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1 Key Messages

Our brief

The Ambulance Service of NSW (ASNSW or the Service) is facing increasing demands for emergency transport for low acuity patients. The Service has introduced policy and practice around authorised paramedics identifying low acuity patients and implementing low acuity pathways for appropriately identified patients. This targeted literature review aims to assist the ASNSW to build upon existing low acuity patient strategies to deliver the right patient to the right place to receive the most appropriate care.

Findings and evidence

There is a paucity of high quality evidence in the literature about prehospital care in general and the prehospital care of low acuity patients in particular. Studies investigating paramedic decision making have largely been conducted in the USA. Studies investigating new models of care have largely been conducted in the UK. There is an almost total absence of research conducted in Australia in either of these areas.

Many studies have been conducted to measure the consistency of triage using the Australasian Triage Scale but it is difficult to compare results. There is no 'gold standard' for measuring the accuracy of triage.

The process of assigning a triage category in emergency departments can be influenced by individual patient factors (e.g. presenting condition); individual provider factors (e.g. knowledge level of triage nurses); and local procedures and systems. There can be quite considerable levels of disagreement about assigning patients to triage categories.

There is no agreed definition of 'low acuity' and many different terms are used to indicate that some patients are less acute than others.

Much of the literature, either about prehospital care or emergency department (ED) care, implies that transport to EDs for some patients is 'inappropriate'. Inappropriateness is difficult to define and much easier to identify retrospectively rather than prospectively.

There is a lack of evidence in the literature supporting the effectiveness of patient assessment decisions made by paramedics.

There are no published studies that compare triage decisions of emergency department staff with triage decisions by paramedics.

There are no published studies about the safety, efficiency, efficacy or effectiveness of directing patients transported to hospital by ambulance to the emergency department waiting room.

The processes and systems for providing care to low acuity patients, however defined, cannot be considered in isolation from processes and systems for other patients.

The referral of low acuity patients for telephone advice and the introduction of emergency care practitioners are the two interventions targeting low acuity patients that are best supported by evidence.

Implications for the Ambulance Service NSW

The process from dispatch to arrival at an emergency department includes a number of key decision or intervention points. There is a need to identify which of these intervention points should be the focus of future research and development.

2 Executive Summary

Introduction

The project 'Review the Capacity of the Paramedic to Identify the Low Risk Patient' was undertaken by the Centre for Health Service Development (CHSD) at the University of Wollongong on behalf of the Ambulance Service of NSW (ASNSW). The purpose of the project was to ascertain what evidence exists in the literature relating to the capacity of paramedics to identify low risk/low acuity patients¹ using risk identification/triage methodology.

Initial consultation with the CHSD provided an opportunity to clarify the patient journey for a caller to the ASNSW. Mapping the patient journey was an important step prior to the literature search to ensure the focus was at the appropriate stage of the patient journey. Initial consultation also established the following parameters for the literature review:

- Understanding the risk identification/triage capacity of emergency department (ED) personnel.
- Comparing the risk identification/triage capacity of paramedics.
- Validation methods used with paramedic decision-making processes for low acuity patients.
- Alternative interventions/models of care for management of low risk/low acuity patients.
- Barriers and enablers to the acceptance of paramedic patient assessment decisions.

The parameters provided the framework for the report that comprised the outcome of the project, delivered to ASNSW in August 2011. The focus of the project is on low acuity patients that would be triaged as 2C i.e. ambulance to be at patient location within 90 minutes of call. The strength of the evidence in the literature was assessed using a classification system designed at the CHSD based on hierarchies of evidence originally developed by other organisations.

General findings

The review of the literature found that there is a paucity of high quality evidence about pre-hospital care in general and the pre-hospital care of low acuity patients in particular. Studies investigating paramedic decision making have largely been conducted in the USA. Studies investigating new models of care have largely been conducted in the UK. There is an almost total absence of research conducted in Australia in either of these areas.

There is no agreed definition of 'low acuity' and many different terms are used to indicate that some patients are less acute than others e.g. 'non-serious', 'not immediately life threatening' and 'minor injuries'. This makes it difficult to compare results across different studies.

Many of the studies identify methodological issues, largely due to the practicalities of undertaking research on models of care, particularly for randomised controlled trials. When randomised controlled trials have been conducted it has usually involved randomisation of the level of service, rather than randomising the patients e.g. by offering a different level of service (the intervention or the control) at different time periods according to some means of randomisation.

Understanding the risk identification/triage capacity of ED personnel

Many studies have been conducted to measure the consistency of triage using the Australian Triage Scale (ATS) but it is difficult to compare results because of differences in methods and changes in the use of the ATS over time. Much of this work has employed written scenarios of patients presenting to ED, which nurses are then asked to categorise by triage category. This may not reflect the 'real world' situation where nurses have the patient in front of them when making triage decisions.

¹ The terms low risk and low acuity are used interchangeably.

There are various approaches to improving the consistency of triage but there is no 'gold standard' for measuring the accuracy of triage. Published studies indicate considerable variation in the reliability of triage. The process of assigning a triage category in EDs can be influenced by individual patient factors (e.g. presenting condition); individual provider factors (e.g. knowledge level of triage nurses); and local procedures and systems.

Comparing the risk identification/triage capacity of paramedics

Triage within EDs can vary by place and by the person doing the triage and any comparison between the risk identification / triage practices of paramedics and ED personnel should be treated with some caution. Much of the research has been done in other countries, particularly the USA, which adds another reason for caution. The results obtained overseas may not be applicable to Australia. There is a lack of Australian studies that directly compare triage decisions of ED staff with triage decisions by paramedics, particularly for low acuity patients.

The prompt for the literature review was consideration of a policy to allow paramedics to admit patients directly to ED waiting rooms. There are no published studies that address this particular issue directly, necessitating recourse to close approximations of what is proposed. In the literature on pre-hospital care the relevant research regarding the risk identification or triage capacity of paramedics is mostly found in studies framed in the following ways:

- Studies comparing transport of patients to EDs with alternatives such as minor injury clinics or urgent care centres.
- The ability of paramedics to identify patients whose transport to ED was considered 'medically unnecessary'.
- The ability of paramedics to identify patients for whom ED treatment was 'needed'.
- Patients with 'minor medical problems'.

In these studies there is a lack of evidence supporting the effectiveness of patient assessment decisions made by paramedics.

Validation methods used with paramedic decision-making processes for low acuity patients

Because there is no gold standard for assessing patient acuity the literature review focused on the inter-rater reliability of the ATS (e.g. ratings of paramedics compared to ratings by ED staff) or other tools. The judgements of paramedics have been compared with the judgements of other health professionals using written scenarios, 'real time' categorisation, retrospective review and comparison with guidelines. Some of the studies focus on low acuity patients, whereas other studies focus on a wider group of patients. Some studies compare results using the ATS, whereas other studies investigate decision making by paramedics about transporting patients to hospital.

Alternative interventions/models of care for management of low risk/low acuity patients

Various models for the management of low risk/low acuity patients have been studied, some with a focus on 'see and treat' at the scene, others with more of an emphasis on referring on to other providers, including alternatives to attending an ED such as minor injury clinics. However, it is difficult to 'unbundle' some of these interventions. For example, a 'see and treat' intervention will inevitably have to contend with referring on some patients, even if it is only to an ED. Some of the models are more comprehensive than others, with some more appropriately described as interventions that fit within a broader model of care.

The two interventions targeting low acuity patients that are best supported by evidence are referral of low acuity patients for telephone advice and the introduction of emergency care practitioners. There are no published studies about the safety, efficiency, efficacy or effectiveness of directing patients transported to hospital by ambulance to ED waiting rooms.

Barriers and enablers to the acceptance of paramedic patient assessment decisions

The lack of clear professional role delineation for paramedics may represent a barrier to their work, including patient assessment decisions. For example, those working with paramedics may have a knowledge deficit regarding the extended paramedic role and skill set. A number of risks, both clinical and legal, are associated with decisions by paramedics not to transport patients, which may serve as another barrier to paramedic patient assessment decisions. Legal action against paramedics has become a more common phenomenon in the US and UK, however, the extent of the relevance to the Australian context is unclear.

Issues of poor record keeping and lack of systems to monitor outcomes of non-transport may also impede paramedic patient assessment decisions. A UK study exploring ambulance crew members' attitudes towards clinical documentation and non-conveyed patients found low completion rates of clinical records for non-conveyed patients.

Several potential enablers for acceptance of paramedic patient assessment decisions were also identified in the literature. These include training, guidelines and protocols; increasing the effectiveness of paramedic assessment and decision making skills; paramedic experience, autonomy and professionalisation of practice; and patient education and knowledge.

Conclusion - Applying the findings from the literature

The literature review suggests there is value in ASNSW building on the current LAP intervention and continuing to develop the skills and knowledge of all paramedics in the management of low acuity cases particularly for older people with conditions that are not immediately life threatening. Other intervention points to improve management of low acuity patients should be reviewed by ASNSW in the context of existing resource and industrial constraints. In the absence of an agreed definition of 'low acuity' it may be useful for ASNSW to more specifically define the types of patients that it considers fit within this category.

Many of the models/interventions identified in the literature were not supported by good quality research evidence. This was not because research had been undertaken with inconclusive or adverse findings; it was simply that the research had not been done. This may provide an impetus for ASNSW to develop its own research strategy to improve the evidence base for low acuity patient management.

The process from dispatch to arrival at an ED includes a number of key decision or intervention points. There is a need to identify which of these intervention points should be the focus of future research and development. In the context of managing low acuity patients in the pre-hospital phase the research questions that might be considered include:

- What is the optimal point in the patient journey for ASNSW to intervene? Is it pre-hospital or on arrival at hospital?
- What alternatives does the ASNSW have for safely managing low acuity patients?
- Why do patients with low acuity conditions contact ASNSW in the first place?
- Why do patients who are assessed by the ASNSW as not needing transport insist on transport to an ED?
- Can paramedics assess and triage low acuity patients as effectively as ED triage personnel?
- What is the size of the problem?
- How many low acuity patients insist on transport to hospital when this is deemed clinically unnecessary?
- What is the impact of transporting low acuity patients to ED on ambulance turnaround times?
- Do low acuity pathways deliver appropriate health outcomes?

Recommendations

It is recommended that research in the short to medium term focus on answering the following questions:

- Why do patients with low acuity conditions contact ASNSW in the first place?
- Why do patients who are assessed by the ASNSW as not needing transport insist on transport to an ED?
- Can paramedics assess and triage low acuity patients as effectively as ED triage personnel?

It is also recommended that this research be conducted in a relatively well-defined locality within NSW such as the Central Coast and the Illawarra. The research would provide an opportunity to develop closer links with the relevant local health district with a view to proceeding to trials of mutually agreed interventions to reduce the demand for hospital services by low acuity patients requiring pre-hospital care, based on the results of the research.

3 Introduction and overview

3.1 Introduction

This is the final report for the project, '**Review the Capacity of the Paramedic to Identify the Low Risk Patient**', being undertaken by the Centre for Health Service Development on behalf of the Ambulance Service of NSW (ASNSW or the Service). The purpose of this targeted literature review is to ascertain what evidence exists in the literature relating to the capacity of paramedics to identify low risk patients² using risk identification/triage methodology. In summary, the ASNSW is interested in exploring:

- In the Australian context, are there any reported issues arising from the ambulance protocols for triaging patients as opposed to the Australasian triage system used in NSW hospitals?
- How do other countries with similar types of ambulance services deal with triage 4/5 patients?
- How does the protocol that ASNSW has developed for managing low acuity patients compare with methods found in the literature?
- What data and research strategy would be needed for ASNSW to establish any variations between the protocols assigned to low acuity patients by ASNSW compared with the triage category assigned by the receiving NSW hospital emergency department?

This document addresses the major deliverable for the project.

3.2 Background and context

The ASNSW is a key part of the State's health system. It provides initial emergency clinical care, patient transport and rescue services. As noted in a recent report by the NSW Auditor-General:

'The Ambulance Service of NSW (the Service) provides a 24 hour, seven day a week service to bring initial clinical care to emergency patients and to transport them to emergency departments of hospitals. It also provides transport for non-urgent patients who cannot travel to treatment by other means.' (New South Wales Audit Office 2007)

This performance review of ASNSW also found that in 2006/2007, the increase in emergency transport for low acuity patients was significantly higher than for high acuity patients. The ASNSW is focusing on adapting its service delivery approaches and models of care to meet changing community health needs while also managing increasing demand for core emergency response services.

The Service has introduced policy and practice around authorised paramedics identifying low acuity patients and implementing low acuity pathways for appropriately identified patients. One mechanism in place is the Extended Care Paramedic (ECP) Program, which currently has 58 extended care paramedics trained in selected locations. The interest of the ASNSW in low acuity pathways however is broader than just the ECP Program with a view that the management of low acuity patients is relevant to the role of all NSW paramedics.

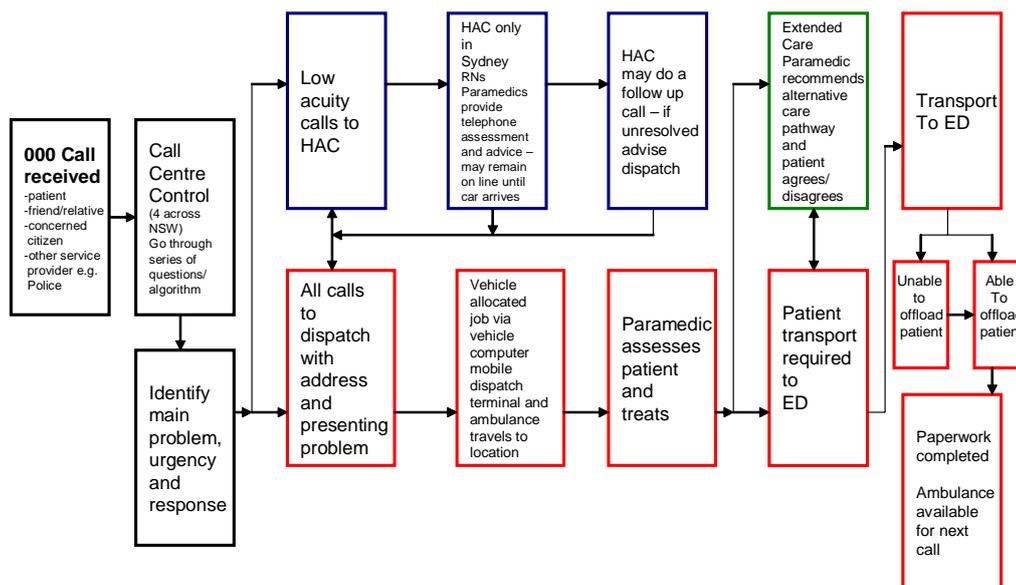
A significant proportion of low acuity patients may not require ambulance attendance or consequently transport. However, patients within this group may still decide that they want to go to hospital. Information provided by the ASNSW notes that a number of these patients are triaged as Category 4/5 under the Australasian Triage System and proceed to the waiting room before definitive care or referral is provided. The primary aim of care provided to the patient via a Low Acuity Pathway is to deliver the right patient to the right place to receive the most appropriate care.

² In this report the terms low risk and low acuity are used interchangeably.

3.3 Patient journey

The initial consultation meeting provided an opportunity to clarify the patient journey for a caller to the ASNSW. Mapping this journey was an important step prior to developing the literature search strategy as it ensured our focus was at the appropriate stage of the patient journey. This is summarised diagrammatically below³:

Figure 1 Patient journey for a caller to the ASNSW



Call Centre Control assesses the situation and chooses a chief complaint protocol which takes the caller through a series of questions relating to the condition. The system allocates priorities through generating one of six response codes: 1A, 1B, 1C, 2A, 2B or 2C (refer to Table 1 below).

Priorities 2B and 2C usually reflect lower acuity cases. Anecdotal reports suggest that approximately 75% of these cases are referred to the Health Access Coordination (HAC) Unit. The HAC operates from 7am to 10pm and the ASNSW is currently trialling an after hours project from 10pm to 7am.

At the same time that the HAC receives the call so does dispatch. The HAC personnel work through algorithms to determine if an ambulance is required at this stage and this therefore provides a key intervention point to re-route low acuity callers. It is possible that the ambulance may arrive at the scene whilst the HAC team are still working through their algorithm, at this point the patient may decide that they no longer require transport to an emergency department (ED).

If a paramedic has specialty training in extended care (an Extended Care Paramedic - ECP) they may recommend a non transport pathway. These ECPs are relatively few in number and are not available 24/7⁴. General paramedics are progressively being trained in low acuity pathways (LAP), they are able to assess the patient and may also offer an alternative care pathway (there are currently approximately 14 low acuity care pathways). This training now starts during the induction course and is completed over a following two in-services.

³ HAC is the acronym for the Health Access Coordination (HAC) Unit – this is a secondary triage system used by the ASNSW. The aim of the HAC Unit is to assist in the management of ASNSW resources, by redirecting non-urgent and non-serious “000” calls away from ambulance response and subsequent ED presentation.

⁴ There are over 26 pathways for ECPs.

Access Economics completed a combined analysis for the Clinical Assessment and Referral (CARE) program (now called LAP and currently being rolled out across all paramedics) and the ECP program.⁵ The analysis found some cost savings generated by the ECP program and to a lesser degree with the CARE (or LAP) program.

Table 1 *ASNSW response grid 2008*⁶

Priority Code	Response Code	Response Category	Response Mode	Response Guidelines
P1	1A	Emergency Immediate Response	Hot	<ul style="list-style-type: none"> ▪ Closest and most timely approved ambulance resource. ▪ Minimum of three (3) officers. ▪ Highest clinical skill should form part of the response.
P1	1B	Emergency Immediate Response	Hot	<ul style="list-style-type: none"> ▪ Most timely ambulance response ▪ Highest clinical skill where available.
P1	1C	Emergency Immediate Response	Hot	<ul style="list-style-type: none"> ▪ Most timely ambulance response
P2	2A	Emergency 30 Minute Response	Cold	<ul style="list-style-type: none"> ▪ Ambulance to be at patient location within thirty (30) minutes of call. ▪ Consider ECP.
P2	2B	Emergency 60 Minute Response	Cold	<ul style="list-style-type: none"> ▪ Ambulance to be at patient location within sixty (60) minutes of call. ▪ Consider ECP.
P2	2C	Emergency 90 Minute Response	Cold	<ul style="list-style-type: none"> ▪ Ambulance to be at patient location within ninety (90) minutes of call. ▪ Consider ECP.
P2	2Ah 2Bh 2Ch	Emergency HAC Eligible	Cold	<ul style="list-style-type: none"> ▪ Incident eligible and may be referred to HAC for secondary triage. ▪ Unless advised otherwise by HAC ambulance must arrive in accordance with the 2A, 2B or 2C grid above. ▪ Consider ECP.

The focus of this project is on low acuity patients that would be triaged as 2C, there may also be value in considering a proportion of patients with a response code of 2B as there may be 'overtriaging' of this cohort as evidenced by the proportion of response code 2B patients that are anecdotally reported as being referred to the HAC Unit.

⁵ As reported by ASNSW, available at: <http://bankstowngp.com.au/uploads/word/429b.doc> accessed 28 June 2011.

⁶ Information provided by the ASNSW, personal communication 12 June 2011. Note the priority codes P3 – P9 have deliberately been excluded.

4 Research Methods

4.1 Strength of evidence

It is our practice with literature reviews to clarify at the outset of the project the definition of what constitutes 'evidence'. When undertaking targeted literature reviews, the level of evidence in academic literature is generally derived from the study design, based on the assumption that certain study designs are more effective than others in eliminating bias (that is, alternative explanations for an observed effect). The Cochrane Collaboration provides a hierarchy of levels of evidence which emphasises the value of systematic reviews of randomised controlled trials (RCTs). The Cochrane methodology was developed for assessing the efficacy of interventions in medical research. However well designed studies, particularly for complex interventions that involve changing systems of health service delivery, often generate equivocal results that are difficult to interpret. When this occurs, although a study might meet the criteria for a certain level of evidence the results need to be interpreted with some caution to determine the extent to which the intervention can be said to be supported by evidence.

While systematic reviews of RCTs may provide a useful starting point for identifying broad types of interventions likely to be successful in evaluating the patient assessment skills of paramedics in identifying low acuity patients, in reality, RCTs relevant specifically to the management of low acuity patients and the NSW context are hard to find. This project requires a broader evidence base and more detail about the content and implementation of relevant interventions than RCTs generally provide. It is also important to bear in mind that what works in one context might not work in another (Dopson, FitzGerald et al. 2002); that implementation might be more context-dependent for some interventions than for others (Øvretveit 2004); or that some contexts might be more receptive to change than others (Pettigrew, Ferlie et al. 1992; Greenhalgh, Robert et al. 2004).

To ensure the focus remains on including the best available evidence, the strength of the evidence has been assessed using the classification system shown in Figure 2. This system of evaluating and summarising the evidence for interventions was designed at the Centre for Health Service Development and is based on hierarchies originally developed by other organisations. In its document on developing clinical practice guidelines, the National Health and Medical Research Council of Australia states that '...recommendations ... should be based on the best possible evidence of the link between the intervention and the clinical outcomes of interest' (1999, p 14).

Figure 2 *Schema for summarising the strength of the evidence*

- | |
|--|
| <ol style="list-style-type: none"> 1. Well-supported practice – evaluated with a prospective randomised controlled trial 2. Supported practice – evaluated with a control group and reported in a peer-reviewed publication 3. Promising practice – evaluated with a comparison group 4. Acceptable practice – evaluated with an independent assessment of outcomes, but no comparison group (e.g., pre- and post-testing, post-testing only, or qualitative methods) or historical comparison group (e.g., normative data) 5. Emerging practice – evaluated without an independent assessment of outcomes (e.g., formative evaluation, service evaluation conducted by host organisation) 6. Profiles of treatment population (e.g., routine data) 7. Service planning parameters (e.g., legislation, policy) 8. Patients' views (e.g., surveys, interviews) 9. Expert opinion (e.g., peak bodies, government policy) 10. Economic evaluation (including service utilisation studies) |
|--|

In the schema, the first five levels are hierarchical and relate to the strength of the evidence on interventions. The last five have been used to assess evidence on relevant implementation aspects of interventions for paramedic response to low acuity patients.

4.2 Development of the literature review framework

Our initial meeting with ASNSW representatives provided us with a sound understanding of several of the challenges facing ASNSW in relation to low risk patients, and the current barriers and enablers in terms of providing appropriate care, transportation issues and general management issues. In particular, the interface between paramedics and Emergency Department staff and services was clarified. The meeting also discussed potential audience/s for the final report.

During this consultation meeting we discussed several threads that might be explored through the literature review framework. These include but are not limited to:

- Understanding the risk identification/triage capacity of ED personnel.
- Comparing the risk identification/triage capacity of paramedics.
- Validation methods used with paramedic decision-making processes for low acuity patients.
- Alternative interventions/models of care for management of low risk/low acuity patients (including any policies/clinical guidelines implemented in other jurisdictions or countries for management of low acuity patients).
- Barriers and enablers to the acceptance of paramedic patient assessment decisions.

An important step in conducting a targeted literature review is to define the key words to be used in the search. Selection of appropriate key words for the review required an understanding of how the service currently operates and the broader contextual issues relevant to the capacity of paramedics to identify low risk patients against other patients using risk identification/triage methodology.

4.3 Search strategies

Using the information provided, (including documentary resources), we identified the relevant medical subject headings (MeSH) terms to guide the literature search. MeSH is the US National Library of Medicine's controlled vocabulary thesaurus, and consists of sets of terms and naming descriptors in a hierarchical structure that permits searching at various levels of specificity. Once suitable references were identified we checked the key terms used in these items and tested various combinations of these key terms in both Google Scholar and health specific databases looking for consistency between the results of the previous searches using the MeSH terms.

This allowed us to refine the search terms which we entered into several databases. Initially searching focused on core clinical journals with the aim of identifying systematic reviews. Known sources of systematic reviews such as the Cochrane Library, Database of Abstracts of Reviews of Effects (DARE) and the Turning Research into Practice (TRIP) database for Evidence Based Medicine were individually searched.

We then completed further searches of the academic literature, utilising a range of databases accessed through the Summon technology available at the University of Wollongong library and/or direct database searches. Outputs were ranked according to relevance to the key words or terms. There were also a number of specific journals that produced articles relevant to the review including Academic Emergency Medicine, Annals of Emergency Medicine, Emergency Medicine Journal, Journal of Emergency Primary Health Care and Prehospital Emergency Care.

Initial searches were highly targeted, using a number of limiters. The search strategy was then widened to see if a greater range of published material was available relating to 'low acuity'

patients and emergency services generally. Searching also included hand searching of some journals that had already provided a number of relevant articles.

In recognition of the fact that many service innovations are often not recorded in the academic literature, we also undertook a search of the 'grey' or practice literature, via service evaluations, policies and evidence based guidelines related to the management of low risk patients in the emergency or first response context and through direct searches of relevant web-sites. Australian sites targeting health professionals were reviewed, such as the Australian Resource Centre for Healthcare Innovations (ARCHI), Paramedics Australasia and the College of Emergency Nurses Australasia (CENA). These sites provided a range of articles, presentations, project and program evaluations as well as protocols and clinical guidelines regarding care of people in emergency service contexts. Further details of the literature searching are included in Appendices A, B, C and D.

5 Findings

5.1 Introduction

The major findings within the literature are synthesised in this section of our report. We have organised our findings in accordance with the following issues as it is our view that understanding this combination of factors is what can best inform thinking about the application of low acuity pathways in the context of the ASNSW:

- Understanding the risk identification/triage capacity of ED personnel.
- Comparing the risk identification/triage capacity of paramedics.
- Validation methods used with paramedic decision-making processes for low acuity patients.
- Alternative interventions/models of care for management of low risk/low acuity patients.
- Barriers and enablers to the acceptance of paramedic patient assessment decisions.

As an understanding of the Australasian Triage Scale (ATS) is fundamental to discussions comparing the risk identification/triage capacity of paramedics with ED triage personnel, a brief analysis is provided from the literature that covers the background, process of assigning a triage category and issues specific to low acuity patients.

The majority of the literature identified by our searches came from the United Kingdom (UK) and the United States of America (USA). Studies from the USA covered a broad range of research topics including effectiveness in triaging and dispatching, ambulance diversion and overcrowding, alternatives to transport and paramedic assessment of low acuity patients. Research from the UK focussed particularly on alternative models of care, with less emphasis on paramedic assessment and alternatives to transport. The net result is that studies investigating paramedic decision making have largely been conducted in the USA whereas studies investigating new models of care have largely been conducted in the UK. There is an almost total absence of research conducted in Australia in either of these areas. There is a paucity of high quality evidence in the literature about prehospital care in general and the prehospital care of low acuity patients in particular. This is consistent with other findings which suggest that the evidence base for prehospital care is 'sparse' and that the evidence that does exist tends to focus on more acute care such as defibrillation and advanced life support (National Health Service Office of the Strategic Health Authorities 2009).

Well-conducted studies of alternative models of care are not frequently cited in the literature, compared to other intervention studies in health care, reflecting the lack of research in this area. Many of the studies identify methodological issues, largely due to the practicalities of undertaking research on models of care, particularly for randomised controlled trials. When randomised controlled trials have been conducted it has usually involved randomisation of the level of service, rather than randomising the patients e.g. by offering a different level of service (the intervention or the control) at different time periods according to some means of randomisation.

The search of the practice literature related to patients who are of low acuity identified Australia, the UK and USA as the most prolific in terms of developing and publishing reports and material related to service models to better manage these patients. The main Australian resources were from relevant government bodies and agencies.

The introduction of alternative approaches to management of low acuity patients within Australia appears to have followed developments internationally, in particular within the UK and North America where greater mobility of acute emergency services and alternative 'urgent care' models have been established. This includes outcomes arising from the review of the London Ambulance Service 'Taking Healthcare to the Patient: Transforming NHS Ambulance Services' in 2005,

resulting in the development of new models of care such as telephone advisory services and 'walk-in' or urgent care centres (Department of Health - UK National Health Service 2005). The reforms have been underpinned by a public education campaign which outlines the hierarchy of care options available, the last one advising people to make their own way to hospital if not in a life-threatening condition. The US has similarly followed suit with major reviews, including the *National Emergency Medical Services Advisory Committees' Position Statement on 'Improved clinical outcomes and downstream healthcare savings'*.

A recurring theme found in the practice literature, is the shift from paramedics being primarily seen as people who transport the sick and injured to hospital, to being health professionals in their own right. This is particularly highlighted at the interface between paramedics and emergency department staff, and the efficient use of their skills and time, particularly their capacity to triage non-urgent patients to appropriate care settings. This debate is occurring at both the international as well as national level, with the relevant peak body websites devoting significant space to such discussions.

5.2 Understanding the risk identification/triage capacity of ED personnel

5.2.1 Australasian triage scale

The Australasian Triage Scale (ATS) is a measure of clinical urgency (see Table 2), with triage by a registered nurse undertaken when people first arrive at an ED. The performance indicator threshold represents the percentage of patients who are expected to be seen within the maximum recommended waiting time for each triage category (Australasian College for Emergency Medicine 2000).

Table 2 Description of the Australasian Triage Scale

ATS category	Treatment acuity (maximum waiting time)	Performance indicator threshold
ATS 1	Immediate	100%
ATS 2	10 minutes	80%
ATS 3	30 minutes	75%
ATS 4	60 minutes	70%
ATS 5	120 minutes	70%

Reference: (Australasian College for Emergency Medicine 2006)

Development of the ATS commenced about 20 years ago. After some early work the National Triage Scale was developed, which then evolved into the ATS in 2000. This in turn has influenced triage scales in the UK and Canada. The ATS has several uses – it is primarily used as a tool to ensure patients are treated within an appropriate time frame based on the urgency of their condition but it can also be used as a casemix tool, a funding mechanism, and as an indicator of performance (Yousif, Bebbington et al. 2005; FitzGerald, Jelinek et al. 2010).

It is important to note that there is no evidence base for the performance indicator thresholds in Table 2 i.e. no evidence that patient outcomes are worse if they are not seen within the recommended times (FitzGerald, Jelinek et al. 2010). A systematic review of the evidence for reducing ED attendances and waiting times in ED concluded that triage is a useful risk management tool when EDs are busy but that the process of triage may cause delays in care:

'...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' (Cooke, Fisher et al. 2004, p 73).

Whilst in theory there are three separate stages when patients arrive in an ED - initial triage, more comprehensive assessment and then treatment based on that assessment - all three can occur

simultaneously, particularly in urgent situations. This makes it difficult to ‘unravel’ the times recorded in EDs for these different activities.

5.2.2 Increasing demand and appropriateness of emergency department services

The issue of increasing demand for ED services has been well covered in a recent systematic review of the literature which takes an Australian perspective (Lowthian, Curtis et al. 2010). The findings cite a number of possible explanations for the increase in ED attendances in recent years, which is a phenomenon not only in Australia but in developed countries more generally:

- Ageing of the population
- Increased loneliness and lack of social support
- De-institutionalisation of people with psychiatric problems (resulting in an increased likelihood of them attending an ED)
- Accessibility of GP services (referring to variable availability)
- Increased community awareness of health issues resulting from health promotion campaigns
- Accessibility and convenience of ED attendance as a ‘one-stop shop’
- Increased use of emergency ambulances

The authors conclude that these factors are ‘complex and inter-related’ (Lowthian, Curtis et al. 2010).

Studies that have investigated patients presenting to EDs who perhaps could have been managed elsewhere have used a variety of terms, including inappropriate presentations, low acuity presentations, presentations suitable for care in general practice and primary care presentations. Studies to identify such patients have used various criteria including severity of symptoms, the treatment prescribed at the time, whether the patient was self referred or not, triage category, use of diagnostic tests, and the need for admission to hospital (Eagar, Lago et al. 2006). A review of the literature on ED presentations concluded that:

- Studies describing the inappropriate use of EDs are relatively plentiful but few studies have evaluated health outcomes associated with alternatives to ED care.
- There is no valid and reliable ‘gold standard’ method for defining appropriate attendances at EDs.
- Definitions of appropriateness usually take a medical perspective.
- There are wide variations in estimates of ED attendances considered to be appropriate (New Zealand Health Technology Assessment Clearing House 1998).

The point was also made that the concept of what constitutes an appropriate visit to an ED largely depends on the perspective being considered. Health practitioners will have one viewpoint, with appropriateness defined using medical criteria, patients will have another perspective incorporating issues such as convenience and accessibility and administrators will have a different viewpoint again (New Zealand Health Technology Assessment Clearing House 1998). Bezzina et al concluded that:

‘There is a lack of agreement on how to judge ‘inappropriate’ or ‘primary care’ presentations. The use of expert opinion, self-ratings by patients, review of department activities and subsequent admissions have all failed to determine appropriateness when applied to specific patients’ (Bezzina, Smith et al. 2005, p 474).

We believe the lessons from the literature on ‘inappropriate’ ED attendances are relevant to the issue of low acuity patients transported by ambulance. Not all low acuity patients transported by ambulance would be considered ‘inappropriate’, no matter how ‘inappropriate’ was defined, but it is easy for the two concepts to be confused.

5.2.3 The process of assigning a triage category

The main measures to determine the value of any assessment tool are validity and reliability. In the context of patient triage, reliability refers to the degree to which repeated assessments of the same patient will result in assignment of the same triage category. This can be either inter-rater reliability (the extent to which different people will assign the same triage category to the same patient) or intra-rater reliability (the extent to which the same person will assign the same triage category to the same patient at different times).

Reliability studies in the literature on ED triage focus on inter-rater reliability, comparing assignment of triage categories between nurses, between nurses and physicians and between physicians and junior doctors (Cooper 2004). Given that a patient's acuity may constantly change over time only simulations of inter-rater reliability can be conducted e.g. ask people to assign a triage category on repeat occasions using written patient scenarios. Fan et al. (2005) have conducted a systematic review of triage scales used in EDs and, based on the results of their review, argue that the reliability of the ATS has only been evaluated in studies of poor to moderate quality. Unfortunately, only the abstract of the review is available, making it difficult to judge the merits of this conclusion.

The Kappa coefficient is a statistical measure of the degree of agreement between two people classifying individuals into the same category on a measurement scale such as the ATS. The Kappa coefficient compares the level of agreement with what might be expected by chance, ranging from +1 (perfect agreement) to -1 (complete disagreement), with zero indicating a level of agreement that would be expected by chance. Within the context of using the Kappa coefficient to assess consistency of triage the following have been suggested as ranges that have clinical significance:

- Poor level of agreement: Kappa coefficient less than 0.40
- Fair level of agreement: Kappa coefficient ranging from 0.40 to 0.59
- Good level of agreement: Kappa coefficient ranging from 0.61 to 0.74
- Excellent: Kappa coefficient ranging from 0.75 to 1.00 (van der Wulp and van Stel 2009)

The Australasian College for Emergency Medicine considers an acceptable standard of agreement to be a weighted Kappa coefficient of at least 0.6 (Australasian College for Emergency Medicine 2006).

'Overtriage' occurs when patients are allocated to a triage category of higher urgency than the one required. 'Undertriage' occurs when a triage category of lower urgency is selected. It has been suggested that the latter may occur in busy periods to more accurately reflect what is likely to happen i.e. patients will wait longer than normal, but there is no evidence to support this (FitzGerald, Jelinek et al. 2010).

Overtriage can manifest itself in low rates of admission for the more urgent triage categories (categories 1-3), with undertriage resulting in higher rates of admission for triage categories 4 and 5 than might be expected i.e. some of the patients in triage categories 4 and 5 should have been triaged to a higher level of urgency (Johnston-Leek, Sprivilis et al. 2001).

The authors who proposed the levels of agreement with clinical significance listed above reviewed published studies from several countries. They estimated that the levels of overtriage and undertriage in the two Australian studies included in their review ranged from approximately 11%-26% and 13%-23% respectively, while recognising that interpretation of the Kappa coefficient should be done with great care (van der Wulp and van Stel 2009).

Many studies have been conducted to measure the consistency of triage using the ATS but it is difficult to compare results because of differences in methods and use of the ATS over time (Gerdtz, Collins et al. 2008). Much of this work has employed written scenarios of patients

presenting to ED, which nurses are then asked to categorise by triage category. This may not reflect the 'real world' situation where nurses have the patient in front of them when making such decisions.

There are various approaches to improving the consistency of triage (of which the descriptors for each triage category for the ATS is one approach) but 'none of these approaches has been shown to be absolutely consistent in the assessment of urgency of any particular patient' (FitzGerald, Jelinek et al. 2010, p 88). The complexity of clinical decision-making is such that there is no 'gold standard' for measuring the accuracy of triage (FitzGerald, Jelinek et al. 2010).

One study published in 1997 examined the inter-rater reliability of triage (the triage scale was known at the time as the National Triage Scale) by getting two nurses to independently triage patients when they presented to ED. Forty one pairs of nurses from three EDs triaged 299 patients. The level of agreement was remarkably consistent across the five triage categories (refer to Table 3). For some patient characteristics there was a very high level of agreement between the triage nurses (e.g. aggressive behaviour, abdominal pain). For some patient characteristics the level of agreement was less (e.g. dry skin, pain). The value of the Kappa coefficient was 0.675, indicating a good level of agreement between the triage nurses (Whitby, Ieraci et al. 1997).

Table 3 *Inter-rater reliability of triage – results from one study*

National Triage Scale category	% of agreement between triage nurses
1	75.0%
2	74.4%
3	78.8%
4	79.6%
5	75.5%

Reference: (Whitby, Ieraci et al. 1997)

Although this study is somewhat dated it is interesting because it was undertaken with the involvement of patients as they presented to one of the participating EDs. The study has been used as the basis for the Emergency Triage Education Kit, originally published in 2002 and updated in 2009, which forms the basis of a standardised approach to triage education in Australia (Department of Health and Ageing 2009).

In a study conducted in 26 EDs in Victoria involving 178 triage nurses it was found that agreement on triage categorisation could be increased from 55% to 62% with use of computer-based scenarios rather than paper-based (text only) scenarios - including use of a still photograph of the patient (Considine, Levasseur et al. 2004).

Consistency in triage is often assessed by analysing the rate of admission by triage category, either within the same hospital over time or between hospitals or groups of hospitals. Many studies have examined the validity of using admission rates as a measure of triage quality, resulting in a recognition that variations in admission rates by triage category do occur (Monash Institute of Health Services Research 2001). Despite this variation, admission rate by triage category is recognised as a useful way of comparing triage accuracy between peer hospitals for the higher urgency categories (Australasian College for Emergency Medicine 2006).

5.2.4 Factors concerning those doing the triage

There is some evidence that application of the ATS is not influenced by nurse characteristics such as age, experience and educational preparation (Considine, Ung et al. 2000; Considine, Ung et al. 2001). In a review of the literature (involving eight studies) it was found that triage nurses with higher levels of factual knowledge make better triage decisions whereas none of the studies found

a significant relationship between triage decision-making and experience, either the number of years working as an emergency nurse or years of triage experience (Considine, Botti et al. 2007). A recent study found that the characteristics of individual triage nurses were not significant factors in influencing the reliability of the ATS (Gerdtz, Chu et al. 2009).

5.2.5 Patient-level factors influencing emergency department triage

There is some evidence (from a study using clinical scenarios to test for consistency in triage-decisions) that the ATS might not be applied in a consistent manner for those with mental health problems and pregnant women (Gerdtz, Collins et al. 2008; Gerdtz, Chu et al. 2009). Currently, there are four triage scales in use to varying degrees in Australia to triage patients with mental illness (one of which is the ATS), although most EDs still use the ATS for mental health triage assessment (Broadbent, Creaton et al. 2010). The issue of reliability and use of different scales has led to a call for a 'consistent and national approach to clients with a mental illness presenting to the ED. This starts with an accurate and consistent triage process' (Broadbent, Creaton et al. 2010, p 715). Other studies have identified issues concerning the triaging of Indigenous / non Indigenous patients (Johnston-Leek, Sprivulis et al. 2001) and possible differences in the triaging of men and women (Mohsin, Bauman et al. 1998).

5.3 Comparing the risk identification / triage capacity of paramedics

Before considering the literature on risk identification / triage by paramedics some key points are worth making:

- There are variations in the proportion of patients classified to each triage category in the different Australian states and territories, indicating that there are variations in triage practices across the country.
- As has been indicated in Section 5.2.3 there is no 'gold standard' for measuring the accuracy of triage and published studies indicate considerable variation in the reliability of triage.
- There is some evidence that triage can be influenced by what is happening in an emergency department at the time.
- There is no 'gold standard' for defining low acuity patients.
- One approach to providing a better service for low acuity patients has been the introduction of fast track services in EDs. There is some evidence that these systems are efficient, safe, and satisfactory when compared to management of such patients in regular EDs, but the evidence is weak (Yoon 2003). Fast track depends on a reliable method of selecting low acuity patients. Published results from the introduction of fast-track in Australia have been mixed. For further details see Section 5.5.5.

Put together, these points mean that triage can vary by place and by the person doing the triage and any comparison between the risk identification / triage practices of paramedics and ED personnel should be treated with some caution. Much of the research has been done in other countries, particularly the USA, which adds another reason for caution. The results obtained overseas may not be applicable to Australia.

The prompt for this targeted literature review is consideration of a policy to allow paramedics to admit patients directly to hospital ED waiting rooms. There are no published studies that address this particular issue directly, necessitating recourse to close approximations of what is proposed. In general, the term 'low acuity' is used more frequently to describe patients either arriving at an ED or receiving treatment in an ED, rather than patients being assessed and treated by paramedics. In the literature on prehospital care the research regarding the risk identification or triage capacity of paramedics is mostly found in studies framed in the following ways:

- Studies comparing transport of patients to EDs with alternatives such as minor injuries clinics or urgent care centres (UCC) (Esensoy 2008).

- The ability of paramedics to identify patients whose transport to ED was considered 'medically unnecessary' (Gratton, Ellison et al. 2003).
- The ability of paramedics to identify patients for whom ED treatment was 'needed' (Hauswald 2002).
- Patients with 'minor medical problems' (Knapp, Tsuchitani et al. 2009).

One study in the UK sought to identify the ability of paramedics to predict, at time of arrival at an ED, whether the patients they had just transported would be admitted to hospital or discharged from ED. It was found that paramedics demonstrated 'reasonable accuracy' when predicting the likelihood of admission to hospital and were slightly better at predicting discharge rather than admission. The paramedics predicted admission much more accurately in non-trauma cases, compared to trauma cases, with the reverse applying for discharge i.e. discharge was predicted more accurately in trauma cases (Clesham, Mason et al. 2008).

The first study to investigate the use of protocols to triage patients to different treatment and transport options involved four options:

- Ambulance transport to an ED.
- Transport to an ED by alternative means.
- Referral to a primary care provider within 24 hours.
- Field assessment and treatment only by a paramedic (Schmidt, Atcheson et al. 2000).

The protocol for the treatment and transport options was developed by an expert panel. The study was repeated, with some refinements, by Pointer et al. (2001). Other studies examined the ability of paramedics to identify patients who did not require ED care based on their judgements arising from answers to a small number of dichotomous (yes/no) questions (Hauswald 2002; Silvestri, Rothrock et al. 2002; Dunne, Compton et al. 2003). In one of the studies this involved just two questions:

- Could this patient have been safely transported by a non-medical transport service?
- Could this patient have been safely transported to a clinic or urgent care centre? (Hauswald 2002).

An Australian review of these and similar studies concluded:

'In summary, these studies suggest that paramedics with their current level of training are generally not well positioned to treat patients with chronic or occult conditions and make determinations about whether transport to a hospital A&E is required' (Raven, Tippett et al. 2006, p 31).

Cooke et al. (2004) conducted a systematic review of innovations to reduce ED attendances and waiting times, included in which is a review of the evidence regarding 'out of hospital' care. They came to similar conclusions to the Australian review:

'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' (Cooke, Fisher et al. 2004, p 45).

The authors of the Australian review pointed out that most of the studies were conducted in the USA and the variation in training in that country make it unclear to what extent training influences the ability of paramedics to triage effectively. Recent developments in paramedic training, particularly programs such as the Emergency Care Practitioner scheme, may have had an impact on the ability of paramedics to identify risks and the usefulness of the studies referred to here is

questionable. Details of the specific techniques to evaluate the risk identification / triage capacity of paramedics are included in the next section.

5.4 Validation methods used with paramedic decision-making processes for low acuity patients

Validity refers to the extent that an assessment tool measures what it is supposed to measure e.g. to what extent does the ATS measure patient acuity? The term implies that there is a 'gold standard' against which the assessment tool can be compared. Unfortunately, there is no gold standard to compare accuracy for patient acuity (FitzGerald, Jelinek et al. 2010). The subject of this review is not so much the validity of a particular tool (e.g. the ATS) but the inter-rater reliability of the ATS (e.g. ratings of paramedics compared to ratings by ED staff) or other tools. As demonstrated in Section 5.2.3 the inter-rater reliability of the ATS, even between staff working in ED all the time, is problematic.

Systems for categorising patients according to need for treatment, as with the ATS, are a means to an end but that often gets forgotten when people propose a 'better' scale or a better way of making an existing scale more reliable. Cooper (2004) has made the point, persuasively in our view, that this is a bit like 'putting the cart before the horse' and that 'when we do not have a theoretical model, we do not know what clinical outcome is best to judge the triage scale, and we do not know what is important to assigning a triage designation' (Cooper 2004, p 525). The argument about the importance of identifying desired clinical outcomes for triage categorisation has been supported by others (FitzGerald, Jelinek et al. 2010).

Table 4 summarises some of the ways in which the judgements of paramedics have been compared with the judgements of other health professionals, including use of written scenarios, 'real time' categorisation, retrospective review and comparison with guidelines. Characteristic of similar studies in the literature some of the studies focus on low acuity patients, using various terms and defined in different ways, whereas other studies focus on a wider group of patients. The first two studies in the table compare results using the ATS, whereas the other three studies investigate decision making by paramedics about transporting patients to hospital. We did not identify any studies comparing paramedic triage capacity with that of ED nurses.

It should be noted that the study by Kahveci et al. (2011) was conducted in Turkey where triage is not well established and most of the triaging in the emergency department where the study was conducted is done by paramedics. The results probably have limited applicability to New South Wales due to differences between the two health systems but the study is worth noting as the only 'real time' investigation of triage decisions by paramedics and doctors using the ATS that we have been able to locate in the literature. The lack of agreement between the two groups is consistent with other findings, although with a lower level of agreement than other studies involving different groups.

Table 4 Comparing paramedic judgements with other health professionals

Types of patients	Method of assessing paramedic decisions	Comparator	Location and comment about study design	Results and study authors
All patients older than 16	Each patient who presented to ED was triaged by a paramedic using the ATS	Each patient was also triaged by an emergency department resident	Turkey Although short term (one week) the study involved 732 patients. It is unclear whether the two assessments were made at the same time.	45% agreement on triage decisions between paramedics and residents (Kahveci, Demircan et al. 2011)
Patients in all triage categories 4 and 5 *	Paramedics assigned triage category based on patient profiles describing patients	ED nurse assessing the same patient profiles	Australia Paramedics and ED nurses provided with	Paramedics allocated more patient profiles to ATS category 5, at the expense of ATS 4. Nurses allocated

Types of patients	Method of assessing paramedic decisions	Comparator	Location and comment about study design	Results and study authors
	actually attending an ED		patient profiles	more to ATS category 4, rather than ATS 5. Both groups allocated similar numbers of patient profiles to ATS categories 1, 2 and 3 (Sprivulis 2003)
All adult patients transported to ED	Paramedics completed questionnaires in which they answered 'yes' or 'no' to questions regarding medical necessity of ambulance transport.	After examining the patient in ED and reviewing the patient's ambulance transport summary the ED physician completed the same questionnaire as the paramedic	USA Questionnaires completed prospectively. Paramedic and ED physician blinded to the results of each other.	Agreement between paramedics and ED physicians on each criterion for transport ranged from fair (71.9%) to moderate (89.6%) (Gratton, Ellison et al. 2003).
Low risk / stable patients transported to hospital	Paramedics assessed need for urgent transport to ED by ambulance using dichotomous ratings (yes/no).	Retrospective review of medical record by physicians to identify need for emergency care based on set criteria	USA Physician reviewers were blinded to the assessment by paramedics of need for ambulance transport	Paramedics, unaided by triage protocols or specific training, could not adequately identify patients in need of emergency medical treatment (Dunne, Compton et al. 2003)
Patients not needing transport to ED *	Paramedics assessed need for one of four possible treatment and transport categories using a set of guidelines to assign category	Panel of physicians assigned the same treatment and transport categories based on what happened to the patient in ED	USA	Paramedics assessed 180 patients (15.3% of total) as not needing to come to ED, of which 99 (55%) were assessed by physicians as needing to attend ED. Physicians assessed 222 (18.8%) as not needing to come to ED. (Pointer, Levitt et al. 2001)

* The results reported here for these two studies (Pointer, Levitt et al. 2001; Sprivulis 2003) are part of studies involving a wider sample of patients but only the results for the patients in the 'types of patients' column are included in the table e.g. the Sprivulis (2003) study involved patients from all ATS triage categories.

Brown et al. (2009) conducted a systematic review and meta-analysis of the ability of paramedics in the USA to identify medical necessity for ambulance transport to hospital i.e. identify those who do and do not require transport to hospital. Sixty one studies were fully reviewed by the authors, of which five were subject to a meta-analysis, including the studies by Pointer et al. (2001) and Gratton et al. (2003) referred to in Table 4. In three of the studies physician opinion was used as the 'gold standard' for comparing decisions by the paramedics. However, as the authors of the systematic review point out, there is a lack of consistency in the way physicians assess medical necessity, hence use of 'physician opinion' to validate decisions by paramedics is of questionable value. This makes it difficult to form conclusions about results such as the one by Gratton et al. (2003) that for 11% of patients paramedics believed that the patient did not warrant transport to ED when the emergency physicians believed that they did. Brown et al. (2009) concluded that the quality of the evidence was generally weak and that the available evidence is insufficient to support the practice of paramedics deciding which patients require ambulance transport.

A wide variety of outcome measures and reference standards have been used to evaluate 'at the scene' triage decisions by paramedics, including patient ability to ambulate, chief complaint, abnormal vital signs, judgements by ED physician or nurse and need for medical care, either during transport to hospital or in hospital (Cone, Benson et al. 2004). These outcomes measures and reference standards have been reviewed, with the conclusion that, for ambulance services 'no "standard" set of triage criteria have been generated or validated in determining medical necessity' (Cone, Benson et al. 2004, p 136).

One final issue regarding validation concerns the context and nature of the decision making by paramedics and triage nurses. In prehospital care the principal form of triaging is done by the Call Centre Control which allocates the response code. An implicit form of triage occurs when paramedics arrive at the scene. By the time paramedics arrive at an ED they are in possession of considerable information about each patient which they are in a position to convey to ED staff. By comparison, when ED nurses triage patients arriving by ambulance they are dealing with patients who have already received a 'first emergency response'. Comparing any form of triage by paramedics and ED staff is very much a case of comparing 'apples with oranges'.

5.5 Alternative interventions / models of care for management of low risk/low acuity patients

This section of the report is divided into sub-sections for the various models of care. Although presented as discrete sub-sections there are overlaps between the models. The term 'models of care' is very generic with a range of definitions and has been interpreted quite broadly for the purposes of this review. Various interventions have been studied, some with a focus on 'see and treat' at the scene, others with more of an emphasis on referring on to other providers, including alternatives to attending an ED such as minor injury clinics. However, it is difficult to 'unbundle' some of these interventions. For example, a 'see and treat' intervention will inevitably have to contend with referring on some patients, even if it is only to an ED.

Some of the models are more comprehensive than others, with some more appropriately described as interventions that fit within a broader model of care. As far as possible the review is restricted to patients that might be described as low acuity but there is no standardisation of definitions across the various studies, with patients referred to in various ways e.g. 'non-serious', 'not immediately life threatening' and 'minor injuries'. The scope of the review is primarily restricted to the period of time starting when a caller contacts an ambulance service and finishing when paramedics deliver patients to an ED or alternative destination, or discharge patients at the scene. Models of care for mental health are excluded. Details of the levels of evidence referred to in this section are to be found in Figure 2 in Section 4.1. A good synopsis of various protocols and guidelines to support models of care are to be found in the publication *Emergency Services Review: A comparative review of international Ambulance Service best practice* (National Health Service Office of the Strategic Health Authorities 2009).

5.5.1 Refer low acuity patients to telephone advice

The first, and most cited, study is the telephone assessment and triage of callers with non-serious problems conducted in the UK (Dale, Higgins et al. 2003). The details are summarised in Table 5. The quality of the reported findings is somewhat diminished by the absence of any data on outcomes for the control group.

Table 5 Telephone triage of non-serious calls

Location	Two ambulance services in the UK a total population of about 10 million
Target group	999 calls identified by call takers as Category C (non-serious) based on a three level range including Category A (life threatening) and Category B (serious)
Intervention	Following ambulance despatch, Category C calls were assigned to a nurse or paramedic, if available, who used a computerised decision support system for assessment, triage and advice.
Level of evidence	Level 2: supported practice, but with a caveat about the issue of safety (see Results)
Results	Telephone assessment of Category C calls is able to identify patients who are less likely to require ED care. Nurses triaged a significantly higher proportion of calls as not requiring an emergency ambulance than paramedics. This difference may have reflected differences in telephone consultation experience rather than differences in professional background. Some safety concerns were raised by the findings as almost 10% of those triaged as not requiring an ambulance were admitted to hospital.
References	(Dale, Higgins et al. 2003)

The issue of safety identified in the results in Table 5 was followed up in a re-analysis of the study data, which include retrospective review of medical records by an expert review panel. The panel members, who were blind to the decisions reached by the nurses and paramedics, had a high level of agreement with the decisions of the nurses and paramedics. These results led the researchers to conclude that ‘telephone assessment, triage, and advice of non-urgent ambulance service callers may be a safe alternative to despatch of an emergency ambulance’ (Dale, Williams et al. 2004, p 368) (emphasis added).

This study was followed up in the UK with a study involving the referral of 999 calls prioritised as non urgent to nurse advisers working in the NHS Direct Clinical Assessment System (NHS Direct) for telephone assessment and advice. Callers prioritised as meeting an agreed dispatch code and the inclusion criteria for the study were randomised to either receive the standard ambulance response (control group) or transferred to a nurse for advice (intervention group), if the caller agreed. Only 13% of potentially eligible calls were randomised, with the remaining calls excluded either because the call was not within agreed operational hours or because the call did not meet the inclusion criteria. Many of the callers who received nurse advice were satisfied with the advice and reassurance they received although there was some dissatisfaction with being asked too many questions and waiting for an ambulance. Based on an observation study, run concurrently with the randomised controlled trial, the researchers concluded that the proportion of non urgent calls that are suitable for further assessment by a nurse is low, although the rationale for this conclusion is unclear (Turner, Snooks et al. 2006). A recent review of the evidence concluded that:

‘The use of telephone triage systems for non-urgent calls does appear to be able to safely transfer most patients for nurse directed advice about their healthcare problems and provide an acceptable and cost-effective method for avoiding ambulance callouts’ (National Health Service Office of the Strategic Health Authorities 2009, p 43).

The studies by Dale et al. (2003) and Turner et al. (2006) indicate the need for further research on the acceptability, reliability and cost effectiveness of telephone triage of low acuity patients (Mason, O’Keeffe et al. 2009). The results indicate that nurses may be the appropriate type of health professional to provide a telephone triage service for low acuity patients. Further support comes from study in the USA which provides Level 4 evidence that transferring non-urgent calls to a nurse adviser results in no adverse patient outcomes (Smith, Culley et al. 2001).

5.5.2 Paramedic Practitioner Older People’s Support scheme

The most comprehensively studied intervention for treating patients with minor injuries and illnesses (referred to as ‘see and treat’) with suitably trained paramedics took place in the UK (see Table 6). There were some practical limitations in the conduct of the study but, in general, the study was well-designed and executed. Almost 30% of the patients in the intervention group did not receive the paramedic practitioner service.

Table 6 *Paramedic Practitioner Older People’s Support scheme*

Location	South Yorkshire Ambulance Service, UK.
Target group	People 60 years of age and older calling 999 for an ambulance with conditions triaged as not immediately life threatening.
Intervention	Paramedics trained in extended skills assessed and treated older people in the community. Scope of practice included patients presenting with falls, lacerations, epistaxis, minor burns and foreign bodies. The most common presenting complaint was a fall.
Level of evidence	Level 1: Well-supported practice. The level of service was randomised, by randomising the weeks in which the intervention took place, not individual patients.
Results	Intervention group patients had less ED attendances and hospital admissions than the control group with shorter treatment times and higher levels of patient satisfaction. The intervention appeared to be cost-effective.

	The care provided to the intervention group was at least as safe as the standard care provided by the ambulance service and the ED.
References	(Mason, Knowles et al. 2007; Mason, Knowles et al. 2008; Dixon, Mason et al. 2009)

The Paramedic Practitioner Older People's Support scheme was further developed to become the Emergency Care Practitioner (ECP) scheme to deal with a wider range of minor injuries and illnesses. There are examples in the literature where the results achieved by the two schemes, one targeting older people, the other with a more general reach, can be conflated (National Health Service Office of the Strategic Health Authorities 2009).

5.5.3 Emergency Care Practitioner scheme

In the UK the ECP role has been evolving for about the last seven years (National Health Service Office of the Strategic Health Authorities 2009). ECPs are trained to undertake a patient history and physical examination, can order further investigations such as x-rays and administer some medications. ECPs can refer to other health professionals when it is considered appropriate to do so (Mason, O'Keeffe et al. 2009). The evaluation of the scheme does not clearly identify the types of patients included in the study, making it difficult to discern the extent to which patients were 'low acuity'. The types of patients are inferred from the settings in which the ECPs worked e.g. minor injuries clinics, urgent care centres. It is not always clear from the literature to what extent ECPs have a paramedic background, with at least one study referring to ECPs having either a nursing, paramedic or 'other relevant healthcare' background (Mason, O'Keeffe et al. 2007). Some details of the largest evaluation of the scheme are summarised in Table 7.

Table 7 *Emergency Care Practitioner scheme*

Location	Five pairs of sites (ECP and non-ECP) in the UK.
Target group	Patients with emergency or urgent presenting complaints eligible to be seen by ECPs 'in their routine practice', including adults and children.
Intervention	There were a variety of service delivery models at the ECP sites, including responding to emergency calls and working in a variety of settings, including GP clinics, minor injuries clinic and urgent care centre.
Level of evidence	Level 2: Supported practice The study involved a mixed-methods, quasi experimental, multi-centre trial, including a cost-effectiveness study.
Results	Overall, there were no differences between ECP sites and non-ECP sites regarding patient discharge, investigations, treatments, time spent with patients, or contact with other services within 28 days of the original episode of care. Patients were more satisfied with ECP care than non-ECP care. Other results were very mixed across different sites
References	(Mason, O'Keeffe et al. 2009)

The heterogeneity of the service delivery models at the various sites were reflected in the mixed nature of the results, making it difficult to generalise the results to other settings. In addition to the findings summarised in Table 7 other studies of emergency care practitioners have identified the following results and levels of evidence:

- Level 3 evidence: promising practice - ECPs carried out less investigations, provided more treatments and were more likely to discharge patients home than usual service providers (Mason, O'Keeffe et al. 2007).
- Level 3 evidence: promising practice - decreased rates of admission to hospital for patients with breathing difficulties and elderly patients (> 65 years) with a fall who had been seen by an ECP (Gray and Walker 2008).
- Level 4 evidence: acceptable practice - patients seen by ECPs were transported to hospital less frequently than patients not seen by ECPs (Cooper, O'Carroll et al. 2007).

Taken together, the studies indicate an 'acceptable' practice in terms of levels of evidence, bearing in mind that in the absence of one standard model of service delivery the results are not automatically generalisable to the NSW setting. A recent review of the literature in the UK concluded that

'Overall, although ECPs have been demonstrated to successfully manage the demand on ambulance transports in a cost-effective manner, they do not manage the overall use of ambulance service resources (still requiring prolonged staff time) or reduce the demand for emergency care' (Hoskins 2011)

The Emergency Care Practitioner role was the forerunner to the Extended Care Paramedic program in the NSW Ambulance Service and in South Australia. A similar program has been established New Zealand (Swain, Hoyle et al. 2010).

5.5.4 Other models and interventions

This section includes a range of models / interventions with less evidence to support implementation.

After receiving appropriate training, paramedics in the London and Surrey Ambulance Services in the UK used protocols to transport patients meeting specific criteria directly to minor injuries units. The target group were patients calling 999 who fell within an agreed list of dispatch criteria judged to cover all potential cases of minor injury. It was found that the proportion of patients taken to minor injury clinics was almost the same for the intervention and control groups and that this only represented a small proportion of patients who appeared to be suitable for treatment in a minor injury clinic. Although the research design (randomised controlled trial) would normally result in Level 1 evidence there was low compliance with the study protocol because paramedics did not adhere to the schedule for randomisation (Snooks, Foster et al. 2004). Hence there is insufficient evidence to judge whether the practice is 'well-supported', 'supported', 'promising', 'acceptable' or 'promising'. One of the key findings was that

'the most important factor influencing the decision to take a patient to a Minor Injury Unit was its location in relation to the incident. When the Minor Injury Units were used, the ambulance service and patients benefited in terms of job cycle time, waiting time, and satisfaction with care' (Snooks, Foster et al. 2004, p 108).

Esensoy (2008) undertook an evaluation of a demonstration project involving two hospitals in Toronto, Canada, whereby ambulance officers had the option of taking patients either to an emergency department or to an Urgent Care Centre (UCC) staffed by ED physicians and nurses. Patients triaged by the ambulance officers at triage levels 4 or 5 according to the Canadian Triage and Acuity Scale (CTAS) and who met the UCC selection criteria were transported to a UCC. The UCC selection criteria aimed to exclude patients who might require inpatient admission or specialised services. If accepted for care in the UCC no details are provided of the process that was followed e.g. whether patients were initially directed to the waiting room or to receive immediate care. Various factors were found to influence the triage decisions of paramedics e.g. pick-up location, presenting complaint, previous experiences at the UCCs, estimated travel time and their past experiences with that particular type of patient. The main outcome measure (ambulance turnaround time) was shorter for patients taken to UCCs compared to EDs. However, there was low uptake by paramedics of the option of taking patients to the UCCs (Esensoy 2008). The study design meant that the level of evidence arising from this study is not high and hence has not influenced the content of the summary table at the end of this section.

Another UK study involved the development of evidence-based 'treat and refer' protocols which allowed paramedics to leave patients at the scene with appropriate self-care advice or refer the patients to community-based services. The target group were 'non-serious' callers to the 999 service although the term 'non-serious' is not defined. Outcomes for patients seen by paramedics at one ambulance station using the protocols were compared with outcomes for patients seen by paramedics at a nearby station not using the protocols. The study found that the protocols were

used and were acceptable to patients. It was anticipated that patients seen by paramedics using the protocols would be more likely to remain at home than those seen by paramedics not using the protocols but this did not eventuate. Some safety concerns were also identified (Snooks, Kearsley et al. 2004).

There is some evidence that paramedics can be trained to assess and treat certain conditions at the scene, including older patients with minor injury or illness (Level 1 evidence) (Mason, Knowles et al. 2007), wound lacerations (Level 5 evidence) (Hale and Sipprell 2000) and hypoglycaemia (Level 5 evidence) (Lerner, Billittier et al. 2003). An alternative approach is to develop systems for paramedics to treat a wider range of conditions. The authors of a USA study which sought to identify patients who could be treated at the scene to avoid transport to hospital, concluded that:

'The patients encountered in the course of this study represent a wide range of medical conditions, with each condition seen only a relatively few times. This suggests that relatively little would be gained from training paramedics to deal with any single clinical entity in the fashion proposed' (Kamper, Mahoney et al. 2001, p 377).

Similar sentiments are to be found in some of the other studies referred to in this section of the report. Much depends on the ability of paramedics to triage patients to the available treatment and transport options. Further details of how complex this can be are to be found in Section 5.3. There is an inherent trade-off between the costs of developing alternatives to existing models and the benefits, either for patients or ambulance services. Unfortunately, there are few economic evaluations to inform this trade-off.

The report from the UK *Taking Healthcare to the Patient Transforming NHS Ambulance Services* notes that:

'Many 999 patients are still taken to hospital when they could safely receive advice, assessment, diagnosis, treatment and/or care closer to home or over the phone. Many ambulance services are still putting a paramedic on every ambulance when models of care now evidence the need for a different skill mix. Ambulance services are increasingly reflecting this with the use of single responders, use of volunteers (both clinicians and members of the public with appropriate training) and greater use of intermediate tier resources. There is more scope for increasing the flexibility and types of responders ambulance services despatch, working in a more integrated way with other urgent care providers' (Department of Health 2005, p 12).

However, the report provides no references to support that claims that ambulance services are using single responders and volunteers and no evidence as to whether these alternative models are effective.

In the UK a pilot program was implemented in which calls to the ambulance service were allocated a priority of A, B or C to indicate the urgency of the response required. For non-urgent cases (priority C) a nurse and a paramedic were dispatched in a fully equipped ambulance. The program was evaluated by comparing the program with the standard paramedic service for non-urgent emergency calls on the same shift, same time period and similar geographical area as the pilot program (i.e. Level 3 evidence – promising practice). The evaluation was only short-term (15 weeks) and small-scale (198 calls attended by a nurse and paramedic). Some of the non-urgent calls could not be treated on-scene by the pilot program, thus requiring a response from the standard paramedic service, although there are no details of why this was the case. Less people were transferred to hospital in the intervention group than in the comparison group but the results should be treated with caution due to the nature of the study (Widiatmoko, Machen et al. 2008). The pilot program was viewed positively by both patients and staff (Machen, Dickinson et al. 2007).

Much of the work evaluating extended roles for paramedics has focused on the acquisition of specific skills, particularly at the more acute end of the spectrum, rather than care of low acuity patients (McPherson, Kersten et al. 2006).

In the course of reviewing the literature, particularly the practice literature, many models/interventions were identified that were not supported by good quality research evidence. This was not because research had been undertaken with inconclusive or adverse findings; it was simply that the research had not been done. An indication of some of these models can be found in Table 8. Any results are not included because of the poor level of evidence. The interventions were generally small in scale and/or implemented for short periods of time.

Table 8 *Examples of models not supported by evidence*

Name (if any) and place	Description	Reference
Perfect Partners Hampshire, UK	Follow-up of older patients not transferred to hospital after making an emergency call to identify need for referral to community services	(Metcalfe 2006)
Nottinghamshire, UK	Referral by paramedics of older people for intermediate care services, rather than transport to ED. Intermediate care provides short-term intensive support.	(Logan, Stoner-Hobbs et al. 2007)
Community paramedics NHS, Scotland	Community paramedics work alongside other staff e.g. in out-of-hours service, ED, 'seeing and treating' minor injuries and illnesses.	(National Health Service Scotland 2010)

5.5.5 Use of fast-track for low complexity patients

Fast-track system is an approach that involves the assessment and treatment of patients with less urgent or less complex conditions, in parallel with assessment and treatment of all other patients, within the one ED. The available evidence indicates that ED fast-track systems appear to be efficient, cost-effective, safe, satisfactory for patients and result in shorter lengths of stay in ED for low acuity patients (Yoon 2003). However, despite the fact that fast-track has been around for approximately 20 years, the studies on which this evidence is based have what have been described as 'noteworthy limitations' (Wiler, Gentle et al. 2010).

There are various options for implementation of fast-track which suggests the need for ongoing investigation to build on the basic knowledge that 'fast-track works' to better understand how it works best and in what circumstances. It has been suggested that the improved access for minor cases resulting from fast-track systems has the potential to increase demand, although there is no evidence to support or refute this (Cooke, Fisher et al. 2004).

The diversity of fast track systems, which makes it difficult to compare results from different studies, can be seen from a summary of the various criteria used in Victoria to select patients for fast track (refer to Table 9) (Department of Human Services 2008).

Table 9 *Summary of fast track criteria used in emergency departments in Victoria*

Criteria	Description
Probability of discharge	Consumers considered likely to be discharged home are streamed to fast track services and patients considered likely to require a hospital admission are directed to other care streams.
Diagnostic group	Consumers presenting with a minor injury and illness are streamed to fast track services.
Acuity by triage category	Consumers allocated a triage category 3, 4 or 5 are streamed to fast track services.
Acuity of care	Consumers requiring simple care are streamed to fast track services while those requiring complex care are directed to other care streams.

Reference: (Department of Human Services 2008, p 18)

The published results from the introduction of fast-track in Australia have been mixed. Introduction of fast track at a large Sydney ED in 2006 resulted in no change in performance for triage category 2 patients but an improvement in performance for triage category 3 patients and very considerable improvement in performance for triage categories 4 and 5 (Ieraci, Digiusto et al. 2008). These improvements occurred for all patients in the ED, not just those who were 'fast tracked'. Introduction of fast track in an ED in Queensland resulted in a trend towards improved performance for triage categories 2 and 3 but this did not reach statistical significance (Kwa and Blake 2008).

The first study in Australia to compare results from the introduction of fast track with a control group found that the median waiting times (for all ED patients) for triage categories 4 and 5 both increased by three minutes after the introduction of fast track. Median waiting times for triage category 2 decreased by one minute and for triage category 3 increased by one minute. The authors argued that the clinical significance of changes of this magnitude were questionable (Considine, Kropman et al. 2008).

At the Flinders Medical Centre in Adelaide introduction of fast-track still involved assigning a triage category to all patients but from that point on, except for those patients with what are described as 'time-critical threats to life and limb', all other patients are seen in order of arrival, irrespective of triage category. Patients are divided into two groups - those considered likely to go home from ED and those likely to be admitted - with each group seen by a different team of staff (Ben-Tovim, Dougherty et al. 2008). This approach produced mixed results for triage waiting performance (across all patients) with a slight decrease in performance for triage categories 2 and 3 and improved performance for triage categories 4 and 5 (King, Ben-Tovim et al. 2006).

The changes at Flinders Medical Centre were driven by the application of Lean Thinking which has come to be used more widely in recent years in health care. The process orientated nature of work in EDs lends itself to such an approach. Patient care is usually reported as being improved by the use of Lean Thinking, including improvements in waiting times, but there is the possibility of a publication bias (null or negative results are not reported) and many unanswered questions remain about how best to implement this approach (Holden 2010).

5.6 Barriers to the acceptance of paramedic interventions to low acuity patients patient assessment decisions

The technical capacity of paramedics to triage and assess risk has been discussed in Section 5.3 and Section 5.4. This section of this report explores potential barriers to the acceptance of paramedic patient assessment decisions. The aim is to give an indication of some of the issues that have arisen from searching the literature and is not meant to be comprehensive.

Given the lack of evidence in the literature supporting the effectiveness of patient assessment decisions made by paramedics, this may impact on acceptance of such decisions by other health professionals. These results do not necessarily mean that paramedics cannot make safe and accurate decisions about whether to transport patients to EDs, it simply means that the evidence to support them doing so is either lacking or of poor quality.

A certain degree of ambiguity regarding the professional role of paramedics seems to exist. This may partly result from the developing role of the paramedic and the expansion of duties performed. The traditional role of an ambulance crew arriving at the scene of an incident and then transporting the patient to the ED is changing. Various initiatives now exist in many countries which provide greater choice of destinations and promote discharge of patients at the scene (Cooke, Fisher et al. 2004). Dobbie and Cooke (2008) have also recognised that skills within the ambulance service have developed, and ambulance staff are undertaking more treatments. A lack of clear professional role delineation for paramedics which reflect such changes may represent a barrier to their work, including patient assessment decisions.

A recent Tasmanian study examined the scope of practice of Australian rural paramedics, identifying community involvement, organisational support, professional support, and education and training as elements of rural paramedic practice that highlight the importance of a multidisciplinary and community based response to patient care in rural areas. The authors suggest a 'move from informality to a more formal framework will perhaps enable rural paramedic practice to emerge as a discipline in its own right' (Mullholland, O'Meara et al. 2009, p 9). Cooke et al. (2004) found that the new roles for ambulance staff in emergency care require further research as they have not been systematically assessed. In addition, a potential barrier is that those working with paramedics, such as nursing staff or emergency physicians may have a deficit of knowledge with regards to the extended paramedic role and skill set (Henderson 2008).

Emerging models of care include options such as walk-in centres, urgent care centres and minor injuries units. Additionally, many patients are now treated at the scene and not transported to hospital (e.g. patients that have had falls or have other minor injuries). While many of these alternatives may be advantageous, a lack of knowledge about their availability and appropriateness, for paramedics and patients, may be a potential barrier. Difficulty for ambulance staff in navigating the varying and complex health and social care referral routes when they wish to refer patients to another professional has been reported. Metcalfe (2006) has described a UK project that aimed to address this problem, which involved a working partnership between intermediate care teams and an ambulance service to avoid unnecessary admission to hospital and to improve health and social care services for older people.

A number of risks, both clinical and legal, are associated with the decision by paramedics not to transport patients. These risks may serve as another barrier to paramedic patient assessment decisions. Concerns have been expressed about the risk of litigation associated with non-transportation (Goldberg et al. 1990 in Cooke, Fisher et al. 2004; Dobbie and Cooke 2008). Legal action against paramedics has become a more common phenomenon in the US and UK, however, the extent of the relevance to the Australian context is unclear. A study of litigation claims against ambulance services of the NHS identify the issue of the decision not to convey a person to hospital as the one clinical area that has not been addressed (whereas obstetric care and spinal injury recognition were addressed by the Joint Royal Colleges Ambulance Liaison Committee guidelines). It is claimed that as the practice of discharging patients from the scene becomes more common, the potential for litigation increases, and as such this will need to be carefully monitored and improved guidelines should be established (Dobbie and Cooke 2008).

Issues of poor record keeping and lack of systems to monitor outcomes of non-transport may also impede paramedic patient assessment decisions. A UK study exploring ambulance crew members' attitudes towards clinical documentation and non-conveyed patients found low completion rates of clinical records for non-conveyed patients. This appeared to be brought about by a belief that clinical records were not important in every circumstance, along with a lack of focus on monitoring by management. Potential consequences of low completion rates of clinical documentation, namely clinical and legal risk, were also discussed (Porter, Snooks et al. 2008).

5.7 Enablers to the acceptance of paramedic patient assessment decisions

Several potential enablers for acceptance of paramedic patient assessment decisions were also identified in the literature. These include training, guidelines and protocols, increasing the effectiveness of paramedic assessment and decision making skills; paramedic experience, autonomy and professionalisation of practice; and patient education and knowledge.

5.7.1 Training

Training has been identified as an important enabler in the promotion of acceptance of patient assessment decisions made by paramedics. Cooke et al. (2004) found that studies in the USA suggest that present training of paramedics is inadequate for their changing roles, and indicate that further research is needed to determine training requirements of individuals. Dobbie and Cooke (2008) note that training in the ambulance service has not had a focus on the assessment

and decision making required to decide if a person does not require treatment or further care. The difference in training received by paramedics in the USA, UK and Australia should be noted and, as much evidence comes from USA, the applicability to Australia is unclear.

In NSW, the need for more specialised training and education of paramedics has been recognised to some extent. The clinical and technical skills of ambulance officers are being progressively upgraded by the Service, 'to enhance the base level of skills of ambulance officers and increase the number of highly skilled paramedics' (New South Wales Audit Office 2007, p 33). Prioritisation for training of officers in rural and remote areas is evident, aiming for consistency in the level of patient care throughout the State. A continuing professional development program has also been introduced. Clinical and non-clinical training and education is being delivered via the internet, and online communities of practice amongst ambulance officers have been established (New South Wales Audit Office 2007). It has been recommended that 'the Ambulance Service of NSW incorporate regular designated, paid training times into rosters, so that paramedics can meet with Clinical Training Officers for uninterrupted training' (General Purpose Standing Committee No 2 2008, p xviii).

Other innovative educational opportunities may be possible to implement. For example, Williams et al. (2004) describe an initiative in Alice Springs which employed ambulance officers on a casual basis against vacant nursing positions in the ED. It was found to be an effective and valuable strategy, easing the workload burden on the existing nursing staff and providing additional educational opportunities for ambulance officers.

5.7.2 Guidelines and protocols

Guidelines and protocols also have the potential to enable acceptance of paramedic patient assessment decisions. Results from a short study (Gray and Wardrope 2007) suggested that guidelines for non-transport of low acuity patients can help support the decision making of ambulance staff. It is cautioned however, that safe practice must be ensured and that guidelines are not used to legitimise sub-standard practice.

From a Swedish study, it was recommended that medical services develop clear criteria for the utilisation of ambulance services to ensure safety and appropriate use of resources, avoiding unnecessary transportation of patients not requiring prehospital interventions (Hjälte, Suserud et al. 2007). Another Swedish study identified improving the triage system as a key step in better utilisation of emergency medical services resources (Khorram-Manesh, Lennquist Montañ et al. 2011).

5.7.3 Paramedic experience, autonomy and professionalisation of practice

Individuals' level of experience may also act as an enabler, improving skills and thus making acceptance of assessment and decision making more likely. A USA study found that 'greater individual volume [among paramedics] is robustly related to improved performance ... [and] that the benefit of learning operates through both recent and past experiences' (David and Brachet 2009, p 902). Thus, it may be cautiously interpreted that although there may not currently be strong evidence on paramedics undertaking patient assessment decisions, with suitable training, and with accumulated experience and individual learning, improved and acceptable performance in this area may be possible.

Another enabler is increasing the autonomy and professionalisation of practice. Illustrative of the increased skills of paramedics, the Australian Triage Process Review, approved by the Australian Health Ministers Advisory Council (AHMAC), recommended investigating paramedic participation in the triage process – 'at what time initial triage should be undertaken and the potential for this to be done earlier in the process e.g. by ambulance paramedics' (New South Wales Department of Health on behalf of the Australian Health Ministers Advisory Council 2009, p 3). Dobbie and Cooke (2008) also note that ambulance care is moving towards a more autonomous practice.

Expanded roles for paramedics have been seen as valuable innovations (O'Meara, Walker et al. 2006). Suggestions for what these roles may look like, and what activities should be undertaken, have been made e.g. Rural Expanded Scope of Practice Model (O'Meara, Walker et al. 2006). A report by Raven et al. (2006) also described a number of options for developing an expanded scope of practice for paramedics in Queensland, and the capacity for paramedics to undertake expanded health care roles is assessed.

On the development of the paramedics' role, O'Meara (2009) states that it

'...has increasingly placed them alongside other health professionals and helped develop their own sense of professional identity. There has been a transition of paramedic care from a simple response, deliver first aid and transport model to a more integrated role within the health system including stronger links to the primary care system. This transition from strict protocol driven practice to procedures requiring the paramedic to use knowledge and experience to problem solve and provide solutions is creating a more complex practice for paramedics. Supporting these changes and providing a firm foundation for the future development of the profession has been the progressive move from a vocationally based training system to university' (O'Meara 2009, p 1).

The professionalisation of paramedics is discussed at length in the literature. For example, Woollard (2009) discusses professionalisation in the context of Australia and the UK; Hoskins' (2011) literature review discusses the developing role of the emergency care practitioner in the UK context and Williams (2009) looks at the connection between professionalisation and education, proposing strategies likely to result in attainment of professional status for paramedics in Australia.

5.7.4 Patient education and knowledge

Patient education and knowledge may also enable greater acceptance of paramedic assessment and decision making. Comprehensive public education on appropriate use of ambulances is supported by Khorram-Manesh et al. (2011) to achieve better utilisation emergency service resources. It has been recommended that

'...the Ambulance Service of NSW undertake further community education programs as a priority. The Service should consider successful communication strategies used by other Ambulance Services, such as the London Ambulance Service, in the development of its future programs' (General Purpose Standing Committee No 2 2008, p xx).

In the UK, the London Ambulance Service encourages patient education e.g. patients choosing the most suitable way of getting the care they need i.e. self-care, GP, NHS walk-in centres, urgent care centres or minor injuries units (London Ambulance Service 2010).

6 Applying the findings from the literature

6.1 Paramedic triage capacity

The aim of this project was to use the evidence available within the academic and practice literature to examine several issues relating to the management of low risk patients by ambulance services. We have endeavoured to identify, where possible, strategies and interventions that have been rigorously evaluated. The focus on evidence means that some established practices that have not been evaluated have not been included as primary material for this final report.

We found no Australian studies that directly compared ambulance protocols for triaging patients with the Australasian triage system used in NSW hospitals. Many studies have been conducted to measure the consistency of triage using the Australasian Triage Scale but it is difficult to compare results. There is no 'gold standard' for measuring the accuracy of triage. The process of assigning a triage category in emergency departments can be influenced by individual patient factors (e.g. presenting condition); individual provider factors (e.g. knowledge level of triage nurses); and local procedures and systems. There can be quite considerable levels of disagreement about assigning patients to triage categories.

In prehospital care the principal form of triaging is done by the Call Centre Control which allocates the response code. An implicit form of triage occurs when paramedics arrive at the scene. By the time paramedics arrive at an ED they are in possession of considerable information about each patient which they are in a position to convey to ED staff. By comparison, when ED nurses triage patients arriving by ambulance they are dealing with patients who have already received a 'first emergency response'. Comparing any form of triage by paramedics and ED staff is very much a case of comparing 'apples with oranges'

6.2 Models of care / interventions

Ambulance services world-wide are faced with increasing demand for services and seeking potential strategies to alleviate these pressures (Pickering, Mason et al. 2009). Our targeted literature review has provided the best evidence available from other countries as to how ambulance services deal with triage 4/5 or 'low acuity' patients.

Table 10 summarises the models of prehospital care with the best level of evidence to support implementation. The referral of low acuity patients for telephone advice and the introduction of emergency care practitioners are the two interventions targeting low acuity patients that are best supported by evidence. This finding is supported by a recent focused review of the academic literature from the UK (National Health Service Office of the Strategic Health Authorities 2009).

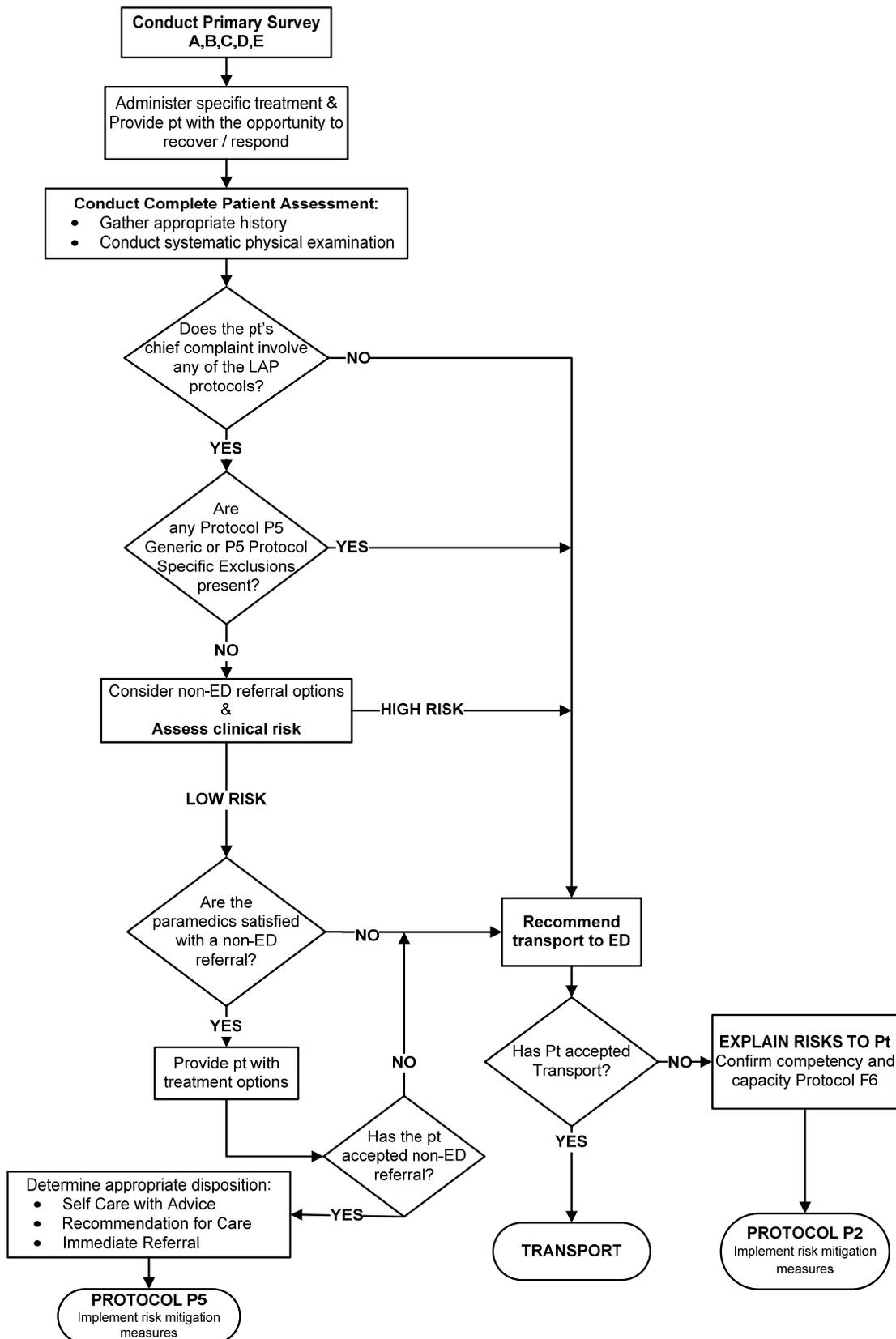
Table 10 *Summary of best supported interventions for low acuity patients*

Level of evidence	Level of support	Intervention
1	Well-supported practice	Paramedics with extended skills assess and treat older people with conditions that are not immediately life-threatening.
2	Supported practice	Triage and assessment of non-serious calls by nurses. Emergency care practitioners.
3	Promising practice	Dispatch of nurse and paramedic to non-urgent calls.

6.2.1 ASNSW low acuity pathway

The low acuity patient (LAP) clinical pathway used by ASNSW is provided in Figure 3.

Figure 3 *Low acuity patient (LAP) clinical pathway*



As no other specific protocols that were directly comparable to the LAP clinical pathway could be sourced through our targeted review of the academic and practice literature it was not possible to compare this protocol with other methods. What is implicit from the protocol is the importance of documented protocols; paramedic assessment and decision making skills; patient preference or

understanding of the intervention and the availability of non-ED referral options. These are factors that have arisen in varying degrees in the literature as evidenced through our analysis in Section 5.

Our synthesis of the evidence suggests there is value in ASNSW building on their current LAP intervention and continuing to develop the skills and knowledge of all paramedics in management of low acuity cases particularly for older people with conditions that are not immediately life threatening. Other intervention points to improve management of low acuity patients, need to be reviewed by ASNSW in the context of existing resource and industrial constraints. There is no agreed definition of 'low acuity' and many different terms are used to indicate that some patients are less acute than others. Therefore it may be useful for ASNSW to more specifically define the types of patients that it considers fit within this category – given the variations in interpretation of the term 'low acuity' found in the literature.

There is a lack of evidence in the literature supporting the effectiveness of patient assessment decisions made by paramedics and there are no published studies that compare triage decisions of emergency department staff with triage decisions by paramedics. There is no evidence in the literature to support transporting low acuity patients directly to ED waiting rooms. Only one reference could be found to the practice of directing low acuity patients arriving by ambulance to ED waiting rooms upon arrival at ED, described as 'common' practice in a study from the USA (Knapp, Tsuchitani et al. 2009). No further details were provided about the practice. Consequently interventions that aim to divert low acuity patients to ED waiting rooms require closer investigation and robust evaluation before their implementation.

There is evidence of alternative strategies to manage low acuity patients that are capable of delivering cost savings and improving demand management – the quantum of these improvements is not readily identifiable within the literature. The processes and systems for providing care to low acuity patients, however defined, cannot be considered in isolation from processes and systems for other patients.

6.3 Future research strategy

6.3.1 Conclusions

As noted previously consistency in triage is often assessed by analysing the rate of admission by triage category, either within the same hospital over time or between hospitals or groups of hospitals. Many studies have examined the validity of using admission rates as a measure of triage quality, resulting in a recognition that variations in admission rates by triage category do occur (Monash Institute of Health Services Research 2001). Despite this variation, admission rate by triage category is recognised as a useful way of comparing triage accuracy between peer hospitals for the higher urgency categories (Australasian College for Emergency Medicine 2006). Whilst these studies have not focused on lower urgency/acuity categories there may be opportunity for ASNSW to compare paramedic triage decisions with ED nurse triage decisions using linked data sets to evaluate a retrospective patient cohort.

The literature review suggests there is value in ASNSW building on the current LAP intervention and continuing to develop the skills and knowledge of all paramedics in the management of low acuity cases particularly for older people with conditions that are not immediately life threatening. Other intervention points to improve management of low acuity patients should be reviewed by ASNSW in the context of existing resource and industrial constraints. In the absence of an agreed definition of 'low acuity' it may be useful for ASNSW to more specifically define the types of patients that it considers fit within this category.

Many of the models/interventions identified in the literature were not supported by good quality research evidence. This was not because research had been undertaken with inconclusive or adverse findings; it was simply that the research had not been done. This may provide an impetus

for ASNSW to develop its own research strategy to improve the evidence base for low acuity patient management.

The process from dispatch to arrival at an ED includes a number of key decision or intervention points. There is a need to identify which of these intervention points should be the focus of future research and development. In the context of managing low acuity patients in the pre-hospital phase the research questions that might be considered include:

- What is the optimal point in the patient journey for ASNSW to intervene? Is it pre-hospital or on arrival at hospital?
- What alternatives does the ASNSW have for safely managing low acuity patients?
- Why do patients with low acuity conditions contact ASNSW in the first place?
- Why do patients who are assessed by the ASNSW as not needing transport insist on transport to an ED?
- Can paramedics assess and triage low acuity patients as effectively as ED triage personnel?
- What is the size of the problem?
- How many low acuity patients insist on transport to hospital when this is deemed clinically unnecessary?
- What is the impact of transporting low acuity patients to ED on ambulance turnaround times?
- Do low acuity pathways deliver appropriate health outcomes?

6.3.2 Recommendations

It is recommended that research in the short to medium term focus on answering the following questions:

- Why do patients with low acuity conditions contact ASNSW in the first place?
- Why do patients who are assessed by the ASNSW as not needing transport insist on transport to an ED?
- Can paramedics assess and triage low acuity patients as effectively as ED triage personnel?

It is also recommended that this research be conducted in a relatively well-defined locality within NSW such as the Central Coast and the Illawarra. The research would provide an opportunity to develop closer links with the relevant local health district with a view to proceeding to trials of mutually agreed interventions to reduce the demand for hospital services by low acuity patients requiring pre-hospital care, based on the results of the research.

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Appendix A: Literature search - limits and databases searched

Limits

The parameters for searching the academic literature are listed below:

- Health related databases only
- Focus on peer reviewed or core clinical journals
- Limited to articles relating to adults
- Limited to articles in English
- Restricted to 2000 – 2011 (unless a key or 'seminal' article has been identified relating to an earlier period)
- Excluded newspaper articles
- Excluded book reviews
- Priority given to material in full text
- Priority given to systematic reviews, meta-analyses and literature reviews

As the depth of practice literature is more restricted fewer limits were placed on our search strategy:

- Limited to articles relating to adults
- Limited to articles in English
- Restricted to 2000 – 2011
- Priority given to web based sources
- Priority given to Australian, UK, US and Canadian web-sites.

Databases

Using Summon, we searched all databases and resources available through the University of Wollongong's library. Summon provides access to approximately 80% of the University's extensive collection of databases, academic books, e-books, dissertations, conference proceedings and newspaper articles, as well as digital and print, audio and video, single articles to entire e-journals, and every format in between. For example, the PubMed/MEDLINE database was searched through Summon.

A selection of databases that are not included in Summon were searched individually including CINAHL and PsychINFO as well as three specialty databases containing health related systematic reviews.

Appendix B: Literature search - search terms

A list of the various search terms used to assist the ASNSW develop a better understanding of the models of care found in the literature for low risk patients is included in Table 11.

Table 11 *Summary of search terms*

Source	Search Terms : Mental Health Frequent Callers to Ambulance Services
Cochrane terms	Prehospital and Emergency Care Field
Medical Subject Headings (MeSH)	Triage Utilization review Health service misuse Severity of illness index Trauma severity indices Emergency medical services Emergency medical technician Economics Prehospital emergency care
Key words Google and Google Scholar	Ambulance Emergency care practitioner Emergency medical technician Extended care paramedic Out of hospital emergency care Prehospital on-site triaging Low acuity patients Ambulance transport and medical necessity Paramedic assessment Treat and refer protocols Paramedic assessment Patient transport Providing non-urgent care Prehospital networks and referral Alternative care options

Appendix C: Literature search - journal titles

A range of journals have consistently generated relevant material. The journals contributing most relevant items and their corresponding Impact Factor (IF) are listed in Table 12. The IF is one tool that can be used to compare journals. It is a measure of the frequency with which the 'average article' in a journal has been cited in a particular year or period. The annual Journal Citation Reports (JCR), published by Thomson Reuters, explains IF as a ratio between citations and recent citable items published. The IF of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years.

The IF is useful in clarifying the significance of absolute (or total) citation frequencies. It eliminates some of the bias of such counts which favour large journals over small ones, or frequently issued journals over less frequently issued ones, and of older journals over newer ones. Care needs to be taken in using IFs in assessing the usefulness of a journal as there are many factors that influence citation rates. The IF should be used with informed peer review. Generally speaking, the higher the IF the higher the status of the journal.⁷

Table 12 *Useful journal titles*

Journals	Impact Factor ⁸
Academic Emergency Medicine	2.197
American Journal of Emergency Medicine	1.994
Annals of Emergency Medicine	4.142
Australian and New Zealand Journal of Public Health	1.529
Australian Health Review	0.803
Australian Journal of Emergency Management	N/A
Australian Journal of Primary Health	0.289 [#]
Canadian Journal of Emergency Medicine	1.515
Emergency Medicine Australasia	0.901 [#]
Emergency Medicine International	N/A
Emergency Medicine Journal	1.269
European Journal of Emergency Medicine	0.901
International Emergency Nursing	N/A
Journal of Emergency Medicine	1.552
Journal of Emergency Primary Health Care	N/A
Journal Health Services Research Policy	2.407 [#]
Prehospital Emergency Care	1.889
Quality Safety and Health Care	2.856

⁷ This information is excerpted from the Thomson-Reuters web-site available at:

http://thomsonreuters.com/products_services/science/free/essays/impact_factor/ accessed 12 July 2011.

⁸ Impact factors are for 2010 unless indicated by # where the impact factor supplied is for 2009. If a current impact factor is not available this is indicated by 'N/A'.

Appendix D: Literature search - practice literature sites

Whilst some practice literature emerged through our search strategies, several web-sites were individually searched for material relevant to paramedic management of low risk patients. These sites are listed in Table 13.

Table 13 *Selection of practice literature sites*

Country of Origin	Practice Literature Sites
Australia	Australian Resource Centre for Healthcare Innovations (ARCHI)
	Australian Government Department of Health and Ageing www.health.gov.au
	College of Emergency Nursing Australia (CENA) www.cena.org.au
	Cochrane Prehospital and Emergency Health Field website
	National Institute of Clinical Studies (NICS)
	Paramedics Australasia www.paramedics.org.au
	State Ambulance Services : Qld, Victoria, SA, WA, Tasmania, ACT and NT
United Kingdom	BestBETS – modified Critical Appraisal Tool (CAT) for Emergency Medicine http://www.bestbets.org/home/bets-introduction.php
	East Midlands Ambulance Service NHS Trust
	Emergency Care policy documents UK Health Department
	Emergency Care web pages at the Health Services Research Institute of Warwick University
	Joint Royal Colleges Ambulance Liaison Committee
	London Ambulance Service NHS
	National Electronic Library for Health (NeLH) Emergency Care
	National Institute for Clinical Excellence (NICE) (UK)
	Paramedic practitioner (NHS) www.paramedicpractitioner.com
	Scottish Intercollegiate Guidelines Network (SIGN)
	Service Delivery Organisation http://www.sdo.lshtm.ac.uk
	Yorkshire Ambulance Service
United States & Canada	Canadian Health Services Research Foundation (CHSRF) www.chsrf.org.ca
	Community Paramedic (US) www.communityparamedic.org
	National Guideline Clearing House (US)
	Operation Care – Baltimore Health Care Access (non profit agency)
	San Francisco – Department of Public Health; intensive case management program; high utilizers of medical services (HUMS)