED patients with ankle injuries</td>
<td>Use of Ottawa ankle guidelines</td>
<td>No reduction in ED LOS was observed by the introduction of OAR 82±37 versus 92 ±34 min; p=39)</td>
</tr>
<tr>
<td>Redfern RO, Langlotz CP, et al. 2002 151</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison n=1085 intervention – filmless system n=307 control – conventional system</td>
<td>Patients requiring an x-ray in ED ED Size: NK</td>
<td>Change to filmless radiology system</td>
<td>Regression analysis predicted - 2-3 minutes saved by filmless system</td>
</tr>
<tr>
<td>Espinosa J 1997 167</td>
<td>Emergency Department</td>
<td>Observational Study 500 pre-redesign</td>
<td>All ED patients plain x-ray ED Size: 30,000 p.a.</td>
<td>X-rays returned direct to ED physician without radiologist report</td>
<td>Reduction in wait for patient x-ray reduced from 74 minutes to 35 minutes Reduction in wait time has increased patient satisfaction</td>
</tr>
<tr>
<td>Horii S, Redfern R/Feingold E, et al. 2001 159</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison n=334 intervention – pager notification n=283 control period</td>
<td>ED patients needing radiology ED Size: NK</td>
<td>Pager notification for radiological results</td>
<td>Significant reduction in ED LOS 6 hours 49 minutes at baseline compared to Shours 32 minutes for pager period (p&lt;0.005)</td>
</tr>
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# Table 18 continued

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<tr>
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<tr>
<td><strong>Lee KM, Wong TW, et al. 1996</strong>&lt;sup&gt;106&lt;/sup&gt;</td>
<td>Emergency Department</td>
<td>Observation Study</td>
<td>Patients attending ED with blunt injury to one region of a limb (March 1995-May 1996) Excluding:</td>
<td>Nurse ordering of x-rays by protocol</td>
<td>Significant reduction in ED LOS by mean 18.59 minutes for patients in nurse ordering group (p&lt;0.001)</td>
</tr>
<tr>
<td>Applicable to UK: Yes Hong Kong</td>
<td></td>
<td>n=934 intervention cases n=699 control cases</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Thurston J &amp; Field S 1996</strong>&lt;sup&gt;108&lt;/sup&gt;</td>
<td>Emergency Department</td>
<td>Simultaneous Prospective Study (N=1833)</td>
<td>ED patients with limb injuries ED Size: 4 ED 1. 50,000 p.a. 2. 43,000 p.a. 3. 86,000 p.a. 4. 55,000 p.a.</td>
<td>Patients allocated to Doctor First (DF) or Nurse First (NF)</td>
<td>Significant reduction in ED LOS when no x-ray requested p&lt;0.001 DF-mean time saved 51 minutes NF - mean time saved 36</td>
</tr>
<tr>
<td>Applicable to UK: Yes United Kingdom</td>
<td></td>
<td>n=918 doctor first n=915 nurse first</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lindley-Jones M &amp; Finlayson BJ 2000</strong>&lt;sup&gt;109&lt;/sup&gt;</td>
<td>Emergency Department</td>
<td>Randomised Controlled Study</td>
<td>Attenders at ED with limb injuries (2 separate 2-week study periods, 6-months apart) excluding:</td>
<td>Experienced triage nurses request x-ray, by protocol, at time of first contact/assessment.</td>
<td>Significant reduction in triage-to-treatment time interval by 37 minutes (p=0.000) Triage nurses did not over request x-rays.</td>
</tr>
<tr>
<td>Applicable to UK: Yes United Kingdom</td>
<td></td>
<td>n=335 intervention – nurse requesting n= 340 control</td>
<td>elbows knees femurs over</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td>ED Size: 59,000 p.a.</td>
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Reducing Attendances and Waits in Emergency Departments

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<tr>
<th>ID</th>
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</tr>
</thead>
</table>
| Parris W, McCarthy S, et al. 1997 [17] | Emergency Department | Randomised Controlled Study \(N=175\) | Patients =14 presenting with ankle injuries. Exclusions:  
- no x-ray needed  
- patients with severe pain  
- patients admitted  
ED Size: 35,000 p.a. | Nurse initiated radiology request | Nurse initiated x-ray does not save time \(p=0.37\) |
| Applicable to UK: Yes Australia |                       |                            |                                                                                 |                                                                               |                                                                                    |

**Table 18 continued**

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<tr>
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<th>Study population</th>
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</thead>
</table>
| Ching TK, Leng LY, et al. 1999 [19] | Emergency Department | Case-control Study \(N=383\) | Patients attending ED excluding:  
- extremity  
- skull injury  
- pregnant  
- multiple injuries  
ED Size: NK | Trained nurse in triage requested x-ray by protocol | Significant reduction in mean ED LOS by 24.45 minutes \(p=0.0013\) |
| Applicable to UK: limited Singapore |                       |                            |                                                                                 |                                                                               |                                                                                    |
| Macleod AJ & Freeland P 1992 [18] | Emergency Department | Observational Study \(N=1833\) | ED patients presenting for triage with the exclusion of serious injuries  
ED Size: 29,000 p.a. | Trained nurse in triage requested x-ray by protocol | That nurse-instigated x-rays save time and broadly are not unnecessary - Mean time saving:  
- sprained ankle - 8.5 mins  
- scaphoid fracture – 21.5 mins  
- ankle fracture – 20 mins  
- clavicle fracture – 10 mins  
- sprained knee – 60.5 mins  
- soft tissue foot – 23 mins |
| Applicable to UK: Yes United Kingdom |                       |                            |                                                                                 |                                                                               |                                                                                    |
| Allerston J & Justham D 2000 [3] | Emergency Department | Case-Control Study \(N=183\) | Patients reporting ankle trauma who attended the ED  
ED Size: NK | Nurses trained in OAR requesting x-rays at triage versus x-ray ordering at assessment | Significant reduction in total time in ED for patients sent to x-ray from triage 81.25 compared to x-ray from assessment 106.59 \(p<0.001\) |
<p>| Applicable to UK: Yes United Kingdom |                       |                            |                                                                                 |                                                                               |                                                                                    |</p>
<table>
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<tr>
<th>ID</th>
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<tbody>
<tr>
<td>Burgher SW, Tandy TK, et al. 1998</td>
<td>Emergency Department</td>
<td>Observation Study</td>
<td>Patients presenting to ED with pelvic pain or vaginal bleeding in the first-trimester</td>
<td>Patients having ultrasound scans performed by ED physician or obstetric/gynaecologist</td>
<td>Significant difference in time to ultrasound performed by ED physician 164.7 minutes compared to obstetric/gynaecologist 234.79 (p&lt;0.003)</td>
</tr>
<tr>
<td>Shih CH 1997</td>
<td>Emergency Department</td>
<td>Observational Study</td>
<td>ED users with vaginal bleeding in early pregnant between October 95 and August 98 (115)</td>
<td>Patients having ultrasound scans performed by EPPPS or non-EPPPS</td>
<td>Significant difference in LOS Ultrasound performed EPPPS 60 minutes compared to radiology performed ultrasound 4hrs 39 minutes (p&lt;0.001)</td>
</tr>
<tr>
<td>Blaivas M, Sierzenski P, et al. 2000</td>
<td>Emergency Department</td>
<td>Case note review (N=1,419)</td>
<td>Patients presenting to ED in the first-trimester who undergo ultrasound scan</td>
<td>Patients having ultrasound scans performed by ED physician or radiology department</td>
<td>Significant reduction in ED LOS for ED performed ultrasound 3hrs 4minutes compared to non-EPPPS 180 minutes (p&lt;0.001)</td>
</tr>
<tr>
<td>Theodoro DL, Blaivas M, et al. 2002</td>
<td>Emergency Department</td>
<td>Observational Study (N=70)</td>
<td>Patients presenting to the ED with suspected DVT</td>
<td>Emergency department physician trained to use Doppler scan compared to radiologist</td>
<td>Significant difference in LOS to disposition. ED doppler performed scan 110 minutes compared to radiologist performed scan 200 minutes (p&lt;0.001)</td>
</tr>
</tbody>
</table>
Case Study 4

Path Pals for Blood Tests

Summary of Improvement

Introduction of a dedicated pathology link person (Path Pal) to reduce the time taken from request for blood test to time patient seen with the result for A&E patients. The goal was to reduce the overall waiting time for A&E patients.

This time between blood being taken from the patient, to the time the patient was seen with the results fell to an average of 72 minutes from 152 minutes.

Changes Made

- An analysis of work flow indicated that significant time was lost between the decision to request diagnostic test and the availability of those results at the point of care.
- Recruitment of Path Pal jointly between A&E and the pathology department.

New System:

1. Path Pal collects blood sample, logs blood sample on to pathology computer system.

2. Path Pal takes sample to lab, spins sample, distributes samples to Biomedical Scientists for analysis.

3. Path Pal retrieves result from computer in A&E, hands results to relevant Doctor or Nurse for action.

Implementation Advice:

- Make the Path Pal a joint appointment with Pathology.
- Provide adequate training and support.
- Address concerns that could lead to delays with other pathology services.

Next Steps:

- To look at expanding the role to take blood samples from patients.
- To examine the impact of this fast track system on other aspects of pathology work.
- To examine the role to see if it can be expanded to include other direct patient tests - i.e. ECG, TPR.
- To secure recurrent funding.

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CASE STUDY 5

Bedside Ultrasonography

Summary of Improvement
We focused on the management of patients following trauma and those with the possibility of an abdominal aortic aneurysm. Patient journey times to definitive treatment and to diagnosis were reduced by as much as 60% in patient groups who previously would have had to wait for further imaging and another medical opinion. All patient groups have benefited from this ultrasound practice.

Change(s) Made
- Introduce A&E-focused bedside ultrasound: The ultrasound system is based within the A&E department, combining sufficient portability for easy movement between patients with the resilience to perform well in the busy environment. It also has a basic recording facility for maintaining quality assurance.
- Consultants, and middle grades receive a day’s training for skilled ultrasound operation.
- We use the ‘rule-in’ practice of ultrasound to confirm diagnoses.
- We provide clear patient information related to those conditions that can benefit from early diagnostic work through bedside ultrasound, thus clarifying the use for medical staff within the department and potentially standardising implementation. Patients receive information about the procedure, as do primary care physicians, through our A&E letter.
- We communicate regularly between
A&E, radiology and nursing staff so that uniform information is provided to patients and their carers.

**Implementation Advice**

- Overcome any reluctance to bedside ultrasound from Radiology with discussion and presentation of the better care that could be provided to patients and the realisation that A&E-focused ultrasonography might help to rationalise and prioritise emergency diagnostic requests. We began this process in 1998.

- Obtain intra-department support through discussion within the A&E department and incorporating radiology and other specialties.

- Ensure full participation of clinical staff in ultrasound teaching and develop departmental change in practice through persistence.

- Develop inter-departmental interest from surgery, ICU, O&G, Urology, and Cardiology.

**Next Steps**

- Incorporate training regularly in local and regional programmes.

- Ensure staffing mix sufficient for use of ultrasound on a 24-hour basis.

- Use ultrasound for central line placement, as suggested in NICE guidelines.

- Focused Cardiac Ultrasound within A&E for hypotensive/ peri-arrest patients.

- Use of ultrasound within A&E for foreign body and soft tissue infection.

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F Admission Avoidance

Inappropriate or preventable admissions may account for 4.7-37% of hospital admissions but criteria are highly variable, as summarised by Glasby, who suggests that new methodologies are required.201

The emergency admission review tool is a validated assessment tool to determine whether a patient’s care is appropriate for an acute bed. Use of this in one study shows that 44-46% of in-patient bed days were inappropriate for acute care in one hospital. This was due to them receiving active rehabilitation and in others it was due to short-term waiting.17

In a study across seven Canadian hospitals, reducing length of in-patient stay did not result in increased rates of readmission or visits by a doctor within 30 days of discharge.239

A variety of schemes have been developed to prevent admission by providing the type of clinical care in the community that had previously been restricted to the hospital environment. These include:

- Specialist nurses working across primary and secondary care caring for heart failure, obstructive airways disease and other conditions.
- DVT outpatient diagnostic and treatment service.
- Hospital at Home service (incl intravenous antibiotics).
- Access to next day medical one-stop clinic.

Accident prevention has a key role in reducing the number of attendances at Emergency departments. This review has not considered aspects of accident prevention, which have been reviewed elsewhere368 (also available on-line at http://www.hda-online.org.uk/documents/prev_accident_al_injury.pdf) including falls prevention in the elderly602 613 470 410 169 251 which have been covered in other reviews.

Other components of admission avoidance are considered in the sections on:

- Social care in ED (see section C (ix)).
- Education (see section D).
- Frequent attenders (see section C (viii)).

A comprehensive programme of long term care of diabetes in 115 patients delivered an 83% drop in inpatient admissions within 6 months and emergency department attendance fell by 67%. This pilot study was only small and was in an American self-funded insurance system. Details of the study methodology were not described.9

F (i) - Heart failure

Management of heart failure by specialists has been shown to decrease (by 53%) the number of admissions.235

Other interventions458 543 and telephone consultation in heart failure and other chronic diseases611 may also decrease hospitalisation rates.
A study using an educational programme on self management and easy access nurse led clinic follow up, resulted in longer periods before readmission (141 vs. 106 days, p<0.05) as well as less time in hospital and similar survival compared to a control group.\(^93\)

The use of a heart failure centre providing aggressive out-patient therapy and extensive patient education was instituted in America. After 16 months initial analysis showed that hospital admissions had decreased by 30\%, hospital days by 42\% and average lengths of stay by 17\%.\(^85\)

**F (ii) - DVT**

In a Cochrane review of home versus in-patient treatment for deep vein thrombosis all randomised controlled trials (RCTs) were collated that compared a home treatment regime (LMWH) with hospital treatment (LMWH or UH) for the initial phase of treatment for DVT, and compared the safety, efficacy, patient acceptability and cost implications of home versus in-patient treatment. Three RCTs with comparable treatment arms were found. All three had fundamental problems including high exclusion rates, partial hospital treatment of many in the LMWH arms, and comparison of UH in hospital with LMWH at home. The trials showed that home treatment was no more liable to complications than hospital treatment.\(^513\)

**F (iii) - Thrombolysis**

Thrombolysis has been extensively studied and reviewed.\(^375\)\(^\text{45}\)\(^\text{619}\)\(^\text{414}\) The Department of Health has also issued best practice guidance with a review of the literature.\(^77\)

Studies have addressed the time to deliver thrombolysis rather total time or waits in emergency department. Because of the importance of this area, key messages are given below but readers should refer to the reviews above for more detailed information.

Key messages are that the following systems improve thrombolysis:

- Use of criteria based decision rule for performing ECGs.\(^213\)
- Prehospital transmission of ECGs.\(^291\)
- Fast track admission to cardiac team or CCU.\(^423\)\(^80\)\(^444\)\(^437\)\(^441\)\(^29\)
- Direct admission to CCU\(^498\)\(^437\) although may be selective.
- Nurse administered or initiated thrombolysis.\(^620\)\(^81\)\(^41\)
- Thrombolysis in emergency department.\(^163\)\(^205\)
- Nurse co-ordinator or thrombolysis nurses.\(^190\)

**F (iv) - Observation Units**

Observation wards have been proposed as a way of reducing the time spent in the main emergency department and providing the patient with a more comfortable and appropriate...
Reducing Attendances and Waits in Emergency Departments

surroundings during their early investigation and treatment phase.\textsuperscript{138} Four systematic reviews of the literature on observation wards/short stay wards have been found.

In 1989, Krome published a review spanning 15 years and made the following conclusions - they were a safe location for initial treatment, patients should have regular observation, care must be time limited, all patients need a plan and clear objectives to their stay in the short stay ward, they should be managed by the emergency department and they should not replace in-patient beds. He did not make conclusions of the effect on waiting or length of stay.\textsuperscript{302}

In 1998, Goodacre examined the use of short-stay units in the United Kingdom and undertook a review of the literature. He found that use of these facilities is highly variable and that evidence of clinical value and cost effectiveness compared with other methods of care were lacking.\textsuperscript{208}

In 2003, Cooke concluded that all types of assessment/admission wards seem to have advantages over traditional admission to a general hospital ward, including reducing the number of admissions and length of stay. A successful ward needs proactive management and organisation, senior staff involvement, and access to diagnostics and is dependent on a clear set of policies in terms of admission and care. Many diagnostic groups benefit from this type of unit, excluding those who will inevitably need longer admission. Vigorous financial studies have yet to be undertaken in the UK.\textsuperscript{105}

In 2003 Daly et al.,\textsuperscript{125} found that short stay and observation units have the potential to benefit patients, reduce length of stay, improve the efficiency of Emergency departments and improve cost effectiveness. However, the benefits reported were variable.

A further review by Hassan, looked at clinical decision units for patients needing a longer period of investigation than is usual in the emergency department but not requiring full admission to hospital but did not quote any evidence of their effect on emergency department waiting times.\textsuperscript{240}

As an extension of emergency department evaluation, an observation unit has also been shown to reduce the workload in the emergency department, thus giving staff better flexibility and improving the flow of patients.\textsuperscript{54} Only two studies were found that focused on the effect on overcrowding of the Emergency Department. A 14-bedded acute care unit was established remote from the main Emergency Department. The unit was designed for those patients needing more than four hours evaluation. During the first 10 weeks 1,589 patients were seen, representing 14.5% of the emergency department volume. Approximately a third were classified as post-emergency department management, 20% were admission processing and the rest (nearly half) were for primary evaluation. The number of patients who left without being seen decreased from 10.1% to
Reducing Attendances and Waits in Emergency Departments

5%. The ambulance diversion was a mean of 6.7 hours per 100 patients immediately before the unit opened and 5.6 hours per 100 patients during the same time in the previous year and decreased to 2.8 after the unit opened (p<0.05). The monthly hours of ambulance diversion decreased by 40% (202 hours to 123 hours, p<0.05).284

Bazarian et al., examined the impact of using a short-stay inpatient medicine unit (to reduce the number of admitted patients held in the Emergency Department) on the amount of time that patients spend in the emergency department.32 The mean (± SD) number of admitted patients per day waiting in the emergency department for more than 8-hours for an inpatient bed dropped from 9.6 ± 4.2, before instituting the SOU, to 2.3 ± 2.6. The authors reported that, after implementation of the SOU, there was a significant reduction in the average time spent in the emergency department for "treat and release" patients with chest pain (from 7.3 ± 6.0 to 5.5 ± 4.8 hours per patient; p<0.001) and asthma (from 5.0 ± 3.6 to 4.2 ± 2.9 hours per patient; p<0.05), but not for those with sickle cell crisis or seizure. However, these findings were confounded by an increase in the average number of beds during the study period from 722 to 736.

Length of stay appears to decrease with the use of observation / short stay wards. In a retrospective analysis of an emergency department observation unit, Williams et al., found that the average length of stay and number of admissions remained the same for the 10 most common diagnostic groups. In the group suitable for admission to the observation ward the average length of stay decreased from 3.97 to 2.59 days in the study period. The number of patients in the suitable groups increased by 19% over the 4-year study period but the total bed days fell by 23%. When compared to patients in the same diagnostic groups in other hospitals in the same town it was discovered that the original length of stay had increased in the other hospitals by 8%. However, it is not possible to conclude that this difference was due to the initiation of a short stay ward.617 Saunders and Gentile studied patients with mild exacerbations of pancreatitis and compared 27 consecutive patients managed through the observation ward with 27 randomly selected patients admitted directly to hospital. The condition of 14 of the observation ward patients improved sufficiently for discharge within 24-hours, with a mean stay of 14.4 hours. The remaining 13 observation ward patients required continuing hospitalisation, with an average length of stay of 7.5 days, which exceeded the average length of stay for patients admitted directly to hospital (5.8 days). There may be bias in the sample in that the observation ward patients had significantly lower serum amylase levels than patients admitted to hospital, suggesting less severe disease.503 Hadden et al., also found, in a prospective study of 214 patients, that observation in a general ward resulted in the patient being seen later and having an increased the length of stay in hospital when compared with observation unit stay. Patients also had to wait longer in a ward before being seen by a senior doctor.224 No studies have been found that show that observation units increase patient length of stay.

Medical admissions may also be avoided by use of observation/short stay wards. Many studies were excluded as
they use an analysis that counts an admission to a short stay ward only as having avoided an admission, when in reality it is an admission to a different area of the hospital. A study in Singapore demonstrated that by using observation wards it was possible to achieve a 6.4% saving to direct inpatient admissions to the hospital.\textsuperscript{313} Ross showed that if patients were admitted to an observation unit where they had an accelerated process of investigation and care this could be effective in improving in-patient bed availability and each emergency department observation unit bed would keep between 1 and 3 patient beds available for other uses.\textsuperscript{479}

McDermott et al., used a prospective randomised controlled trial in patients with acute asthma who did not meet discharge criteria within 3-hours of presentation to the emergency department.\textsuperscript{350} Patients were randomly allocated to receive ongoing care in either the emergency diagnostic and treatment unit or in a hospital ward. Of the 110 patients managed through the emergency diagnostic and treatment unit, 59\% were discharged home and 41\% were transferred onto a ward. In this study, 45 patients avoided an inpatient admission. Brillman and Tandberg undertook a retrospective comparative cohort analysis of patients with asthma — 834 before the observation ward was opened and 390 after it was opened. They found that use of an observation unit for patients with asthma reduced initial discharge rates from the emergency department and did not change admission rates.\textsuperscript{55} One randomised trial, which used a small patient sample size of 222, assessed the treatment of asthma patients and compared hospital inpatient care with an emergency department observation unit. However, no difference was found in admission rates between the two groups.\textsuperscript{350} A before and after study investigating the introduction of a paediatric observation ward noted a reduction in admissions of 31\% and the frequency of under 24 hour admissions decreased from 17\% to 10\% but with an increased rate of repeat visits to the emergency department within 72-hours (from 3\% up to 5\%).\textsuperscript{211} However, Willert and colleagues, in a randomised clinical trial of 103 children with asthma, showed no difference between groups in the rate of re-presentation to emergency.\textsuperscript{616}

A study in an emergency care tertiary centre with forty six thousand annual visits looked at whether there was a cost reduction in providing observation beds to avoid full hospital admission. Only 32\% of the admissions could have been treated in an observation ward and the potential savings from inpatient bed closures would only have amounted to 1.68 whole time equivalents because they would have been evenly spread across the hospital. This would not be enough to staff a four-bedded observation unit, which would require at least 5 full-time equivalents.\textsuperscript{541}

The purpose of chest pain assessment units is to rule out myocardial infarction or other serious cardiac pathology and are therefore a specialised type of observation ward or clinical decision unit. Present regimes take 6-12 hours.

In a systematic review of the literature on chest pain units Goodacre concluded that chest pain assessment unit care is safe and costs are well defined. There is no strong evidence that a chest pain assessment unit will improve outcomes.
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if routine practice is good. Cost savings have been shown when compared with routine care in the United States but may not be reproduced the UK. The studies did not specifically look at the time spent in emergency department or the effects of chest pain assessment units on this time. 80% of patients seen in chest pain assessment units avoided full hospital admission. In a randomised controlled trial involving 100 chest pain patients, Gomez et al., evaluated the efficacy of their "rapid" protocol, which included a period of observation in a chest pain unit to exclude the diagnosis of myocardial ischaemia. The average length of stay for "rapid" protocol patients was 15.4 ± 12.2 hours, which compared favourably with 54.6 ± 12.6 hours for patients receiving routine care. As the authors attributed these findings to their protocol, it is not clear what role the observation unit played.

Subsequently Taylor et al., have studied a clinical rule out strategy and found that the median time for discharge was 23 hours. There was no comparative data on "routine practice". A prospective, observational, cohort study by Goodacre verified the safety of such a system but did not look at the time factors.

In conclusion, it appears that assessment/short stay wards may reduce length of stay in emergency department and possibly in the hospital. However, results are variable and confounded by methodological issues. Studies often look at times in specific hospital areas rather than patient focused times in hospital and "wasted" time.

F (v) - Social care supporting discharge

The role of social workers in Emergency departments has already been discussed in section C(ix) of this chapter.

Hyde et al., undertook a systematic review to investigate the effects of supported discharge after an acute admission in older people with undifferentiated clinical problems. They found nine studies but concluded that bias was present in all. There was relative certainty that the proportion of those at home 6-12 months after admission is greater with supported discharge (odds ratio 1.4, 95% confidence interval 1.1-2.0). This was associated with a consistent pattern of reduction in admission to long-stay care over the same period, without apparent increases immortality. There was uncertainty about the effect of supported discharge on hospitalization.

An Australian system involved a pre-discharge interview and a home follow up by a pharmacist for patients with chronic illness requiring medication. This resulted in a decreased emergency department attendance rate (236 vs. 314, p<0.01) and unplanned readmission rate (154 vs. 197, p=0.22) compared to a control group.

Use of hospital intervention team with additional in-hospital and post-discharge follow-up of elderly patients did not change survival in a randomised control trial, but the intervention group showed a significant reduction in length of hospital stay (33.49 days vs. 40.7 days in the assessment group and 42.7 days in the control group; p<0.05). There
Reducing Attendances and Waits in Emergency Departments

was no difference in survival, acute care hospital readmissions or new admissions to nursing homes but the intervention group had significantly shorter hospital readmissions (22.2 days vs. 34.2 days and 35.7 days; p<0.05) However, there were methodological problems with cross-contamination between study groups.

A systematic review of preventive home visits to older people reviewed 15 trials and found no clear evidence of their effectiveness for a variety of outcomes, including reduction in hospital admissions but did not look at emergency department attendance.

Social care issues are also covered in the sections on:

- Social care in ED (Section C (ix)).
- Education (Section D).
- Delayed discharge (Section H).
- Social care supporting discharge (Section F (v)).

F (vi) - Hospital at home

Hospital at home studies have looked at the effect with respect to hospital bed days but have not looked directly at the effect on the emergency department. It is therefore presumption that decreasing length of stay will decrease bed occupancy and therefore improve emergency care patient flows resulting in decreased delays in the emergency department. A Cochrane review looked at randomised trials of hospital at home care compared with acute hospital in-patient care. The participants were patients aged 18 years and over. Sixteen trials evaluated hospital at home for elderly patients with a mix of medical conditions and those recovering from elective surgery failed to detect a difference for patient health outcomes. The data for those recovering from a stroke was conflicting. One trial reported an increase in independence for those allocated to hospital at home, and another decreased communication and psychosocial well being at three months follow-up but not at six months follow-up. Patients allocated to hospital at home expressed greater satisfaction with care than those in hospital. Carers however expressed less satisfaction with hospital at home compared with hospital care. Allocation to hospital at home resulted in a reduction in hospital length of stay, but hospital at home increased overall length of care. This review does not support the development of hospital at home services as a cheaper alternative to in-patient care. Early discharge schemes for patients recovering from elective surgery and elderly patients with a medical condition may have a place in reducing the pressure on acute hospital beds, providing the views of the carers are taken into account. For these clinical groups hospital length of stay is reduced, although this is offset by the provision of hospital at home. The evidence supporting hospital at home for patients recovering from a stroke is conflicting. There is some evidence that admission avoidance schemes may provide a less costly alternative to hospital care. Future research should focus on admission avoidance schemes, and the effect of early discharge hospital at home schemes for patients recovering from a stroke.

A further review looked at stroke patients specifically and considered controlled clinical trials, it discovered four trials of which three had outcome...
Reducing Attendances and Waits in Emergency Departments

Data available (921 patients; 857 from one controlled trial, 64 from two randomised trials). There were no statistically significant differences between the patient and carer outcomes of the intervention and control groups either within individual trials or in pooled analyses. There was a trend toward greater hospital bed use and increased costs in the intervention groups. 309

Admission Avoidance – Conclusions

A variety of specialist nursing interventions have been shown to be able to reduce the risk of emergency admission and emergency department attendance, including care of heart failure and mild COPD, hospital at home schemes, social support systems and management of DVTs. There is good evidence supported by Cochrane reviews in many of these areas. Observation units can prevent hospital admission and reduce length of stay, but methodological flaws make it difficult to interpret whether the changes are significant to the patient or simply a different environment. Similarly chest pain units may avoid hospital admission and be clinically effective but there is no evidence of their effect on emergency department delays.

Key points

- Specialist nurse care in heart failure, COPD and DVT can reduce hospital admissions.
- Home support (medical and social) can reduce hospital admissions.
- Observation wards may reduce length of stay and avoid admission.
<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
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<tr>
<td>Anonymous 1998</td>
<td>Not known</td>
<td>Study design NK (N=115)</td>
<td>Diabetic NetCare patients</td>
<td>Not known</td>
<td>Reduction of 67% on ED attendance</td>
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<td>United States</td>
<td></td>
<td>Setting: NK</td>
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<td>Stewart S, Pearson S. et al. 1998</td>
<td>Tertiary hospital.</td>
<td>Randomised Controlled Trial (N=906)</td>
<td>Medical and surgical patients discharged home with medication.</td>
<td>Home based Intervention versus usual care</td>
<td>Significant decrease in ED attendance post intervention (236 vs. 314, (p&lt;0.01)</td>
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<td>Setting: 440-bed hospital</td>
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<td>-counselling pre-discharge by nurse and/or pharmacist</td>
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<td>-home visit by nurse and pharmacist one-week post discharge for high risk patients to:</td>
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<td>§ “Detect otherwise hidden problems.”</td>
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<td>§ “Increase patient/caregiver vigilance for impending crisis.”</td>
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<td>§ “Improve liaison with community based services”</td>
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<td>Gouin S, Macarthur C, et al. 1997</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison</td>
<td>Children (1-18-years) with:</td>
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<td>n=350 asthma visits post-observation unit group</td>
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<td>n=352 asthma visits pre-observation unit group</td>
<td>• reactive airways disease</td>
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<td>• Exclusions:</td>
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ED size: >50,000 per 2,000 – children with asthma

Paediatric observation unit staffed by emergency physician and registered nurses.

Increase in repeat ED visits
Pre-observation unit 3.2%
Post-observation unit 5.0%
<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
</table>
| Bazarian JJ, Schneider SM, et al. 1996 | Emergency Department | Pre-post intervention comparison Historical Control | Patients with:  
- chest pain  
- asthma exacerbation  
- sickle-cell crisis  
- seizure.  
ED size: 60,000 p.a.  
Setting: short-stay inpatient unit 135 patients per month from ED | Establishment of short-stay medical unit | Significant reduction in ED LOS for treat-and-release patients with:  
- chest pain (7.3 to 5.5 hours) (p<0.001)  
- asthma exacerbation (5.0 to 4.2 hours) (p<0.05) |
| Kelen GD, Scheulen JJ, et al. 2001 | Emergency Department | Observational study n=1,589Post-acute care unit Historical control | Acute Care Unit users during 10 weeks post intervention  
ED size: 54,00 p.a. | Acute Care Unit staffed by ED nurses | ACU had significant effect on ED overcrowding:  
- ambulance diversion - Pre-intervention 6.7hrs/100pts. Post-intervention 2.8hrs/100pts (p<0.05).  
- ambulance diversion hours/per month - Pre-intervention 220hrs. post-intervention 123hrs. (p<0.05).  
- LWBS – Pre-intervention 10.1% post intervention 5.0% |
<table>
<thead>
<tr>
<th>Nikolaus T, Specht-Leible N, et al. 1999</th>
<th>Applicable to UK: limited Germany</th>
<th>University-affiliated geriatric hospital /care home</th>
<th>Randomised Controlled Study (N=545)</th>
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<td>n=181 - home intervention</td>
<td>n=179 - assessment</td>
<td>n=185 - control</td>
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No difference in hospital readmission rate for the three groups
CASE STUDY 6

Clinical Decision Unit

The development of a nurse led, protocol driven Clinical Decision Unit led to a 17% reduction (3970 patients) in unscheduled admissions. Patient satisfaction with the service is excellent.

Starting Point

Long delays for assessment for Emergency patients. GP referrals and emergency patients back logging into A & E.

Due to the delays in assessment, patients requiring observation admitted to main wards.

Improvement made:

- Introduction of Clinical Decisions Units (CDU) into two large A&E departments in Leeds, with the aim of rapid diagnosis, short-term treatment and/or observation of selected emergency patients with Chest Pain, DVT, PE, Cellulitis, Renal Colic, Syncope, Self Harm, Headache, Minor Head Injury, Asthma.

- Development of evidence-based care protocols across a range of conditions.

- Involvement and commitment of key services across the Trust.

- Development of nursing practice to deliver nurse-led services, including nurse initiated investigations.

- Securing on-going financial support for further development.

Impact of this change:

- 4793 patients entered the two CDUs in the first 12 months. Of these, 823 were admitted (17%), a saving of 3970 unscheduled admissions.

- Nurse-led management of DVT and Cellulitis services.

- Patient satisfaction with service – 84% gave a rating of excellent or very good.

Next Steps:

- Development of further protocols for new groups of patients.

- Further exploration of nurse-led services.

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G. Bed Management

Bed management has been the focus of a lot of attention in the last year, with particular emphasis on the need to predict bed requirements and adopt an anticipatory style of bed management\(^\text{137}\)\(^\text{22}\) access to beds in a timely manner is key to avoiding waits in the emergency department.\(^\text{460}\) Summaries of bed management functions and a literature review have described how it may help solve overcrowding in the emergency department.\(^\text{341, 43, 440}\) Although summarising the evidence, it was not designed as a systematic literature review, but highlights the lack of trials in this area.

G (i) – General

It was noted that finding an appropriate bed was consistently the difficulty causing access regardless of time of day.\(^\text{28}\) An automated bed tracking system in Pittsburgh, using bedside communication devices to inform a central bed system of the status of the bed, was reported to reduce the ED length of stay by 30%. The paper did not give any details of how this improvement was measured or any other contributing factors.\(^\text{574}\)

A study of when waits occur show that during times of acute overcrowding as defined by critical bed status then significant delays occur for patients in allocation to a bed in the emergency department. This was more pronounced in the less severely ill patients. Once in a bed they did not show any difference in the time they waited to be seen by a physician or the time to first intervention, however they did then wait longer to be moved to a new patient bed.\(^\text{327}\) However a UK study shows that waiting for a bed after the decision to admit is one of the top four causes of delays.\(^\text{179}\)

It has been found that 65% of the workload variation of Emergency departments can be predicted using historical temporal trends, infectious disease notifications and weather information.\(^\text{368}\) Forecasting the daily number of occupied beds is possible with an accuracy of 3% of the mean number of beds used for emergency admissions. It is also recognised that volatility in emergency admissions is a better predictor of long waits in emergency department than total bed occupancy.\(^\text{248}\) It has been suggested that calculating a demand value for the emergency department may enable prediction of when an emergency department is decompensating. Demand value is a function of the bed ratio, the acuity ratio and the provider ratio.\(^\text{453}\)

Modelling of the dynamics of a hospital system using a discrete stochastic simulation model revealed that there is a discernible risk of waits in emergency department when bed occupancy exceeds 85% and that regular bed shortages and crises can occur if bed occupancy rises to more than 90%.\(^\text{25}\) An observational study using routinely collected data from a large teaching hospital demonstrated that increased hospital occupancy is strongly associated with emergency department length of stay for admitted patients. The length of stay increased to 80 minutes when there was an absolute increase in occupancy of 10%. It appeared to increase extensively when over 90% occupancy was achieved. During the study period there was only a small variation in occupancy so large changes
may not be detectable. The study excluded patients who were discharged home from the emergency department and only considered those admitted. This study demonstrates a link but not a causal relationship.\textsuperscript{182}

By reorganising the method by which emergency patients were assigned within the emergency medicine department it was shown to be possible to reduce the length of stay. Patients from the emergency ward were assigned to the internal medical departments according to a quota system that ensured that each department received a similar share of the admissions, hence preventing some departments having excessive workload compared to others. The average length of stay was shortened from 8 days to 6.3 days (p=0.0001). The occupancy rate in hospital was reduced from 94\% to 88\% (p=0.002) during a period in which the number of admissions increased by 19\%. However the rate of readmissions within 30 days did also increase from 12.5 to 16.4\% (p=0.0001). Mortality was unchanged during this period. At a paired hospital in the same area length of stay occupancy and number of admissions were unchanged. It appears therefore that this simple administrative intervention may have influenced physician incentives and significantly reduced hospital length of stay and therefore bed occupancy.\textsuperscript{480}

G (ii) - Discharge lounges

Discharge lounges are areas of the hospital where patients can wait on the day of discharge until transport and other arrangements are made for their discharge. They help to counter the mismatch between the time beds are required for admissions and the time beds become available from the discharge of patients from the ward. One hospital established a discharge lounge from 10am to 6pm each day.
After one year it had saved 6,074 bed hours on the wards but it is unknown how this impacted on waits in emergency department.\textsuperscript{113}

G (iii) - Nurse led discharge

If nurses are allowed to discharge patients, it may prevent delays in awaiting medical staff to visit the ward. One study in a gynaecology ward reduced the length of stay of hysterectomy patients from 2.2 to 1.7 days.\textsuperscript{59} A system of nurse led discharge has been shown to decrease the time to readmission (p<0.001) and the number of readmissions (p<0.001). No analysis was undertaken of its effect on the initial length of stay.\textsuperscript{418}

However a study of a nurse led inpatient facility for patients requiring no further medical intervention showed that they had longer length of stay than the those randomly assigned to traditional consultant managed care (median 27.0 days vs. 15.5 days, p<0.036).

G (iv) - Discharge planning

Discharge planning has been described as haphazard in the NHS but no studies were found to evaluate the benefits. The role of discharge co-ordinators has been described but not evaluated.\textsuperscript{387}

Bed Management – Conclusions

There is a lack of evidence supporting any innovations in bed management although it has been shown that workload can be predicted. There is weak evidence that allowing direct admission by the emergency department team will reduce waits and has no negative effect.

Managing the beds in a hospital is a key role to its efficient functioning and yet no trials of different bed management strategies were found. This should be a priority area for future research in view of the alleged wastage in beds from unnecessary long stays in hospital.

Key points

- There is a lack of evidence of innovations in bed management.
- Allowing emergency department staff to admit to wards will reduce delays.
### Table 20 - H Bed Management

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Study population</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
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<tr>
<td>Forster AJ, Stiell I, et al. 2003</td>
<td>Emergency Department in-hospital care</td>
<td>Observational Study</td>
<td>ED users admitted to hospital April 93’- June 99</td>
<td>Effect of hospital occupancy on ED LOS for admitted patients</td>
<td>ED LOS significantly associated with hospital occupancy - increases in hospital bed occupancy (esp. 79%) lead to prolonged ED waiting times</td>
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<td>Applicable to UK: limited</td>
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<td>ED Size: 60,000 p.a.</td>
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CASE STUDY 7

Discharge Lounge

Summary of Improvement
The introduction of a discharge lounge has improved the utilisation of beds and provided a more efficient service for both elective and emergency admissions, ensuring that care is not compromised.

Bed hours saved since November 2000: 4,658 hours.

Trolley waits were reduced.

Patient/user satisfaction i.e.: “The lounge is a wonderful idea; I gave up my bed 4 or 5 hours earlier so use of it could be made for another patient.” And “The most useful part was having a co-ordinator keeping you informed and trying to speed the discharge process; on the wards, nurses are so busy they don’t really get time to do that”.

Changes Made:
- More efficient utilisation of beds and timely admissions.
- Orderly discharge process using dedicated staff.
- More effective use of transport services.
- Quality of care improvement as shown in user questionnaire feedback.

Implementation Advice:
- Facilitate a change in culture; convince staff it will not be “more work”.
- Even if wards are not busy, encourage staff to use the lounge.
- Communicate with transport and relatives; carers need to be aware of the transfer to the discharge lounge.
- Take into consideration the needs of and finding a suitable area to provide the service.

Next Steps:
- Reinforce the message to all staff involved about the benefits of using the lounge for both staff and patients; the results are indisputable.
- Working closely with the clinical site managers has improved the use of the our lounge; daily joint visits are made to the wards collecting the names of possible users and discharge information.

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H - Delayed Discharges

A review of the literature around delayed discharges was undertaken by Vetter.\textsuperscript{603} He highlighted the fact that research is difficult because of the lack of an objective measure of inappropriate delay, although a systematic review of this subject by McDonagh\textsuperscript{351} has suggested the appropriateness evaluation protocol (AEP) to be the best validated.

Vetter\textsuperscript{603} found that no trials have looked at outcome in-patients deemed to have been inappropriately discharge. He also found that there have been no robust analyses of discharge planning other than a systematic review of home visits before discharge\textsuperscript{421}, which found no randomised controlled trials. Only five studies (two retrospective surveys, three observational surveys) were identified. In four of these, a possible benefit for home visiting was suggested.

Glasby has reviewed the literature relating to delayed discharges and has highlighted the key issues as:

- Failure to give patients and their carers adequate notice of discharge.
- Failure to involve patients and their carers in decisions about discharge and ongoing care arrangements.
- Failure of health and social care partners to work effectively together.
- Hospital delays in arranging transport and medications.
- Lack of attention to the needs of carers.
- Structural barriers e.g. separate funding streams, organisational and professional barriers.

He also highlights the lack of intervention studies to research innovations that could influence these factors.\textsuperscript{200} He is also undertaking a systematic literature review funded by Department of Health (PREP) Policy Research Program, which aims to identify and explore the rate and causes of delayed hospital charges and policies and practices that may reduce delayed discharges and improve the experiences of older people.

In Seattle the most frequent reason for ‘overstays’ was lack of post-hospital beds. Overstays were calculated as days in hospital after the patient had been declared medically fit. 81% of patients had no one available at home to give care. System failures accounted for 90% of overstay days.\textsuperscript{523}

A thematic analysis identified the barriers to successful discharge practices in a general hospital in Leeds UK using four focus groups of staff and ten in-depth patient interviews.\textsuperscript{73}

Five themes emerged:

1. Communication in the multi-disciplinary team and with patients was variable.
2. Teamwork- there was a lack of cohesive working.
3. The discharge process, impacting its co-ordination.
4. Resources, in particular equipment.
5. Planning to ensure referral before the time discharge is required.
Social care issues are also covered in the sections on:

- Social care in emergency department (section C (ix)).
- Admission avoidance (section F).
- Education (section D).
- Social care supporting discharge (section F (v)).

Delayed Discharges – Conclusions

The literature exploring delayed discharge is limited, hampered by the lack of an objective measure of ‘inappropriate delay’. A number of factors effecting delayed discharge have been identified, however, the research base is weak. One systematic review has been found which explored the effect of home visits prior to discharge and although a possible benefit for home visiting was suggested only five studies: two surveys and three observational were found. More research is needed in this important though difficult area.

Key points

- There is a lack of evidence about innovations to reduce delayed discharges from hospital.
- Most evidence looks at the causes of delays rather than solutions.
I - Staffing

Matching the number of staff to the caseload arrival is key to ensuring that a queue does not form but this needs to be combined with measures of workload; tools have been developed to assist this. By applying the theory of constraints, bottlenecks in the system can be identified and a model created to determine if extra staffing is required to reduce waits. It has been successfully used to predict an SHO shift pattern that more closely matched the patient arrival pattern and would produce shorter waiting times.

Most emergency departments have fixed staffing levels. One study developed an additional team of personnel who were on call during the viral epidemic season. If the hourly number of presentations was greater then 25% of the hourly average for the year then the team would be mobilised. The team was used 32% of the time in the viral season. It resulted in non-significant decreased waits to see a doctor of 15 minutes compared to the previous year when there was no such team. The study was limited to those patients discharged and in whom all data was available (which was only 64% in the control time period). A Chinese study looked at developing a team of experienced nurses who were responsible for quality control and had to be available for on call duties overnight as well as working evenings in the emergency department. They reported that it improved pressure on staff and improved quality of care but detailed analysis was not available. In Rochester a system was developed so that at periods of overcrowding a “code red” was instituted which provided extra staff in the emergency department, increased flexibility of bed usage in the hospital and a transition team to care for patients awaiting admission in the emergency department. The analysis did not allow exact measurement of the improvements.

Team working was assessed by a trial whereby physicians and nurses were teemed up compared to a trial of normal practice. Patient satisfaction with waiting time improved with the team system (score 68 vs. 73, p=0.01). Changing from a system of individual doctors determining their own work rate (by seeing the next patient when they are ready) to a system of rotational allocation caused a reduction in length of stay for moderately ill patients. Critically ill, psychiatric and paediatric patients were excluded. After one year the waits had reduced from 7.11 hours to 5.86 hours (N=425 pre and 448 post; p<0.001). Another system of small team working was assessed by Lau et al. Before and after the introduction of the new system, the average waiting time of the patients was 35.19 minutes and 22.04 minutes respectively (range 0 to 134.0 minutes and 0 to 106.3 minutes, respectively). The difference of 13.15 minutes in the average waiting times was clinically and statistically significant (t=2.81; p=0.004), supporting this new system of working.

No high quality studies were found to help predict staffing requirements.

I (i) - Senior Staff

Many of the studies previously mentioned have suggested that increased involvement of senior staff would improve the emergency care
system but have not supported this with evidence. The debate about 24-hour senior cover in the emergency department was summarised by Cooke et al.\textsuperscript{107}

In a time series study, a three week period of medical emergencies receiving normal junior assessment with senior advice if required followed by a three week period of being assessed by a single senior registrar then by a group of senior registrars. The same day discharge was better in week two than week one (3.6% vs. 29%, \(p<0.001\)) and still higher than week one in the third week (15%, \(p<0.001\)) the readmission rate also reduced (13.3%, 6.9%, 6%).\textsuperscript{607} Murphy et al. demonstrated that using the ED staff grade to determine the need for admission compared to the traditional referral system reduced the wait from decision to admit to bed from 130 minutes to 235 minutes (\(p<0.0001\)). However in the emergency department staff grade arm of the trial only one person who was more senior saw the patient.\textsuperscript{381}

A British study undertook a randomised controlled trial reviewing patients who had been referred to the surgical team for intra-abdominal abnormalities which did not require emergency surgery. In the intervention group patients were seen by a senior surgeon (consultant or senior registrar) and then had abdominal ultrasound and/or plain x-rays which were evaluated by a radiologist. The 2 groups had no significant difference in mean waiting time in emergency department, length of admission, surgical intervention, readmission rate, and mortality. However, there was a significant difference in the major outcome measure of number of patients admitted. It was therefore successful in avoiding admissions.\textsuperscript{95}

One study noted that 2.5% of total emergency department re-attendances were unplanned emergency department attendances. The common reason for this related to persistent pain following injury and approximately half had a significant change in their management. It was also estimated by expert opinion that two thirds of re-attendances were unavoidable therefore only 0.8% of all emergency department attendances are avoidable because of changes that reduce re-attendance rate. The article suggests that senior emergency department doctors may be able to reduce this number.\textsuperscript{16}

In a study of 156 patients potentially needing psychiatric care the assessment given by emergency physicians and psychiatrists was compared. The emergency physicians and psychiatrists had only a moderate agreement to regarding danger to self (\(k=0.44\)) danger to others (\(k=0.4\)) and substance abuse being a primary problem (\(k=0.5\)) and the need for psychiatric hospitalisation (\(k=0.54\)). The study did not look at which diagnosis eventually was deemed to be correct. It suggested that this only moderate level of agreement means that there should be more shared training and suggests that a policy of direct psychiatric admission following emergency physician assessment may produce some discrepancy of opinion.\textsuperscript{191}

Improvements in care may also be achievable by enabling staff to increase their patient contact time. An American study showed low levels of direct contact\textsuperscript{258} and Brown reported UK
consultants only able to spend a 30% of their time in patient contact. This study of the activities of emergency department consultants showed that the more consultants present the more time they spent on clinical duties but none of the consultants studied spent more than 48% of their time in clinical contact, although all worked over their contracted hours. It was however using a small convenience sample of staff. A time and motion evaluation of the activities of four emergency department consultants determined that over 20% of their time could have been saved with the use of a physician’s assistant. This study only took place in one hospital and the consultants knew they were being observed, so this may not be applicable to all situations.

I (ii) Nurse Practitioners

Nurse Practitioners are used widely throughout the UK and schemes are increasing rapidly. They have been shown to be as safe as junior doctors and patients are satisfied with the care they administer. Although, interestingly, in a paying system, patients are prepared to pay more to see a doctor. A literature appraisal concluded that depending on the protocols and patients’ age restrictions, Emergency Nurse Practitioners could independently treat between 24% and 30% of patients attending emergency department but the cost per case may be higher for Emergency Nurse Practitioners. It has been demonstrated that emergency nurse practitioners can treat minor injuries equally effectively as senior house officers but that both made significant errors in 9-10% of cases. This study did not assess the time taken by each to examine the patient or complete their care.

A study in a minor injury service showed that practice nurses seem to offer an effective service for patients with minor illnesses although consultation times were slightly longer. The difference in emergency department visits between the two groups was not significant. A study of nurse practitioners in various emergency care settings showed that the nurse practitioners spent 12 minutes longer than doctors at the initial consultation but this resulted in greater patient satisfaction. The overall length of stay was also shorter with ENPs. However, the study had a significant weakness in that the ENPs were based in a minor injury unit or a minor injury stream of ED and the doctors in the ED, it is therefore impossible to determine if the delays were due to the carer or the environment.

A systematic review of nurse practitioners working in primary care showed that in selected groups of patients, patients are more satisfied with care from nurse practitioner than from a doctor, with no difference in health outcomes. This may be related to the fact that nurse practitioners take longer for consultations, but it also noted that they carry out more investigations. The studies were mainly limited to patients with minor illness. Minor illness in primary care can be successfully treated by nurses who have access to a doctor.

An Australian study looked at suturing of minor lacerations by clinical nurse specialists. Patients were randomly assigned to have their lacerations
sutured by either doctors or the clinical nurse specialist. Analysis found that the patient length of stay was not significantly different between the two groups. However, those who were cared for by the nurse appeared to be more satisfied with their care and the overall services. Wound healing outcomes were similar for both groups.\textsuperscript{87}

A new concept is now developing in emergency nursing whereby rather than having a division between nurses and emergency nurse practitioners, a spectrum is developed based on individual competencies. This concept has only recently been described by Crouch et al., and has yet to be evaluated for effectiveness.\textsuperscript{115}

\section*{I (iii) Specialist Nurses}

In a systematic review of COPD specialist nurses four studies were found. Three assessed mortality following twelve months of care (n=96, 152 and 301), and one after seven months (n=75). Meta-analysis demonstrated that mortality was not significantly reduced by the intervention, (Odds Ratio 0.72; 95 \% confidence interval 0.43, 1.21). Post hoc subgroup analysis suggested that mortality was reduced by the outreach nursing programme in patients with less severe disease. Significant improvements in health related quality of life were reported in one study in moderate COPD, but not in a study in patients with severe disease. No changes in clinical course were identified. Hospital admissions were reported in only one study in patients with severe disease and no benefit was observed.\textsuperscript{329}

The presence of a diabetes specialist nurse / nurse case manager may improve patients' diabetic control over short time periods, but from currently available trials the effects over longer periods of time are not evident. There were no significant differences overall in hypoglycaemic episodes, hyperglycaemic incidents, or hospital admissions. Quality of life was not shown to be affected by input from a diabetes specialist nurse/nurse case manager.\textsuperscript{329}

\section*{I (iv) Emergency Care Practitioners}

Emergency Care Practitioners are a new term that has been adopted to cover a group of individuals working in emergency care who have skills that apply across traditional boundaries. Most frequently it applies to ambulance paramedics with extra skills and training to increase the diagnostic and clinical management abilities. But it has also been applied to nurses who have expanded their skills in prehospital care and other professional groups working in emergency departments. The role of the paramedic in the emergency department has been described\textsuperscript{324} and the different training requirements of nurses and paramedics in the UK has been explored.\textsuperscript{374}

A study of community paramedics in Staffordshire demonstrated that 25\% of patients attended were not transported and there were no adverse outcomes. However, with no control group and no details of the extra training they received, it is not possible to estimate the effect of this scheme or its generalisability.\textsuperscript{563} A study in Cumbria looked at emergency nurse practitioners working on ambulances. Without extra
training, 20% of the cases were not transported with the nurse on the ambulance and 34% when she was on a fast response vehicle, but as they were selected cases the effect on a whole system cannot be assessed. No figures were analysed for times when the Emergency Nurse Practitioner was not available as a comparator.\textsuperscript{606}

In 27% of US Emergency departments Emergency Medicine (Ambulance) Technicians are used or are planned to be used.\textsuperscript{5} An Australian paper has formulated ideas of the practitioner role in prehospital care using soft systems methodology and reviews its potential in Australia, much of which is also applicable in the UK. It concludes that most of the development is speculative without research on the innovations being proposed.\textsuperscript{407} Guidelines have been established for the role of physician's assistant in emergency departments in the United States, stressing that they must supplement and assist the emergency physicians and not replace the medical expertise and they must always work under the supervision of emergency physicians and the scope must be clearly delineated. They need to have appropriate credentials to undertake the work and there must be a dedicated person providing the overall direction of activities of physicians' assistants within the emergency department.\textsuperscript{165} A non-randomised study looking at non-medical technicians in an emergency department undertaking minor procedures such as blood taking, retrieval of results, suturing, plastering, etc. showed that the mean waiting time was reduced by 10 minutes against a background time of 3 hours (p<0.0001). The reduction was confined to those in categories 3 and 4. The number of patients who left without being seen was reduced from 8.2 to 5.3%. The technicians were extra staff, so some of the effect may be due to increased staff rather than the specific role.\textsuperscript{221} A fifteen-year study of such technicians had similar infection rates for suturing as physicians.\textsuperscript{546}

In the UK, using paramedics in Emergency departments has been undertaken in two ways. The first practice is using paramedics between calls but has raised concerns because their first responsibility must be to respond to emergency ambulance calls, hence risking sudden cessation of the care they are undertaking.\textsuperscript{623} The second role is using them as members of the team in emergency department. This approach is currently being trialled in the UK but no evaluation is yet available.\textsuperscript{397}

I (v) - Allied Health Professionals

In a Cochrane review of pharmacist interventions, one study demonstrated a decrease in admissions.\textsuperscript{36} The review included 25 Randomised trials, controlled clinical trials, controlled before and after studies and interrupted time series analyses compared four interventions, involving more than 40 pharmacists and 16,000 patients:

1. Pharmacist services targeted at patients versus services delivered by other health professionals (one study) resulted in a slight increase in utilisation of scheduled services, whereas hospital admissions and emergency room admissions were decreased.

2. Pharmacist services targeted at patients versus the delivery of no comparable service; pharmacist
services decreased the use of non-scheduled health services, the number of specialty physician visits or the number and costs of drugs, compared to control patients (six studies). Improvements in the targeted patient condition were reported in 10 of 13 studies that measured patient outcomes but patients’ quality of life did not seem to change.

3. Pharmacist services targeted at health professionals versus services delivered by other health professionals; (one study), the intervention delivered by the pharmacist was less successful than that delivered by physician counsellors in decreasing inappropriate prescribing.

4. Pharmacist services targeted at health professionals versus the delivery of no comparable service. Twenty-five studies were included involving more than 40 pharmacists and 16,000 patients. All studies demonstrated that pharmacist interventions produced the intended effects on physicians prescribing practices.

Only two studies compared pharmacist services with other health professional services and were reported to have some bias and conclusions could not be drawn about comparisons 1 and 3. The other studies supported the expanded roles of pharmacists in patient counselling and physician education. Because of the lack of generalisability, poor definitions of interventions, lack of cost analysis and outcome data, further research was recommended before implementing changes.

The use of occupational therapists in emergency departments has been described and quoted as preventing 21% of admissions referred to them as judged by the doctors’ opinion. The data quality and description do not allow full interpretation of this small study.230

Staffing – Conclusions

There are very few studies looking at the impact of differing staffing levels, skill mix or systems of work. Work looking at increased use of senior medical staff suggests they may reduce admissions and decrease delay, particularly if they have admitting rights. Nurse practitioners have been shown to be safe and effective but their impact on waits has not been assessed. New roles in emergency care for ambulance staff, physiotherapist, pharmacists and occupational therapists have not been systematically assessed and need further research.

Key points

- Teams of staff available for unpredicted surges in activity may reduce delays.
- Rotational allocation of patients may be better than clinician self-determination.
- Senior staff may reduce admissions and delays.
- Nurse practitioners are safe and effective but their effect on waits is unknown.
- The role of other health care professional in emergency care needs evaluation.
Reducing Attendances and Waits in Emergency Departments

DRAFT - subject to clarifications
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<tr>
<th>ID</th>
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<th>Patient Group</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
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<td>Shaw KN &amp; Lavelle JM 1998</td>
<td>Paediatric Emergency Department</td>
<td>Pre-post intervention comparison study</td>
<td>All patients attending ED</td>
<td>Use of additional staffing as a team and additional space. Plan was activated between 1pm and midnight when 4 hourly totals and numbers attending increased by 25% on the previous years number average.</td>
<td>Reduction in waiting time from arrival to physician of 15 minutes (95%CI –10 to -20) LWBS reduced by 37% (95%CI 33% to 41%)</td>
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<td>Lau FL &amp; Leung KP 1997</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison study (N=2583)</td>
<td>All ED patients</td>
<td>A small team consultation system</td>
<td>The new system reduced waits Mean wait time reduced from 35 to 22 minutes (p=0.004)</td>
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<td>Hirshon JM, Kirsch TD, et al. 1996</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison study (N=2,637)</td>
<td>All patients ≥18 except those with ophthalmology disorders.</td>
<td>Assigning patients in sequential rotation to residents</td>
<td>Significant reduction in mean ED LOS Pre=7.11 - Post 5.86 hours (p&lt;0.001) • surgical patients - LOS reduced from 1.88 to 1.43 hours • medical to 5.36 to 4.95</td>
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<td>Shum C, Humphreys A, et al. 2000</td>
<td>Primary Health Care</td>
<td>Randomised Controlled Trial (N=2021)</td>
<td>All patients requesting and offered same day in general practice</td>
<td>Patients with minor injuries allocated to nurse or doctor in GP practices</td>
<td>Nurse consultations: 10 mins Doctor consultations 8 mins 2% of patients in each group visited ED</td>
</tr>
<tr>
<td>Byrne G, Richardson M, Brunsdon J, Patel A. 2000</td>
<td>Emergency Department</td>
<td>Observational Study (N=181)</td>
<td>Minor Injuries</td>
<td>Comparison of ED, MIU and nurse led MIU</td>
<td>Nurse led service reduced waiting time – patients waited significantly longer to see a doctor in ED than patients waiting to be seen by ENP by 40 minutes (p&lt;0.001)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
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<td>-----------------------------</td>
<td>----------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Applicable to UK: Yes United Kingdom</td>
<td>n=57 Traditional ED</td>
<td>ED Size: NK</td>
<td>Control: No</td>
<td>Control: No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=57 MATS</td>
<td>MATS Size: NK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=67 Nurse-led MIU</td>
<td>MIU Size: NK</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 21 continued

<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Patient Group</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
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<tbody>
<tr>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Prehospital care</td>
<td>Action Research Study</td>
<td>Emergency requests-999 or GP requesting transfers</td>
<td>Reduction in attendance at ED-ECP managed 20% of patients at the scene who were not subsequently admitted to ED</td>
</tr>
<tr>
<td>Walsh M &amp; Little S 2001 606</td>
<td></td>
<td></td>
<td></td>
<td>Introduction of an Emergency Care Practitioner to the ambulance service.</td>
<td></td>
</tr>
<tr>
<td>Applicable to UK: Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grouse A &amp; Bishop R 2001 221</td>
<td>Emergency Department</td>
<td>Cohort Study (N=6909)</td>
<td>ED uses during NMT 'week on' in study weeks</td>
<td>Recruiting NMTs to carry out minor procedures - 2 trained non-medical technicians (nurses) performed bloods, IVC, plasters etc.</td>
<td>Significant reduction in waiting time reduced from 40 mins to 30 mins (p&lt;0.001) Reduction of LWBSs by 35%</td>
</tr>
<tr>
<td>Applicable to UK: Yes</td>
<td></td>
<td>n=3248 intervention days</td>
<td>ED Size: 37,000 p.a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td>n=3481 control days</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case Study 8

Nurse-Led Assessment Areas

Summary of Improvement

A nurse-led ‘assessment area’ was developed using a See and Treat model and incorporating advanced triage, near-patient testing and streaming to primary care. This has made an immediate improvement on the A&E patients total waiting times and improved the patients’ experience. Prior to the change, long waiting lists meant violence was not uncommon in the department, making staff recruitment and retention difficult.

A very short PDSA cycle was initiated to trial the Assessment Area. A set of very simple criteria were applied to the project. These were to make it safe, make it relatively cost neutral and make sure that any outcomes were measurable. Following a one-week pilot, the effects were so dramatic on patients’ waiting times that the decision was made to make the change permanent.

This improvement has contributed significantly to:

- More than 98% of patients now are seen, treated, admitted, transferred or discharged within 4-hours of arrival at A&E, compared to 93% in December 2002.
- Elimination of A&E gridlock.
- Reduced waiting room congestion.
- Reduced waiting room congestion.
- Significant reduction in number of complaints received from patients -- have received two since 17th Feb, and both were dealt with effectively at the time).
- Improved atmosphere within the department. Patients noticeably happier. Lower stress levels amongst staff, hence improving staff morale. No more overnight Patients.
- Strong support by the A&E Consultants who were fully involved in setting up and trialling the project, thus improving communications and team work between all levels.
- Raised profile of the department, recent recruitment of staff, students now requesting to do elective placements there.
- ‘Up to date’ area with notice boards, resource folders and books – assists with training of junior staff.
- Ongoing improvement of communications and referral systems within Primary Care Services.
- Patients now streamed to the appropriate place for their needs, according to DOH guidelines.

Changes Made:

- All patients are seen within 10 minutes of arrival and triaged according to Manchester Triage. Because patients are not returned to the waiting room, the Triage process has been pared down to a “two-minute Triage” model. P1 and P2 patients are streamed to the majors / resus area, and minors are streamed to the minors area to be seen by an Emergency Nurse Practitioner or doctor.
- All other presenting patients (both walk in and ambulance) are seen immediately in the ‘Assessment
Area’. Patients receive advanced triage and a decision is made by a senior A&E nurse at ‘F’ or ‘G’ grade whether the patient needs to be seen in A&E or has a primary care need.

- Patients undergo a variety of investigations and assessments with near patient testing using an ISTAT® blood machine bought specifically for the area. This follows a ‘diagnostic recipe book’ developed by the A&E consultants which ensures that all essential investigations are completed prior to the first medical assessment with the exception of x-rays.

- Patients suitable for primary care have appointments and referrals made at the time by the assessment nurse and are streamed away from the A&E department with open access to return should their condition worsen.

- Patients waiting time is better utilised with the patients having a ‘full package’ of investigations and results readily available when seen by the doctor.

**Implementation Advice:**

- Staffing issues – lack of senior experienced staff to cover.

- Initially open 9-5pm; after 4 weeks, it has been open for 24-hours daily. Needed staffing to match as well as training and supervision.

- Communications difficulties between ‘A&E Assessment Area’ and the rest of department. Initially seen as ‘them and us’. All staff were encouraged to spend time working in the area to familiarise themselves with the
concept and this helped relationships.

- Changing staff attitudes and implementing changes in traditional working practice. Changing Staff and Patients attitudes regarding A&E needs and Primary Care needs.

- ‘Streaming to Primary Care’ developed – this has assisted towards target figures by at least 10-15% daily of patients attending the assessment area. However this has been largely experimental, thus highlighting the need for training/guidelines/policies/protocols.

- Liaising with PCT and GP forums to ensure that they are aware that patients will be streamed back to them. BAEM Core Service Guidelines used.

- Financial impact of near-patient testing (particularly disposables) and staffing needs to be fed into Local Development Planning and PCT forums.

Next Steps:

- Development of local guidelines / policies and protocols for the unit.

- Health Care Assistant’s role extended to include IV Cannulation / Phlebotomy following training and clinical supervision. Increase in the number of Emergency Medical Assistants in the department. (Protocol for staff to highlight abnormal results to senior nursing staff).

- Exploring the Majors Nurse Practitioner role including request of chest/abdominal X-rays and referral to specialities, i.e. medics following assessment etc.

- Development of ‘Primary Care Streaming’ guidelines with training and study days to ensure that this is done safely.

Audits to be done for:

1. GP uptake and re-presenting or re-admission to A&E.
2. Match assessment unit demand to activity (data already has been collected).
3. Patient experiences in A&E, how we can improve.
4. Staff questionnaires re: current attitudes etc.

For further information please contact:
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Newham General Hospital
Glen Road
Plaistow
London
E13 8SL
J – Multi Component Studies

Although most of the studies mentioned so far have been single innovations. It is far more common that institutions are undertaking a wide array of changes simultaneously in an effort to reduce their waiting times. This obviously makes it more difficult to determine which of the changes has been effective. However some of these studies are described here. They also illustrate the importance of determining the local causes of delays before introducing changes. Use of simulation models is now increasing to help diagnose where changes can be made and test their effects but it has been noted that it may not be an accurate representation of patient flow because of the large number of assumptions that had to be made in this preliminary model. Such systems can be used to assist in redesign or resource management. A wide variety of innovations have been tested in emergency care to reduce waits. Many have been undertaken recently as part of the NHS Modernisation Agency’s Emergency Services Collaborative using the PDSA methodology but it is not possible to determine whether these case reports are generalisable or universally applicable. Reports have been produced that define the effect on the whole system of this array of local measures.

A similar collaborative system operates in Australia, Canada and America. The Institute of Healthcare Improvement have produced a guidebook to reducing waits and delays in healthcare and focuses on four key areas, of which one is emergency care, which includes many case studies and have reported their work in Emergency departments.

Use of a continuous process of time analysis over a prolonged period with a variety of small interventions has been described to improve waiting times. Kyricacou and colleagues demonstrated a significant reduction in median total length of stay from 6.8 hours to 4.6 hours. However, reduction was not sustained over all the time periods of the study and total length of stay increased in the final two time periods to 6.0 hours. The authors suggest that the increase in length of stay is due to an increase in patient numbers and a decrease in nurse and physician numbers.

Miro described a thorough analysis of issues causing waits in a Spanish emergency department. Increasing staffing levels and increased space in the emergency department followed this. This resulted in improvements in waiting times to be seen (87 vs. 24 minutes, p<0.001) and a decrease in the amount of time the department was considered to overcrowded numerically (31% vs. 8%, p<0.001) and functionally (48% vs. 15%, p<0.001).

In a French study a series of changes were made that reduced waits. These changes included having a doctor available in the Emergency Department, allowing staff to admit patients, increasing work of paramedical staff. This resulted in reduction in waits (p>0.001) in all components (to see the...
patient initially and before discharge). The methods are not fully described so the quality of the study cannot be assessed. Equally the changes due to having a doctor present at all times would not be applicable in the UK, where this is already standard practice. This article does therefore not add practical changes for UK emergency care.

An initiative in Quebec in 1986 consisted of 28 specific components to reduce the overcrowding in the 40 hospital emergency rooms but was perceived to have had limited effectiveness.  At Kennewick hospital, a series of interventions were trialled using the Taguchi method of quality improvement. Those resulting in reduced waits were adding an additional doctor, additional laboratory staff, strong co-ordinator role and right of the emergency physician to admit a patient. However, increasing the number of rooms, dedicated radiology services, primary care nursing stream in the emergency department and increased pharmacy cover were not found to reduce waits in their system. Many of these factors were not as expected by the task force, illustrating the danger of expert opinion and the need to assess any changes critically.

An American rapid process redesign system managed to reduce throughput times from 4 hours to 2 hours 55 minutes by a series of changes. The changes included staffing issues, change in triage and registration, laboratory and radiology systems and an emergency department nursing admit team. It was noted that key to the changes was the high level priority given to the changes by the hospital.

At Kaiser Permanente, Colorado, a review revealed a conflict of work between office setting and hospital, the fact that patients often saw multiple doctors and a reliance on junior staff for much emergency work. A restructuring was undertaken that consisted of three key elements: a dedicated team of inpatient physicians, enhanced continuity of care and a two tiered admission process. The triage physician reviewed all admissions and if they disagreed with the admitting physician then the patient was referred to the emergency room for a further assessment. The study reported reductions in average lengths of stay without any change in readmission rate. It did not record the increased workload of the emergency department as a result of the new system or effects on overload of that department.

A retrospective review of the procedures for reducing ambulance diversions was undertaken in New York. System-wide procedures involved the exchange of information concerning diversions and hospital specific procedures involved implementation of additional planning and specifying criteria for implementing diversion as well as development of additional patient care resources. During the study period the number of ambulance diversions declined by 25% and the number of hours on diversion declined by a third. There were a wide variety of problems and solutions at the time when the number of ambulance transports increased by 7%. The study demonstrates that a combination of approaches can produce reductions in ambulance diversions but is unable to
differentiate whether this was due to a change in the threshold for diversion caused by establishing criteria or whether it was due to increased resources.\textsuperscript{305}

In an Australian system, a series of staffing and administrative interventions produced dramatic changes for the seriously ill (triage category one improved from 52\% to 100\% in target time, category two from 30\% to 65\% but little change in other groups, but no statistical analysis undertaken). The changes included increased senior staff, transfer of junior doctor posts to middle grade posts, change of staff rotations, appointment of a nurse educator, appointment of more clerical staff and reorganisation of nursing duties.\textsuperscript{271}

These multi-component studies are useful in that they reflect the methods usually used in healthcare. They illustrate problems encountered by healthcare providers and this is reflected by the wide variety of solutions that can produce improvement. It also illustrates that several routes, e.g. increasing staffing or changing processes, can improve waits and delays.
<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Patient Group</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
</table>
| Pouriat JL, Prudhomme C, et al. 1989<br>Applicable to UK: No France | Emergency Department | Pre-post intervention comparison  
n=700 – intervention period  
n=385 control period | Patient attending ED in 1985  
ED Size: NK | Include doctor in ED at all times;  
ED doctor able to admit patients directly to ward | Significant reduction in time interval to see a doctor 21 ± 7 to ± -4 (p<0.001).  
Reduction in ED LOS from 98 ± 16 to 41 ± 14 minutes (p<0.001) |
| Rinderer ZM 1996<br>Applicable to UK: No United States | Emergency Department | Observational Study  
Control: Yes | Not specified  
ED Size: 33,190 p.a. | Taguchi method to identify improvements:  
- additional nurse  
- additional secretary/clerk- 10:00-16:00hrs & 16:00-22:00hrs –  
- additional physician  
- additional laboratory technician-10:00-22:00hrs  
- dedicated radiology technician-10:00-22:00hrs.  
- primary care nursing-12:30-19:30hrs  
- additional pharmacy hours-22:00-01:00hrs  
- additional patient rooms  
- auto-hold policy  
- non-patient care coordinator-12:30-19:30hrs  
- triage room | Reduction in ED LOS 100.8 minutes year before implementation to 79.1 minutes year after implementation.  
Improvements which had most impact on ED LOS:  
- additional physician  
- additional laboratory technician  
- auto-hold policy |
<table>
<thead>
<tr>
<th>ID</th>
<th>Domain</th>
<th>Study Design</th>
<th>Patient Group</th>
<th>Intervention</th>
<th>Findings/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jelinek G A, Mountain D, et al. 1999</td>
<td>Emergency Department</td>
<td>Pre-post intervention comparison Historical control</td>
<td>ED users except: obstetrics &amp; gynaecology paediatrics burns &amp; spinal injuries ED Size: 35,000 p.a.</td>
<td>Appointing Chair/Professor in Emergency Medicine plus 8 consultants changing staffing from residents to mostly registrars. Appointing clinical nurse educator/educational activities.</td>
<td>Improvements in: thrombolysis time—89 mins down to 41 mins complaint rates: 52 to 23 missed fractures: 95 to 35 Re-engineering in ED can improve quality of care over a range of variables.</td>
</tr>
<tr>
<td>Lagoe RJ, Kohlbrenner JC, et al. 2003</td>
<td>Emergency Department Prehospital Care</td>
<td>Observational Study Historical control</td>
<td>Ambulance transports Four general hospitals: 1. ED Size: 41,000 p.a. 2. ED Size: 21,000 p.a. 3. ED Size: 49,000 p.a. 4. ED Size: 42,000 p.a.</td>
<td>Information exchange concerning ambulance diversion Development of additional patient resource within diversion hospital</td>
<td>Reduction in diversion hours between 24.8% and 33.6%</td>
</tr>
<tr>
<td>Kyriacou DN, Ricketts V, et al. 1999</td>
<td>Emergency Department</td>
<td>Time Study Analysis (N=826)</td>
<td>Patients attending the emergency department with:</td>
<td>Time flow analysis of the patient journey for seven periods from September 93'-July 98’ Interventions undertaken as a result of time flow analysis including:</td>
<td>Overall reduction in median total ED LOS from 6.8 to 4.6 hours during the first five time periods. In the last two time periods ED LOS increased to 6.0.</td>
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Chapter 5 – Papers addressing economic issues

5.1 - Identification of economic literature

Papers were first identified (by scanning the abstracts and/or titles), from the search strategy described in Chapter 2, in which cost, cost-effectiveness, economic evaluation or other phrases indicative of a paper with potentially relevant economic content. 240 papers were identified in this manner. Of these, 26 were excluded because no abstract or paper could be obtained. A further 26 were excluded because on reading the abstract it was judged that the paper had no relevance to economic evaluation. A further 28 papers were categorised as 'exhortation papers', with no primary economic content but highlighting the need for economic evaluation in the area. The largest group of articles was limited to consideration of cost (135). However, 54 of these appeared to only mention cost in passing and provide limited details, while the remaining 81 appeared to contain some information on costs. Only 25 papers were identified as possibly reporting a full economic evaluation (e.g. cost-effectiveness analysis).

Summary of findings

Most common outcomes studied

- Time saved for the patient - waiting time and total length of stay in the ED
- Number of hospital admissions averted
- Number of re-presentations averted
- Throughput in the ED
- Patient satisfaction
- Inappropriate demand on ED averted
- Patient left without being seen
- Ambulance diversion

Table 23 - Percentage of studies reporting the outcomes of interest

<table>
<thead>
<tr>
<th>Outcomes studied</th>
<th>Reported outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>1. Time saved for the ED/hospital</td>
<td>99</td>
</tr>
<tr>
<td>2. Number of hospital admissions averted</td>
<td>23</td>
</tr>
<tr>
<td>3. Number of re-presentations averted</td>
<td>13</td>
</tr>
<tr>
<td>4. Throughput in the ED</td>
<td>26</td>
</tr>
<tr>
<td>5. Time saved for the patient</td>
<td>55</td>
</tr>
<tr>
<td>6. Patient satisfaction</td>
<td>12</td>
</tr>
<tr>
<td>7. Inappropriate demand on ED averted</td>
<td>10</td>
</tr>
<tr>
<td>8. Patient left without being seen</td>
<td>9</td>
</tr>
<tr>
<td>9. Ambulance diversion</td>
<td>4</td>
</tr>
</tbody>
</table>

All outcomes stated in section two should be evaluated against the costs associated with the intervention and the comparator. A true economic evaluation should report all cost-direct and indirect-so that the cost-effectiveness of the intervention against the comparator can be assessed. This is an essential requirement for justifying the adoption of the intervention as an alternative that can be generalised to similar settings. If, for example, the benefits of an
intervention in terms of time savings (of a few minutes) for the ED are associated with huge increase in direct (training, set-up etc.) and indirect costs of the intervention, cost-effectiveness of the intervention is suspect and recommendation of the intervention as beneficial may not be justified. Similarly if cost savings through averted hospital admissions are associated with increased number of re-presentations and patient dissatisfaction, the cost-effectiveness of the intervention may be questionable.

Only a few studies (17%) of the studies reviewed have information on cost or resources used. Even when costs data are included in the study, they are inadequate to make proper judgements about the cost-effectiveness of the intervention studied or to evaluate the quality of the costs analysis performed. Table 2 summarises the main features and findings of the few studies that have provided cost or resource use data. As can be seen from this brief review, the quality of cost information in most of the studies leaves scope for further research in the field to properly assess the cost-effectiveness of the interventions studied.
Table 24 – Main findings of the cost-effectiveness data

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention/comparator</th>
<th>Outcomes studied</th>
<th>Costs/resource use reported</th>
<th>Findings about costs and outcomes</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Rivara FP, Wall HP, et al. 1986 | Triage of walk-in-paediatric patients by nurse and referrals outside the institution for non-urgent cases. / All walk-in-patients treated in the ED | 1. Number of appointments kept by the patients 2. Number of re-presentations | 1. Total cost of care for those who underwent triage 2. Total cost if all patients were treated in the ED | Costs:  
= $20,672  
= $48,620  
Outcomes:  
Appointments kept = 74% Vs 97%  
Re-presentations = 8.4% for intervention group | Intervention reported as cost-effective.  
No break-down of costs given.  
| Stiell IG, McKnight RD, et al. 1994 | Use of Ottawa Ankle Rules(OAR) by ED physicians when considering radiography for ankle injury. / No use of OAR | 1. Proportions referred for ankle and foot radiography 2. Time saved for the ED and the patient 3. Number of re-presentations 4. Patient satisfaction | Charges for all ED and subsequent physician visits and radiography for those discharged without radiography Vs those who had radiography 2. Mean time spent in ED from registration to discharge for those discharged without radiography Vs those who had radiography | Costs:  
= Mean = $62 Vs $173  
= 80 min Vs 116 min  
Outcomes:  
Ankle radiography = 60% vs 93%  
Foot radiography = 27% Vs 33%  
Revisits for no radiography Vs radiography group = 7% Vs 20%  
Days off work for no radiography Vs radiography group = 3 Vs 5 | Cost data does not refer to the intervention and comparator groups. Comparison is not straight forward.  
US study. |
<table>
<thead>
<tr>
<th>Patient satisfaction for no radiography Vs radiography group = 95% Vs 96%</th>
</tr>
</thead>
</table>
### Table 24 continued

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention/comparator</th>
<th>Outcomes studied</th>
<th>Costs/resource use reported</th>
<th>Findings about costs and outcomes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewart S, Pearson S, et al. 1998</td>
<td>Home based intervention (counselling + one home visit by a nurse or pharmacist) for patients discharged from acute hospital care. / Usual care</td>
<td>1. Number of unplanned readmissions&lt;br&gt;2. Out-of-hospital deaths</td>
<td>1. Hospital based costs of care (included salaries, infrastructure and transportation and other professional services)&lt;br&gt;2. Mean cost per patient visited&lt;br&gt;3. Other community based health care costs (included primary care, pharmacotherapy and home-visit costs)</td>
<td>Cost:&lt;br&gt;  = $A 2190 Vs $A 2680 per patient&lt;br&gt;  = $A 190 per patient&lt;br&gt;  = Same for both groups&lt;br&gt;Outcomes:&lt;br&gt; Unplanned readmissions = 154 Vs 197&lt;br&gt; Out of hospital deaths = 1 Vs 20</td>
<td>Appears to be a good study. Australian study.</td>
</tr>
<tr>
<td>Nelson DS, Hoagland JR, et al. 2000</td>
<td>Sedation by orally administered midazolam for repair of lacerations in children &lt;10 yrs. of age / No sedation</td>
<td>1. Length of stay (LOS) in the ED</td>
<td>1. Physician charges&lt;br&gt;2. Combined nurse/hospital charges (includes nurse fee, cost of medication, a pulse oximetry charge and a facility fee)</td>
<td>costs:&lt;br&gt;  = Same for both groups&lt;br&gt;  = Intervention costs increased by 18% to 28% depending on the type of lacerations.&lt;br&gt;Outcomes:&lt;br&gt; Mean LOS increased by 17.1 min for simple laceration.&lt;br&gt; Mean LOS increased by 30.9 min for layered repairs.</td>
<td>Charges to the patients rather than actual costs are included in the study. US study, 1996. May not be generalisable?</td>
</tr>
<tr>
<td>Kelen GD, Scheulen JJ, et al. 2001</td>
<td>Managed Acute Care Unit (ACU) in ED. / No ACU in ED</td>
<td>1. Number of those who left without being seen (LWBS) per day to accommodate the ACU&lt;br&gt;2.Ambulance diversion</td>
<td>Extension in total attending coverage (physicians and nurse)</td>
<td>costs:&lt;br&gt;  = Extension of 7 hrs a day.&lt;br&gt;Outcomes:&lt;br&gt; LWBS = 5% Vs 10.1%&lt;br&gt; Ambulance diversion = 2.8 hrs Vs 6.7 hrs per 100 patients</td>
<td>No monetary equivalent of costs for extended hours is given. No capital or other costs are considered. Study setting – Emergency Department</td>
</tr>
</tbody>
</table>
## Table 24 continued

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention/ comparator</th>
<th>Outcomes studied</th>
<th>Costs/resource use reported</th>
<th>Findings about costs and outcomes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamboa Antinolo F, Gomez Camacho E, et al. 2002</td>
<td>A new health care model for patients with chronic conditions. Conventional health care</td>
<td>1. Number of visits to ED 2. Number of hospital admissions 3. Length of stay (LOS) in hospital</td>
<td>Cannot understand the details. The paper is in Spanish</td>
<td>Costs: Monthly savings of over 5 Million pesetas for the attended population. Outcomes: Visits to ED = decreased by 50% Hospital admissions = decreased by 45% LOS = decreased by 26%</td>
<td>Appears to be a good study. However, need to look at the details of cost analysis to comment further. Spain</td>
</tr>
<tr>
<td>Blaivas M, Sierzenski P, Plecque D, Lambert M, 2000</td>
<td>Ultrasound examination performed by EP. Ultrasound examination performed by the radiology department</td>
<td>1. Length of stay (LOS) 2. Length of stay for those who presented after hours - 6pm to 6am</td>
<td>Only the additional cost of performing an examination at night is reported.</td>
<td>Costs: Estimated at $70 to $100 above that of the examination during the day. Outcomes: Median LOS = 3.40 hrs Vs 4.39 hrs Median LOS for after hours patients = 3.20 hrs Vs 4.37 hrs.</td>
<td>No proper cost data. US study, 1995-98.</td>
</tr>
<tr>
<td>Heaney DJ, Paxton FM, 1997</td>
<td>Nurse-led Minor Injuries Clinic. /No Minor Injuries Clinic</td>
<td>1. Number of attendances in other A&amp;E Departments in the region</td>
<td>1. Cost per episode which includes administrative costs, domestic and portering services costs, supplies and pharmacy, staff and material costs, cost for physiotherapy and radiography</td>
<td>Cost: £32 per patient</td>
<td></td>
</tr>
</tbody>
</table>

Outcomes:
Result for number of attendances in other A&E Departments is mixed, with increases in some and decreases in others.

From the information given, it is not possible to comment on the cost-effectiveness of the intervention.

Scotland.
<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention/comparator</th>
<th>Outcomes studied</th>
<th>Costs/resource use reported</th>
<th>Findings about costs and outcomes</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Richards DA, Meakins J, et al. 2002 | Nurse telephone triage of requests for same day appointments in primary care / standard management | 1. Time for consultation  
2. Effect on A&E attendances | Cost per patient which includes cost of GP, nurse time, prescription costs, cost of tests and emergency care | Costs:  
Mean difference of £1.48 more per patient for triage.  
Outcomes:  
Time for consultation = 1.7 minutes more than standard management.  
There were increased A&E attendances. | Intervention does not appear to be cost-effective.  
UK study |
2. Survival rate  
3. Re-hospitalisation rate | Total direct costs including staff costs, i.e., nurses, physicians, occupational therapists, social workers | Costs:  
DM 3.365,000 Vs DM 4, 145,000  
Outcomes:  
LOS = Reported as shortened by intervention  
Survival rate = No difference  
Re-hospitalisation rate = No difference. | Outcomes are not reported properly. No synthesis of costs and benefits possible from the information given  
Germany |
### Table 24 continued

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention/comparator</th>
<th>Outcomes studied</th>
<th>Costs/resource use reported</th>
<th>Findings about costs and outcomes</th>
<th>Comments</th>
</tr>
</thead>
</table>
| London Ambulance Service NHS Trust, 2002    | 999 call patients triaged to Minor Injuries Unit (MIU), by Ambulance Crew. All patients taken to A & E | 1. Ambulance service job-cycle time  
2. Time to treatment  
3. Total time of attendance in receiving unit | 1. Ambulance service resources used  
2. MIU and A&E resources used  
3. NHS follow-up resources used  
4. Patient costs (time costs—waiting +treatment) | Costs:  
= saving of £2,300  
= saving of £22,764  
= saving of £1,303  
Mean of 93.1 min Vs 198.0 min.  
Outcomes:  
Mean Ambulance job-cycle time = 43.9 min Vs 56.6 min.  
Mean time to treatment = 51.4 min Vs 140.5 min.  
Mean attendance time = 103.8 min Vs 312.2 min. | Detailed analysis of costs and benefits carried out.                                    |
| Jelinek GA, Mountain D, O'Brien D, Rogers IR, Wilkes G, 1999 | Major staffing and functional changes in the ED. / No staffing and functional changes | 1. Throughput of short-stay patients  
2. Total costs of ED | Costs:  
= Increase of $1.95 Million during the study period.  
Outcomes:  
Short-stay patients treated = 725 Vs 392  
Throughput = 394 more patients treated. | No break-down of costs provided                                                      | Australia                                                                                 |
Chapter 6 – Discussion

Reducing the time people have to wait is a priority for patients and is a UK government priority. This systematic literature review has demonstrated that waits and delays in emergency department care is a world-wide problem and there is a very extensive literature describing the extent of the problem and its possible causes. Much of the literature on causes is derived from the opinions of staff and considers the emergency department in isolation.

Waits and delays in emergency departments are the symptoms of a variety of problems and many result from inflow problems, internal flow problems or outflow problems for the emergency department. Most of the literature attributes the recent increase in overcrowding of emergency departments to decreases in bed availability and pays little attention to inflow or internal flows. In most systems it is likely that all three contribute.

Unfortunately, although there is a vast amount of literature about waits and delays, most is rhetoric and anecdotal and most focuses on the extent of the problem. There is surprisingly little evidence about service delivery and organisation factors in emergency care that provides evidence to change the time course of a person’s stay in the emergency department.

The inflow of patients to the emergency department may be affected by a variety of innovations in the community to either reduce people’s usage of the health service in general or to divert them to other sources of care. There is some evidence that diversion of some appropriate 999 calls to NHS Direct, or similar advice lines, may reduce the workload of the ambulance service and therefore potentially the emergency department but there are some concerns regarding the safety of such systems that need clarifying. Once an ambulance crew arrives at the scene of an incident, they have traditionally conveyed the majority of cases to the emergency department. This is now changing and various initiatives are in place to allow a wider choice of destinations and to promote discharge of patients at scene. American studies suggest that the present training of paramedics is inadequate for this task and UK studies are needed to determine the safety and effectiveness of such systems, as well as the training requirements of the individuals.

The organisation of primary care is rapidly changing in the UK. There is however a dearth of evidence of the effects these changes are having and are likely to have, in the future, on the workload of emergency departments. The use of general practitioners in the emergency department has been shown in RCTs to be clinically and cost effective but the effect on patient flows has not been determined. At present there is no evidence for NHS Direct or NHS walk-in centres causing significant decreases in workload for emergency departments. In other health care systems the gatekeeping role of primary care has been extended and the use of co-payments introduced to reduce emergency department attendances but there are concerns over its safety and
whether it may exclude some in need of emergency treatment. Numbers of patient going through the emergency department can be reduced by triaging them out on arrival, however a few studies have suggested that some people may be inappropriately sent away although most studies have not shown any adverse events. None of these studies have been undertaken in the UK health system.

There are great opportunities to reduce the numbers attending emergency departments by secondary prevention. The small group of people who attend more than 3 times per year account for a large amount of the emergency department workload. Although there are many studies describing the characteristics of these patients, there are only a few studies of innovations most of which suggest that personalised programmes may reduce future use.

For the elderly and those with chronic disease a variety of interventions from educational programmes, to routine visiting and screening have been shown to be effective at reducing emergency department attendances and emergency admissions. Similarly several small studies have indicated that the use of social workers in the emergency department and subsequently can reduce subsequent health care usage. Education schemes across whole communities have not demonstrated any effect on emergency department attendances but Cochrane reviews have shown that those focused on specific groups may have an effect but this has been variable.

Admission may also be avoided in a variety of conditions, including heart failure and thrombo-embolic disease as well as in hospital at home services, but most have not looked directly at emergency department attendance. Observation wards may also reduce length of stay but most studies have significant biases. Chest pain assessment units have not yet proven their benefit in reducing length of stay.

The internal flow of patients in the emergency department has been the subject of the most intensive scrutiny. There is good evidence, including several RCTs, that instituting near patient testing reduces the delays for the large number of patients who have biochemical and haematological tests, but there is also evidence that many test results do not contribute to the admission or early management decisions. It may therefore be as effective to reduce the number of tests by having earlier senior opinion as to redesign diagnostic systems. Innovations to reduce delays in undertaking x-rays have received little attention, but again undertaking the tests within the emergency department seems to be effective in some small trials of ultrasound. Effective systems of delivery are important with laboratory results and there is some evidence that stand-alone electronic reporting systems may delay care.

There is also good evidence, including RCTs, to support the use of fast track systems for minor injuries and that it is better to use extra staff in establishing a fast track than simply increasing the total workforce. Future research should focus on the configuration of such fast track systems and the resource requirements rather than comparing fast track with traditional models of care. Other fast track systems remain unproven. There is no evidence to support the role of traditional triage/prioritisation in reducing waits and some small studies
suggesting it may cause delays. It is important to remember that it does form an important risk management function so long as it is performed soon after arrival. However triage can reduce delays when it incorporates ordering of x-rays by the nurse; the future of this has to be questioned when fast track systems are introduced.

A wide variety of clinical innovations also help to reduce waits and delays in the emergency department including the application of local anaesthetic on arrival, wound closure techniques and asthma treatment regimes. Some delays in the clerical components may be speeded up by bedside registration and by voice recognition/transcription rather than writing notes but this is only supported by isolated small trials. Whilst reducing waits is important it is also important that patients feel they have waited less. There are a few trials that suggest that better information, either written, by video or by an individual, improve the patient’s perception of their wait.

The outflow of patients from the emergency department is dependent on a continuing flow of patients through the whole health and social care system, until the patient returns to their own home or definitive accommodation. In the immediate phase after the emergency department the flow of patients requires effective bed management within the hospital. There is a small amount of literature describing various systems to improve bed management including use of predictive models and discharge planning but there have been no trials of these systems to determine their effects. Similarly research into delayed discharges has focused on the causes rather than on trialling any interventions to reduce them, whether because of issues in the health or social care sectors.

Human resources account for the largest expenditure in the NHS but most research focuses on system processes. There is no substantial research on the staffing requirements of the emergency care system either within the emergency department or in other areas of the system. Research shows that there are a wide variety of factors that influence emergency department attendances but that it is possible to predict 65% of the workload by hour. Matching this predicted workload to staffing requirements has been an elusive goal, partly because of the difficulty of linking workload, via casemix, to numbers of attendances. Similarly most of the research on ways of working has been focused on establishing the safety of new models rather than the effect on waits and delays. There is some weak evidence that use of senior staff will reduce delays as well improving quality of care. Historically, emergency nurse practitioners were introduced to take over the role of junior doctors because of their reducing hours; subsequently they have further developed in a more patient centred approach. Research has established the safety and effectiveness of emergency nurse practitioners but has not established that they help reduce waits per se, they may only be effective because of the increased staffing. A new role of emergency care practitioner is being established in the UK to work across hospital and community sectors with a broad based training covering areas that have traditionally been across primary care, emergency medicine and ambulance care. There is not yet any evidence on the effect of this new role. The wide area of cultural and internal organisation and
its effect on waits and delays in emergency care has not been the focus of any interventional studies.

Comparison of studies has been hampered by the lack of any uniform definition of overcrowding, delays and waits. In the UK there has been concentration on the total time spent in the emergency department, but other countries focus on number of ambulance diversions and cubicle occupancy. An American scale for overcrowding has been suggested recently. A wide variety of timings have been utilised as outcome measures including:

- Arrival to triage.
- Triage to see doctor or nurse practitioner.
- Arrival to see doctor or nurse practitioner.
- Decision to admit to leave emergency department.
- Arrival to departure time in emergency department.
- Ambulance diversions.

Studies often state the size of department but rarely give sufficient information to allow case mix to compared, e.g. some studies exclude minor injuries, some only include those with insurance. As waits in emergency departments are often the symptom of problems across a whole healthcare system, the organisation of healthcare across the whole system will cause variation in applicability of studies. Therefore any studies outside the NHS, have to be considered carefully before their generalisability in the UK is accepted. In particular, much of the literature emanates from America, where there is an insurance based system and in some areas some groups are excluded from certain types of medical care.
Chapter 7 – Conclusions

The large literature in the area of overcrowding of emergency departments and the delays and waits in the emergency care systems is mainly anecdotal and around assessing the extent of the situation or giving "expert" opinion on causes and possible solutions. In searching for solutions it is vital to consider three factors.

1. The solutions in any locality are likely to depend on local causes, which are probably variable even within one healthcare system.

2. For any problem there may be several ways of solving it e.g. long waits for minor illness and injury patients may be solved by diverting cases away from the emergency department, introducing fast track systems, introducing emergency nurse practitioners or increasing existing staffing.

3. The apparent cause may only be the most severe bottleneck in the system and other constraints are likely to appear as the initial cause is resolved (Theory of Constraints)

It is disappointing that despite a period of great change in the NHS and particularly in emergency care, more evidence has not been produced. This is likely to be because of the very short time frame that government has prescribed for such changes and also the use of the PDSA methodology, which will produce large numbers of case studies and small number trials without formal statistical evaluation.

There are however a few areas that have been supported by randomised controlled trials including the use of near patient testing and fast track systems for minor illness and injury and some admission avoidance schemes, where implementation of present research findings needs to occur. Others have weaker evidence that suggests useful innovations that require studies with increased power, including the wide variety of interventions to reduce emergency department attendances by older people, frequent attenders and those with chronic disease and the use of observation wards and clinical decision units.

Some areas have early evidence that raise concerns about their safety that urgently need further evaluation as they are already being widely instituted in the NHS. Managers need to be aware of the risks of instituting such innovations to avoid their premature adoption because of the pressures for change. Full risk assessments to determine both benefits and potential hazards should be undertaken. These include discharge of patients from scene by paramedics and the role of pre-hospital emergency care practitioners. The diversion of some 999 calls to NHS Direct is already being evaluated. Primary care gatekeeping, triaging out of the emergency department and the use of co-payment systems are also potentially unsafe practices that need evaluation.

Other areas have initial evidence that suggests the innovations have had little effect on the time flows through the
emergency department including the introduction of walk-in centres and NHS Direct.

Most areas do however need more high quality evaluation to determine how the NHS should proceed. The key areas needing research are bed management, reducing delayed discharges (both because of internal hospital processes and because of social care issues) and the changes in provision of emergency primary care, including its links with other components of the emergency care system. Research into staffing levels, new roles and utilisation of staff have received little attention and need further work. Some of the cultural issues are already being addressed but aspects such as the new emergency care networks have no planned evaluation.135

It is important to remember that lack of evidence does not mean that the changes being implemented do not work and so should not suppress innovation. But it is also important that such innovations are analysed for the system-wide organisational, clinical and cost effectiveness.
This systematic literature review has highlighted the fact that there are very few innovations to reduce attendances at emergency departments and to reduce waits in emergency departments that are supported by high quality evidence. There is therefore, a large number of areas that needed to be subjected to more rigorous evaluation. We recommend that the first step should be a prioritisation exercise to explore which areas should be undertaken first. This exercise would need to take account of not only the level of existing evidence but the strategic importance, potential system impact and patient safety issues of the innovation. The exercise should involve a broad spectrum of stakeholders including clinicians and managers from all sectors of emergency care, policy makers, researchers, health economists and representation from users (patients, carers and public) and appropriate national bodies.

The order of the recommendations below reflects this order, in the authors’ opinion, but has not undergone a formal prioritisation process:

- Innovations in bed management and patient flow to reduce delays in the in-patient process and in discharge.
- Innovations to reduce attendance at emergency departments and in particular those involving patients with chronic illness and those who already attend frequently.
- Impact of emergency care networks.
- Effect of social care in hospital and home support in reducing emergency department attendance.
- The impact of various new models of primary care provision, especially out of hours care, on emergency department attendance.
- The effectiveness and safety of paramedics in discharging patients from the scene and determining destinations.
- The appropriate and effective staffing of emergency departments. The roles of health care professionals in emergency care, including new roles for professional groups and the appropriate training requirements of these individuals.
- The effects of different styles of team working in the emergency care system.
- Delivery of timely imaging in emergency departments.
- The safety of triaging patients out of the emergency department.
- The effect of alternative minor injury and illness services on emergency department attendances.
- Configuration of minor injury fast track systems.
- Factors that make education campaigns effective in assisting patients choose appropriate sources of emergency care.

There was a paucity of studies on patient and public opinion or that had their participation. This needs to be considered in all future research.
Work is also required on developing standard definitions and agreed outcome measures for use in research in emergency department waits and overcrowding. Warwick Emergency Care has already commenced pilot work in this area.

In view of the large amount of work being undertaken in the area of improving access to emergency care, we would recommend that this literature review is updated in a maximum of two years.

Major research projects are already underway in the following areas:

- Evaluation of diversion of 999 calls to NHS Direct (SDO).
- Organisational issues in waits in ED (SDO).
- Causes and reduction of delayed discharges (Dept of Health).
- Impact of Walk-in Centres on emergency departments (Dept of Health).
- Outcome measures in emergency healthcare service delivery (Warwick University).
Chapter 9 – Implementation of Findings

Policy

This work has been actively informing Department of Health policy throughout its production. Hence most of the innovations have already helped to inform developing policy.

There are some key areas of policy that either have no evidence available or, in some cases, are not supported by quality evidence.

NHS Walk-in Centres and NHS Direct have not been shown to reduce attendances at emergency departments, except possibly when co-located with the ED. Patient education has not been demonstrated to reduce ED attendances. Similarly the effect of Nurse Practitioners on reducing waits has not been studied. All these initiatives have however been shown to have other advantages and benefits to patient care and the NHS.

Good evidence exists to support the following policies:
- Fast track systems for minor injury patients.
- Chronic disease case management, home support and specialist nurse care to reduce emergency admissions.

Therefore these should be instituted locally.

Some policy areas have a marked lack of evidence and rely on expert opinion and experience from within the NHS. These areas should be priorities for future service delivery research and include:
- Bed management.
- Reducing delayed discharges.
- Reorganisation of emergency primary care.

The effectiveness and safety of diverting 999 calls to nurse advice and of ambulance staff discharging patients at scene has not been adequately assessed but is part of present policy.

Co-payments have been shown to reduce attendances but safety has not been assessed and they go against the current philosophy of the NHS - free care for all.

Local Decisions

Many of the innovations described above that are supported by present policy now require local implementation. Other innovations described in this study are at the level of detail that is not appropriate for national policy and should be explored at local level to determine their applicability. These include:
- Senior staff seeing patients at an earlier stage.
- ED staff admission rights.
- Changes to the present triage systems.
- Escalation clinical teams.
- Rotational allocation of patients on arrival.
<table>
<thead>
<tr>
<th>Evidence</th>
<th>Present Policy Status</th>
<th>Comments &amp; links to policy</th>
<th>Actions required</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is possible to divert some 999 calls to advice lines but the safety of such systems is still being evaluated.</td>
<td>Supported by present policy</td>
<td><a href="Http://www.dh.gov.uk/assetroot/04/05/07/60/04050760.pdf">Http://www.dh.gov.uk/assetroot/04/05/07/60/04050760.pdf</a></td>
<td>Research evaluation in progress</td>
</tr>
<tr>
<td>The role of paramedics in either discharging patients from scene or deciding on appropriate destinations has not been adequately studied to confirm its safety and effectiveness in the UK.</td>
<td>Supported by present policy</td>
<td><a href="Http://www.dh.gov.uk/assetroot/04/05/07/60/04050760.pdf">Http://www.dh.gov.uk/assetroot/04/05/07/60/04050760.pdf</a></td>
<td>Needs safety evaluation results before widely disseminated</td>
</tr>
<tr>
<td>Primary care gatekeeping can reduce emergency department attendance but its safety is unknown.</td>
<td>Supported by present policy</td>
<td></td>
<td>Needs safety evaluation results before widely disseminated</td>
</tr>
<tr>
<td>Walk-in centres and NHS Direct have not been demonstrated to reduce attendances at emergency departments.</td>
<td>Supported by present policy</td>
<td></td>
<td>Further research evaluation in progress</td>
</tr>
<tr>
<td>Fast track systems for minor injuries reduce waits, ideal configurations include senior staff.</td>
<td>Supported by present policy</td>
<td><a href="Http://www.modern.nhs.uk/scripts/default.asp?Site_id=35&amp;id=8196">Http://www.modern.nhs.uk/scripts/default.asp?Site_id=35&amp;id=8196</a></td>
<td>Widely utilised but optimal configuration needs further evaluation</td>
</tr>
<tr>
<td>Attendance by the elderly, those with chronic disease and those with multiple attendances may be reduced by various interventions; trials are needed in this area, including the role of social workers.</td>
<td>Supported by present policy</td>
<td>Pilot sites are underway <a href="http://www.natpact.nhs.uk/cms/2.php">http://www.natpact.nhs.uk/cms/2.php</a></td>
<td>Awaiting results of evaluation</td>
</tr>
<tr>
<td>Patient education is of unproven in most areas except chronic disease management.</td>
<td>Supported by present policy</td>
<td>Several national and local programmes in progress</td>
<td>Less investment in this area may be appropriate</td>
</tr>
<tr>
<td>Phoning for advice before going to the Emergency Department may reduce attendances.</td>
<td>Supported by present policy</td>
<td></td>
<td>Needs to be linked with evaluation of and</td>
</tr>
</tbody>
</table>
Table 25 continued

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Present Policy Status</th>
<th>Comments &amp; links to policy</th>
<th>Actions required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialist nurse care in heart failure, COPD and DVT can reduce hospital admissions.</td>
<td>Supported by present policy</td>
<td>Pilot sites are underway <a href="http://www.natpact.nhs.uk/cms/2.php">http://www.natpact.nhs.uk/cms/2.php</a></td>
<td>Awaiting results of evaluation</td>
</tr>
<tr>
<td>Home support (medical and social) can reduce hospital admissions.</td>
<td>Supported by present policy</td>
<td>Pilot sites are underway <a href="http://www.natpact.nhs.uk/cms/2.php">http://www.natpact.nhs.uk/cms/2.php</a></td>
<td>Awaiting results of evaluation</td>
</tr>
<tr>
<td>Nurse practitioners are safe and effective but their effect on waits is unknown.</td>
<td>Supported by present policy</td>
<td><a href="http://www.natpact.nhs.uk/cms/2.php">http://www.natpact.nhs.uk/cms/2.php</a></td>
<td>Further research evaluation required</td>
</tr>
<tr>
<td>The role of other health care professional in emergency care needs evaluation.</td>
<td>Supported by present policy</td>
<td><a href="http://www.dh.gov.uk/assetroot/04/07/61/64/0407">http://www.dh.gov.uk/assetroot/04/07/61/64/0407</a> 6164.pdf</td>
<td>Further research evaluation required</td>
</tr>
<tr>
<td>There is a lack of evidence of innovations in bed management.</td>
<td>Present policy supported by experience rather than evidence</td>
<td><a href="http://www.modern.nhs.uk/scripts/default.asp?Site_id=35&amp;id=16491">http://www.modern.nhs.uk/scripts/default.asp?Site_id=35&amp;id=16491</a></td>
<td>More evidence required</td>
</tr>
<tr>
<td>There is a lack of evidence about innovations to reduce delayed discharges from hospital.</td>
<td>Present policy supported by experience rather than evidence</td>
<td>Present innovations are not supported by evidence</td>
<td>More evidence required</td>
</tr>
<tr>
<td>Co-payment systems reduce attendances but may equally reduce attendances by those requiring emergency care.</td>
<td>Not supported by present policy</td>
<td></td>
<td>No action</td>
</tr>
<tr>
<td>Senior staff may reduce admissions and delays.</td>
<td>Local decision, with national policy to support more senior staff</td>
<td><a href="http://www.dh.gov.uk/assetroot/04/07/61/66/0407">http://www.dh.gov.uk/assetroot/04/07/61/66/0407</a> 6166.PDF</td>
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Table 25 continued

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<th>Evidence</th>
<th>Present Policy Status</th>
<th>Comments &amp; links to policy</th>
<th>Actions required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowing emergency department staff to admit to wards will reduce delays.</td>
<td>Local decision that is supported by present policy</td>
<td><a href="http://www.dh.gov.uk/publicationsandstatistics/Publications/policyandguidance/publicationspolicyandguidancearticle/fs/en?CONTENT_ID=4083662&amp;chk=qxj%2Bn5">http://www.dh.gov.uk/publicationsandstatistics/Publications/policyandguidance/publicationspolicyandguidancearticle/fs/en?CONTENT_ID=4083662&amp;chk=qxj%2Bn5</a></td>
<td>Introduce unless good reason locally</td>
</tr>
<tr>
<td>There is no evidence around the effects on waiting times of general practitioners working in emergency departments.</td>
<td>Local decision</td>
<td>Various models of GP working in the ED and in collocated primary care centres are in place</td>
<td>More evidence required</td>
</tr>
<tr>
<td>Triage is a risk management tool for busy periods; it may cause delays in care.</td>
<td>Local decision</td>
<td>Move away from triage for all patients at all times</td>
<td>Move away from triage for all patients at all times</td>
</tr>
<tr>
<td>Triaging out of the emergency department can reduce numbers but more work is required to assess the safety of such systems.</td>
<td>Local decision</td>
<td>Collocation and provision of on site primary care are developing as preferred models in UK</td>
<td></td>
</tr>
<tr>
<td>Observation wards may reduce length of stay and avoid admission.</td>
<td>Local decision</td>
<td><a href="http://www.dh.gov.uk/assetroot/04/06/08/94/04060894.pdf">http://www.dh.gov.uk/assetroot/04/06/08/94/04060894.pdf</a></td>
<td>Appropriately managed observation and assessment units should be established</td>
</tr>
<tr>
<td>Teams of staff available for unpredicted surges in activity may reduce delays.</td>
<td>Local decision</td>
<td>Unknown if used</td>
<td>Local consideration</td>
</tr>
<tr>
<td>Rotational allocation of patients may be better than clinician self determination.</td>
<td>Local decision</td>
<td>Unknown if used</td>
<td>Local consideration</td>
</tr>
</tbody>
</table>
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508. Scherer YK, Bruce S. Knowledge, attitudes, and self-efficacy and compliance with medical regimen, number of emergency department visits, and hospitalizations in adults with asthma. Heart and Lung: Journal of Acute and Critical Care 2001;30:250-257.


Reducing Attendances and Waits in Emergency Departments


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Reducing Attendances and Waits in Emergency Departments


538. Simpson AN, Wardrobe J, Burke


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hospital. Archives of Disease in Childhood 1994;70:488-492.


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619. Williams JL. Guidelines to reducing delays in administration of thrombolytic therapy in acute


Appendix 1

Search Strategy

The sources searched for this review are listed below.

Database searches

- BIDS - (Bath Information and Data Services)
- BIND – British Nursing Index
- BIOME Database
- CINAHL – (Cumulative Index to Nursing and Allied Health Literature)
- COCHRANE Database
- COIN – DoH Circulars
- DARE - Database of Abstracts of Reviews of Effects
- MEDLINE - (Ovid)
- NHS ED - (NHS Economic Evaluation Database)
- HTA - (Health Technology Assessment)
- EMBASE Database
- LIBCAT – Department of Health
- NRR (National Research Register)
- PIONT – DoH Publications
- PsycINFO

- SIGLE – System for Information on Grey Literature in Europe
- THESIS Database
- TRIP+ Database

The search strategy given below was developed to search the MEDLINE database. Subsequent database searches utilised the same format modified only to accommodate differences in search capabilities.

Copies of search strategies for these databases are available from the authors.

MEDLINE (Ovid): 1985-2003

# 1 exp Emergency Service, Hospital/ or A&E.mp.
# 2 exp Emergency Medicine/ or "Accident and Emergency".mp.
# 3 exp Emergency Medical Services/ or "Emergency Department".mp.
# 4 Casualty.mp.
# 5 exp Emergency Medical Services/ or Emergicenters.mp.
# 6 “Minor Injur$ Unit$ .mp. [mp=title, abstract, cas registry/ec number word, mesh subject heading]
# 7 exp Primary Health Care/ or "Primary Health Care".mp.
# 8 exp Emergency Medical Services/ or “Pre-hospital Care” .mp.
# 9 exp Emergency Medical Services/ or “Prehospital Care”.mp.

# 10 exp Social Work/ or "Social Work$".mp.

# 11 "Social Care".mp.

# 12 exp Emergency Medicine/

# 13 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12

# 14 exp Waiting Lists/ or Wait$.mp.

# 15 "Wait$ List$".mp.

# 16 exp Time Factors/ or "Waiting Time$".mp.

# 17 "Trolley Wait$".mp. or exp Emergency Service, Hospital/

# 18 exp Emergency Service, Hospital/ or Overcrowding.mp.

# 19 exp Emergency Service, Hospital/ or Attendance$.mp.

# 20 exp Health Services Misuse/ or “Inappropriate Attend$.mp.”

# 21 “Unscheduled Attend$.mp.”

# 22 exp Time Factors/ or Delay$.mp.

# 23 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22

# 24 13 and 23

# 25 limit 24 to human

# 26 limit 25 to yr=1985-2003
Journal Search:

Electronic search

- Academic Emergency Medicine
- American Journal of Emergency Medicine
- Annals of Emergency Medicine
- Applied Nursing Research
- Clinical Excellence
- EMS Insider
- EMS Manager and Supervisor
- International Journal of operations and production management
- International Journal of Trauma Nursing
- JEMS
- Journal of Accident and Emergency Medicine
- Journal of Emergency Nursing
- Journal of management in medicine
- Journal of Professional Nursing
- Nurse practitioners
- Nursing Outlook
- Prehospital Emergency Care
- RCN Publishing
Hand search

- Academic Emergency Medicine
- Accident and Emergency Nursing
- Ambulance UK
- Annals of Emergency Medicine
- British Medical Journal
- Emergency Medical Journal
- Emergency Nurse
- Journal of A&E Medicine
- Journal of Emergency Medicine
- Journal of Emergency Nursing
- Nurse Practitioner
- Nursing Times
- Pre-Hospital Immediate Care
- Royal Nurse
- Today’s Emergency

Internet searches were also undertaken using the biomedical search engine BIOME ‘http://biome.ac.uk’, the meta-search engine Search.com (http://www.search.com and the Google search engine http://www.google.com/).

Key researchers were contacted and adverts placed in key journals, ‘Emergency Care Network’ and on internet mailing lists.
Appendix 2 - Useful Sources of Information

- Emergency care checklists, Department of Health 2002.
- Emergency Services Collaborative Case Studies in Emergency Care NHS Modernisation Agency.
- Trolley Wait programme NHS Modernisation Agency.
- See and Treat NHS Modernisation Agency.
- IDEA programme NHS Modernisation Agency.
- Improvement Leaders Guide NHS Modernisation Agency.
- Changing Workforce Programme NHS Modernisation Agency.
- Configuring hospitals and service change Department of Health 2002.
- National Service Frameworks Department of Health.
- Ambulance Policies and Procedures University of Warwick.
- Views on REC- EMJ.
- EMJ - special REC edition.

- ECL bulletin Department of Health.
- Institute of Healthcare Improvement.
- Patient and public involvement in health Department of Health.
- DoH hospital data Department of Health.

These are all available via the National electronic library for health’s emergency care specialist library in the managing emergency care section http://www.nelh.nhs.uk/emergency".
Appendix 3 - Sources of Case Studies

NHS Modernisation Agency

Emergency Care Improvement Case Studies
http://www.modern.nhs.uk/emergency

Institute of Healthcare Management.401
Appendix 4 - Related research at Warwick University

Details available at: www.emergencycare.org.uk

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<tr>
<th>Service Delivery, Organisation and Informatics</th>
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<tr>
<td>International emergency department Overcrowding Project (MA)</td>
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<td>Emergency Care Facilitator Study (MA)</td>
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<td>Modernising through team building 2002-2003</td>
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<tr>
<td>Open Access Unplanned Health Care in Coventry (Completed)</td>
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<tr>
<td>Evaluation of Modernisation Agency Ideal Design of Emergency Access (IDEA) Project (Completed)</td>
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<td>Contribution of A&amp;E Department in Coventry to Crime Reduction Initiatives</td>
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<td>Development of emergency department assistant role</td>
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<td>A study of discharging patients from triage (Completed)</td>
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<td>Fast track Systems in A&amp;E (Completed)</td>
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<td>Can A&amp;E nurses predict admission (Completed)</td>
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<tr>
<td>Emergency Care Practitioner Study</td>
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<td>UK Ambulance Services National Clinical Guidelines Development Project</td>
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<td>Innovations in UK Ambulance Services</td>
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<td>Safety and Effectiveness of Criteria Based dispatch (Completed)</td>
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<td>Shared Learning Project (Completed)</td>
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<td>“Treat and refer” protocols (Completed)</td>
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<td>Surrey Emergency Care Project phase 1</td>
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<td>National electronic library and national A&amp;E guidelines project</td>
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<td>Social work and older people in A&amp;E, Anglo-Scandinavian study (Nuffield Foundation)</td>
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<tr>
<td>Social workers in A&amp;E (Completed)</td>
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