

Which paramedic skills are making an impact in emergency care? A systematic review of the evidence.

Rachel Evans

Supervisors: Dorothy Newbury-Birch, Ruth McGovern

| | |
|---------------------------------------|----|
| Introduction | 3 |
| Background | 3 |
| The role of Paramedics in the UK..... | 3 |
| Current pressures..... | 4 |
| International models..... | 6 |
| Background from the literature | 7 |
| Aims | 8 |
| Objectives | 8 |
| Methodology..... | 8 |
| Study Selection..... | 8 |
| Participants | 8 |
| Interventions..... | 9 |
| Control | 9 |
| Outcome measures | 10 |
| Types of evidence | 10 |
| Information sources..... | 10 |
| Search terms | 11 |
| Management of identified studies..... | 11 |
| Summarised flow of information | 12 |
| Data abstraction and synthesis..... | 13 |
| Costs..... | 13 |
| Risks | 14 |
| References | 15 |

Introduction

Emergency care must adapt to respond to public demands which have changed over time and also differ between geographic areas. Research into emergency services personnel working in new and innovative ways - with extra skills or in different settings - is going on at various centres in the UK and in other countries, programs are uncoordinated, sometimes overlapping and show mixed results.

Background

This section summarises the role of Paramedics in various countries and the recent relevant literature, justifying a need for this review.

The role of Paramedics in the UK

Skilled and timeous care is vital to improve outcomes for acutely ill patients in the community. However initially emergency care was variable and “a service focusing primarily on resuscitation, trauma and acute care” (1).

Service formalisation began following the Millar report in 1966, recommending intensive training for ambulance staff (Paramedics) in first aid, caring for seriously ill patients, communication and driving(2). A national training scheme was introduced by the National Health Service (NHS) Training Authority in 1988 and government targets for one Paramedic per emergency ambulance following 1995(1). A bachelor’s degree in paramedical sciences is required to practice. And over the last ten years, new roles are developing such as Emergency Care Practitioners and Paramedic Practitioners to provide different (or extra) services(3).

Most commonly Paramedics now operate as part of a two-man ambulance team responding to emergency (999) calls, together with Emergency Care Assistants or Ambulance Technicians; professionals who have similar, but not as advanced training. They evaluate the patient, make necessary (sometimes life-saving) interventions and decide whether to transfer the patient to hospital. They have a limited list of medicines that they can administer and are trained to use a range of technical equipment on board the ambulance.

Current skills and competencies which paramedic courses must adhere to, are defined in the British Paramedic Association (BPA) in the document, Curriculum Guidance and Competencies Framework (CGCF), 2008.

Current pressures

Figure 1 shows a steady increase in the number of emergency calls (999) made to the ambulance service over the last ten years; a 2.08 million increase in the last five years.

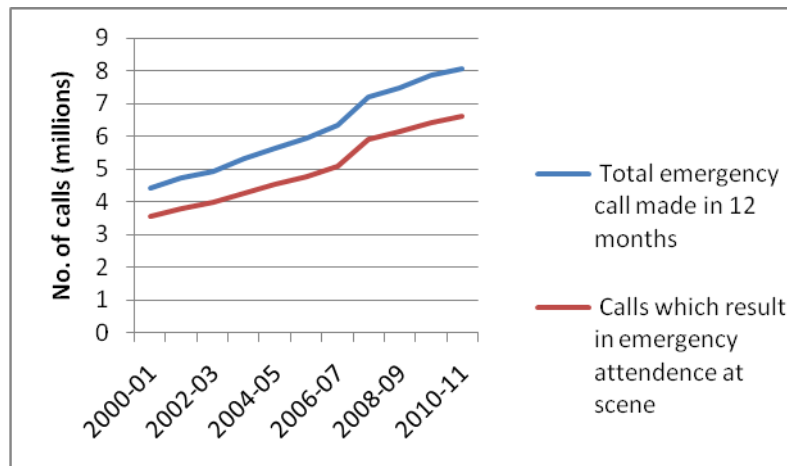


Figure 1 - Graph showing total emergency calls made in England since 2001(4)

The number of patients requiring emergency transportation increased by 170,000 from 2009-10 to 2010-11, most arriving at Emergency Departments(5). However research shows that only 10% of patients calling 999 have a life-threatening emergency(6).

This suggests that ambulances have functions beyond that of critical care alone: many respond to patients with exacerbations of chronic diseases or older people having fallen at home(1). Half of all emergency calls are patients who could be treated at home(1).

There have been calls from government, the Paramedic Association and acute hospitals trusts in the UK to restructure Ambulance services in response to these changing demands. Suggestions include enhancing the skills and remit of Paramedics or working in partnership with other services. In recent years, Paramedics have been deployed on push-bikes, motorcycles or solo in cars, for faster responses or to calls deemed unlikely to require patient transport.

In the NHS Plan (2000), the government designated £140 million to develop healthcare workers “own skills” in recognition of the service’s need to evolve to respond better to patient needs(7). document, “Taking Healthcare to the Patient: Transforming NHS Ambulance Services (2005)”, the Department of Health make four key recommendations(8).

- 1. Improvement and standardisation of call handling, prioritisation, clinical advice to callers (hear and treat) and integration with other urgent care providers (e.g. urgent care teams);**
- 2. Provide a range of mobile healthcare for patients who need urgent care (see and treat) in collaboration with primary care;**
- 3. Provide other services, e.g. in primary care, diagnostics and health promotion;**
- 4. Improve the speed and quality of emergency care services.**

There is insufficient data currently available to prescribe how ambulance trusts should respond to these proposals(8).

International models

The challenges to healthcare provision, including population aging, increases in population and, the prevalence of chronic disease and a shortage of healthcare workers, are global(9). Distinct epidemiological, geographical and economic factors affect how individual countries and even regions within them respond. Canada, Australia and the US have all piloted new and innovative emergency service models whereas France operates emergency services in a very different way.

| | Personnel and competencies | Problems | Responses |
|-----------|--|---|--|
| UK | 1 paramedic per ambulance, work with Emergency Care Assistants to provide emergency care and transportation. | Increasing and evolving types of demands | Regular updates of “core competencies” necessary for practice. Trials of “Paramedic Practitioners” and “Emergency Care Practitioners” with extended skills. |
| Canada | 4-levels (Emergency Medical Responder upto Critical Care Paramedic)with increasing competencies; exactly what, varies between provinces(10). | Rural communities Inter-provincial variation in training, funding, skills etc | 2011 National Occupancy Profiles (national) include health promotion, patient safety(11) Nova Scotia: interdisciplinary partnership programs(12) |
| USA | 4 levels (Emergency Medical Responder upto Paramedic) with increasing capabilities upto advanced life support. | Increased demand on public services since introduction of Patient Protection and Affordable Care Act 2010(13) | 1996 Emergency Medical Services Agenda for Change: integration with community services, acute and chronic care, health monitoring... 2007 National Scope of Practice Model standardising care(14). “ Skilling up ” Advance Emergency Medical Technicians because cheaper than Paramedics |
| Australia | Titles, skills and responsibilities vary between provinces | Rural communities Difficulty recruiting – long hours etc(9) | Queensland: role expansion and “expanded scope” of rural practitioners(9) South Australia: “ multi-skilling ” and partnership working with other services(15, 16). The “Rural Expanded Scope of Practice” incorporated health education, screening and minor injury treatment (17). |
| France | 4 levels (Emergency Medical Technicians have transportation vehicles upto Mobile Intensive Care Units with very high-tech equipment and an emergency doctor and nurse on board). | France has a differing attitude to emergency care: they prioritise providing the most appropriate patient management on scene, compared to the swift transportation to hospital favoured in the UK. This is why they have physicians on telephone triage services –there is no role for paramedics. | |

Background from the literature

Over recent years, allied health professionals (AHPs) have been working in new and innovative ways to provide services that better respond to the patient needs of today.

Recent systematic reviews have highlighted evolving roles for paramedics: McPherson et al. looking at all AHPs found literature discussing specific skills and telephone assessment/triage systems(18). However their impact was evaluated in relation to clinical guidelines, rather than patient outcomes. Some suggest that the initial assessment, triage and referral of patients is “the weakest link”(19). For example, Driscoll (1999) highlighted the importance of differentiating haemorrhagic and non-haemorrhagic patients who require significantly different interventions “on-scene”(20). Evidently extra skills are required for Paramedics to make assessment decisions on scene.

New practitioners with distinct titles have been piloted in some UK regions and internationally. Cooper et al. compare the Emergency Care Practitioner (ECP) and Paramedic Practitioner (PP) to conveyance to hospital rates and interventions on scene, rather than health impacts over four years ago and to a poor quality(3). Other studies have identified a need for Paramedics to manage non-urgent patients: Ball (2005) recommends capabilities to diagnose and treat minor ailments too(21). Other studies examine paramedics working together with other services to expand their capabilities(22). This inevitably requires extra skills, some of which may be “soft” skills.

Another area in which there is a paucity of evidence is robust cost analysis. Some studies have highlighted cost savings in sending a certain practitioner to an incident rather than another, but inadequate follow-up means that no information about costs of later readmissions is available, or cost differences in training the individuals. No systematic reviews have looked at evaluated the skills involved in partnership working (between police and ambulance crews for example).

Suzanne Mason and Helen Snooks, two of the key authors in this field observe that “changes mean reconsidering traditional roles and areas of responsibility and renegotiating the boundaries between acute and community care”(23). At a critical time in NHS finances, it is vital to ascertain reliably which paramedic skills (beyond the core competencies) are of greatest benefit to emergency care, as defined below, through a high quality up-to-date literature review. Existing reviews all date before 2008 and evidence is emerging all the time.

Aims

This review is part of a master's degree programme and aims to identify potential alternative working models for Paramedics' in response to UK government calls for innovation and efficiency in emergency care.

There are currently no systematic reviews published in this area, nor protocols for forthcoming reviews registered with the Cochrane Database of Systematic Reviews and York Centre for Reviews and Dissemination.

This aim of this review is to identify the specific skills used by Paramedics in extended roles which are making an impact in emergency care.

Objectives

This review will;

- ...use systematic review methodology to identify, evaluate and synthesise current evidence of paramedics with skills beyond standard competencies as decreed by the BPA.
- ...need to consider why they are used, whether they achieve their intentions and the costs and benefits to healthcare and also to the practitioner themselves in order to make comprehensive evaluation of each skill. However it will not be assessing these factors in their own right.
- ...relate this to UK needs and make practicable recommendations specifically for UK future practice.

Which paramedic skills are making an impact in emergency care?

Methodology

This review protocol will be submitted and registered with the York Centre for Reviews and Dissemination to avoid duplication and promote transparency.

Study Selection

Participants

Studies will be included on the basis of the practitioners not the patient groups they study. This will be emergency medical responders including voluntary, charitable and government services. The title paramedic is now protected in the UK, but it is not universal: first responder, emergency technician, ambulance technician and emergency care assistant are also used for professionals providing emergency care worldwide. All these terms will be included, see search terms for more detail.

This systematic review will include all these roles, hereafter commonly referred to as “Paramedics” unless otherwise stated - different levels of paramedic exist in some countries (e.g. consultant paramedic, primary care paramedic etc).

Practitioners may operate alone or in conjunction with doctors, nurses, fire crews or other services: this review will not look at other services alone for example pre-hospital physicians or fire-fighters trained in first aid.

Interventions

The intervention to be looked at will be paramedics acquiring extra skills to perform non-traditional tasks; beyond the baseline competencies expected at their level (baseline information will be gathered for each country included in the trial). “Skills” pertains to the individual’s specific capabilities in history taking, examination, diagnostics, and interventions but the review is focussing on studies in which specific skill sets are acquired for a specific new, non-traditional role. It will not be looking at specific skills acquired incrementally such as intubation as part of personal development, nor any specific role.

For example, in the UK there is pressure to reduce hospital admissions to save money and for the comfort of patients who prefer to be treated in their own home(23). Such responsibility is not part of their core competencies which are currently based on providing life-saving treatment and swift transfer to hospital (“scoop and run” – in the UK thought to be the most effective management in an emergency and practice in 73% of cases(4)). Hence paramedics will have to acquire extra skills in order to be able to make decisions, thorough and safe diagnoses and interventions and any necessary referrals, or the primary care, diagnostics and health promotion” as recommended in “Taking healthcare to the patient”(1).

This review will look at paramedics treating all patient groups in order to investigate the impact of these extended roles across the board, although variation in benefits between groups, such as neonates or elderly people, may be seen. Extended roles also include working in partnership with other services, the police and fire services for example.

Controls

Controls will not be specified, as all study designs will be included. For practical, financial and ethical reasons emergency care is studied in different ways and not all studies will compare practice to “baseline”.

Outcome measures

The “impact” of extended skills includes the positive and negative outcomes and will here be measured by the following indicators of “patient care” identified as common outcome measures through initial scoping;

- morbidity and mortality
- satisfaction
- intervention (on scene)
- investigation (on scene)
- admission/conveyance to hospital

Types of evidence

This review will include published and non-published evidence from existing reviews and original qualitative and quantitative research.

It will include any study design (case studies, longitudinal studies, randomised controlled trials (RCTs) etc) as well as service evaluations, government reports and other grey literature as many trialled changes may not have been published but are still relevant. Any length of follow up is valuable.

No language restrictions will be used: should there be non-English studies in the final sample; a member of the author team will translate. The applicability of international data to UK systems will be covered in the discussion. However the different healthcare systems and their demands will be noted in the discussion.

Quality will not be an excluding factor but will be critically assessed during the data abstraction stages (see below).

In 2000, “The NHS Plan” was released by the Department of Health, the government’s first policy earmarking AHP skills as key areas for development. They allocated £140 million to facilitate skills development, therefore this study will search evidence published since 1990, intending to encompass 10 years worth of emerging literature that may have influenced this policy.

Information sources

Evidence databases MEDLINE, EMBASE, CINAHL, ProQuest, Scopus, Cochrane Database of Systematic Reviews, York Centre for Reviews and Dissemination and NHS evidence will be searched comprehensively. Reference lists of the final sample will be reviewed for potentially relevant papers.

Grey literature will be identified through the Department of Health website and comparable international bodies, UK Public Health Observatory (various literatures), British Library (PhD theses), Web of Science (conference proceedings), Policy Network (policies), Zetoc (conference proceedings) and Newcastle University Library index to theses. The search date will be reported.

Search terms

Search terms will include all permutations of terms in the study question, devised from scoping findings and use of Endnote MeSH terms. The study will look at “paramedics” under any title (see below) as emergency medical service staff titles vary in use and meaning worldwide.

Terms may vary appropriate to each database, but all will be recorded such that they could be replicated. Searches will be saved online, should the review want updating in the future and alerts for newly published relevant studies will be set. One full electronic search strategy for one database, including limits, will be presented as an appendix in the final report(24).

Management of identified studies

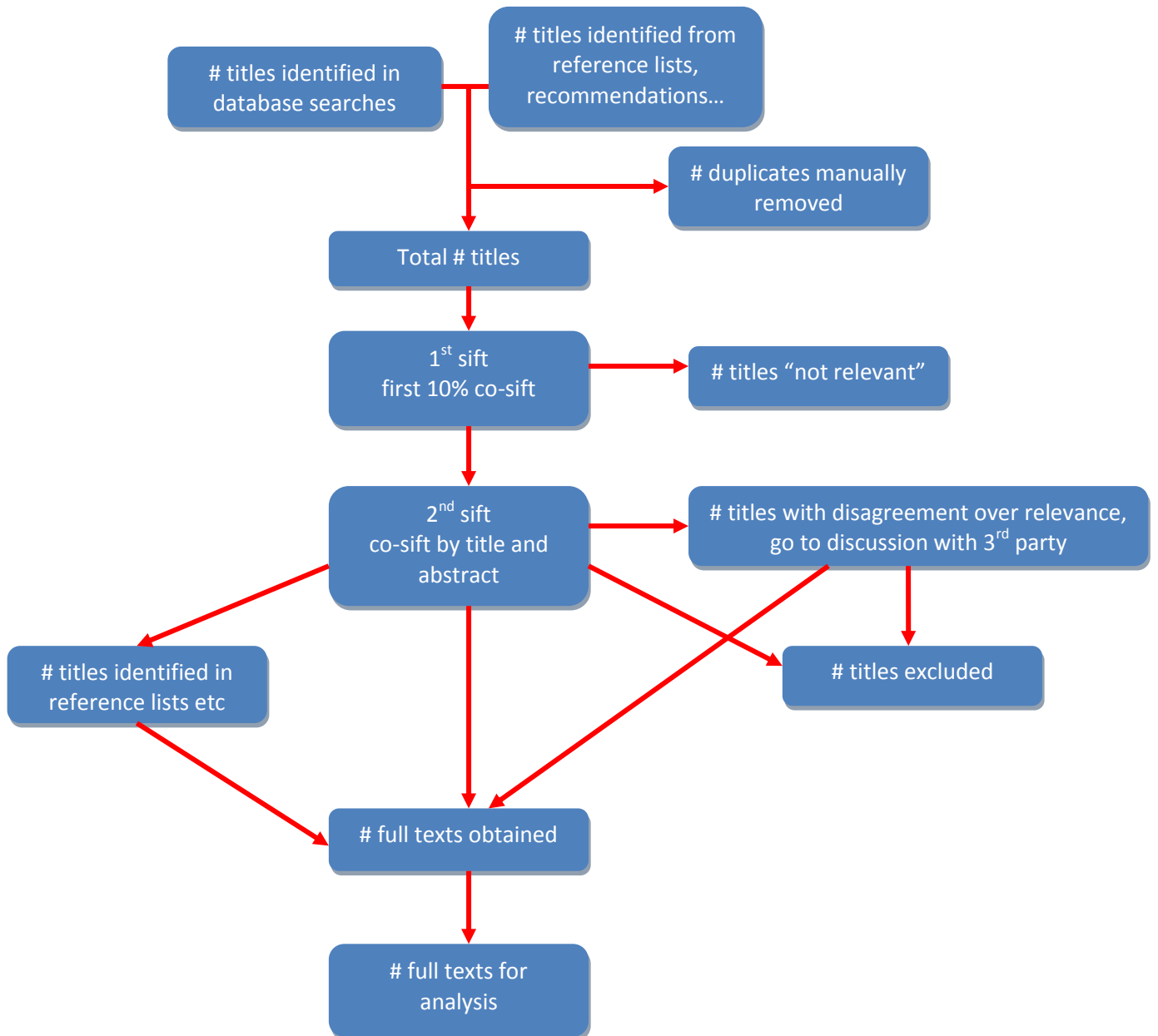
Abstracts and citations of all identified studies will be exported to an Endnote® library, from where duplicate articles will be manually excluded. A first sift for article relevance will be performed by one author, using the title (and abstract if needed) compared to the above “study selection” criteria, excluding studies deemed unequivocally irrelevant. The first 10% will be co-sifted to ensure consistent comprehension of criteria. A second sift will be performed by two authors independently, and any article over which there is any uncertainty about exclusion will be noted and discussed later by the two authors together. Agreement on inclusion/exclusion must be reached. A third team member will be consulted if there is continued dispute.

The reference lists of papers resulting from the second sift will be examined for potentially valid papers missed during previous searches. Furthermore, authors of two or more of the included papers will be contacted and asked to recommend applicable key papers, all of which will be obtained and screened under the same process. These extra studies may be added to the sample at this point.

The final sample will be saved as an Endnote® library and the full texts obtained through Newcastle University library and inter-library loans. Authors of articles which only published the abstract will be contacted and asked for more information; summaries, presentations etc.

Summarised flow of information

This diagram illustrates the flow of information, as recommended in the PRISMA statement (25).



Data abstraction and synthesis

Data will be abstracted from the remaining studies by two authors, independently. Data abstraction forms, having been piloted with a small number of relevant studies, will be used to record the range of alternative paramedic practice (skills or services). This will include study characteristics (descriptive data such as where, when, how), details of the practices investigated (participants, interventions, what was current practice and why was this instigated) and any findings. Findings will be mapped to the BPA competencies framework and compared using largely descriptive analysis. This is most appropriate due to the wide variety of study types we are likely to obtain.

Meta-analysis will only be performed if studies use comparable methodology and sub-group analysis or sensitivity measures will only be used if appropriate as with comparisons of cost-effectiveness. A small proportion of qualitative studies is expected which will enable synthesis through thematic analysis of reported results rather than taking the authors own conclusions. This would neglect in-depth analysis of the study and potentially omit important information from the review. Qualitative studies will require an adjusted extraction form and be synthesised using meta-ethnographic techniques to identify overarching concepts, if required(26). If any outcomes are unclear or sufficient explanation missing, the authors will be contacted for clarification.

Study quality will be assessed looking at factors such as definition of aims and inclusion/exclusion criteria, level of detail in the methodology and length of time for follow-up, in order to evaluate the usability of results. Findings will then be reviewed, combined and summarised in a final table and considered in relation to the UK health system. Findings may or may not be applicable or practicable to the NHS. Recommendations for UK practice will be made.

Costs

Anticipated costs are those of supervisor and my own time, for which no extra financial outlay will be made and workspace if provided for free. Some ILL papers may need to be obtained and the BPA framework costs £25 and will be purchased by the team.

Risks

| Hazard | Impact | Likelihood | Risk management | Managed? |
|--|--|------------|---|----------|
| Necessary literature inaccessible; money (charges?) time (sources abroad?) legal (copyright) | High | Low-medium | Inter-library loans (ILL) will enable access to most journals and sources. Early start will allow time for delivery of articles. | Yes |
| Personnel; Lack of personal skill/knowledge Lack of colleague skill/knowledge Illness/absence/leaving | Medium (would produce lower quality paper but not unsatisfactory) | Low | Supportive and experienced team of supervisors who are providing training in practicalities and we will have frequent communication. Contacting professionals “in the field” during scoping to understand key terms etc. | Yes |
| Dates delayed | High | Low | Starting ahead of time to allow for unexpected issues arising. | Yes |
| IT failure/flood/fire etc | High | Low | Back-up/make multiple copies of EndNote files, in different places | Yes |
| Acceptability to practice; emerging evidence change in policy | Medium | Medium | Thorough scoping before starting and keeping abreast of literature and current events during process | Yes |
| Risk of bias; author, publication | Medium | Medium | Input from qualitative synthesiser will be obtained if many qualitative papers return. Searching many databases and including grey lit. will minimise publication bias. | Yes |
| High volume of literature returned | Medium | Low | Thorough scoping has given indication of number of paper likely to be obtained. | Yes |

References

1. Department of Health. Taking Healthcare to the Patient, Transforming NHS Ambulance Services. 2005.
2. Kilner T. Desirable attributes of the ambulance technician, paramedic, and clinical supervisor: findings from a Delphi study. *Emergency Medicine Journal*. 2004;21:374-8.
3. Cooper SJ, Grant J. New and emerging roles in out of hospital emergency care: A review of the international literature. *International Emergency Nursing*. 2009;17(2):90-8.
4. Ambulance Services England [database on the Internet]2011 [cited 21/11/2011].
5. The Ambulance Service Network. A vision for emergency and urgent care The role of ambulance services. In: Confederation TN, editor.2008.
6. Cooke M, Fisher J, Dale J, McLeod E, Szczepura A, Walley P, et al. Reducing attendances and waits in Emergency Departments. A systematic review of present innovations. National Co-ordinating centre for NHS service delivery and organisation R & D: Warwick University2004.
7. Department of Health. The NHS Plan: a plan for investment, a plan for reform. In: Department of Health, editor.: HMSO copyright unit; 2000.
8. Mason S, Knowles E, Freeman J, Snooks H. Safety of paramedics with extended skills. *Acad Emerg Med*. 2008 Jul;15(7):607-12.
9. Raven S, Tippet V, Ferguson J-G, Smith S. An exploration of expanded paramedic healthcare roles for Queensland,: Australian Centre for Prehospital Research,2006.
10. Paramedic Association of Canada. General Competency. National occupational competency profile2011.
11. Adnet F, Lapostolle F. International EMS systems: France. *Resuscitation*. 2004 Oct;63(1):7-9.
12. Ruth Martin-Misener, Barbara Downe- Wamboldt, Ed Cain, Marilyn Girouard. Cost effectiveness and outcomes of a nurse practitioner-paramedic-family physician model. *Primary Health Care Research & Development*. 2009;10:14-25.
13. Conference AsNHP. The impact of the affordable care act on the safety net. In: USA A, editor. www.academyhealth.org2011.
14. National Highway Traffic Safety Administrator. National emergency medical services scope of practice model. In: Department of Transportation, editor. www.nhtsa.gov2007.
15. Ray Creen. Defining the road ahead - Service delivery model 2008-2015. In: South Australia Ambulance Service, editor. www.saambulance.co.au2008.
16. Government of South Australia. South Australia's Health Care Plan 2007-2016: The South Australian government's plan for healthcare over the next 10 years. 2007.
17. O'Meara P. The rural and regional ambulance paramedic: moving beyond emergency response. *Standing up for Rural Health, Learning from the past, Action for the future*; Albury, New South Wales2007.
18. McPherson K, Kersten P, George S, Lattimer V, Breton A, Ellis B, et al. A systematic review of evidence about extended roles for allied health professionals. *Journal of Health Services Research and Policy*. 2006;11(4):240-7.
19. Snooks H, Nicholl J. Sorting patients: the weakest link in the emergency care system. *Emergency Medicine Journal*. [Commentary]. 2007;24:74.
20. Driscoll P, Kent A. The effect of scene time on survival. *Trauma*. 1999;1(1):23-30.
21. Ball L. Setting the scene for the paramedic in primary care: a review of the literature. *Emergency Medicine Journal*. 2005 Dec;22(12):896-900.

22. Cooper S, O'Carroll J, Jenkin A, Badger B. Collaborative practices in unscheduled emergency care. The role and impact of the Emergency Care Practitioner (ECP): University of Plymouth (UK)2006.
23. Mason S, Snooks H. Alternative services to deliver urgent care in the community. *Emergency Medicine Journal*. [Commissioned Series]. 2009;27:183-5.
24. Higgins JPT, Green S, Cochrane Collaboration. *Cochrane handbook for systematic reviews of interventions*. Chichester: Wiley-Blackwell; 2009.
25. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine*. [Guideline Research Support, Non-U.S. Gov't]. 2009 Jul 21;6(7):e1000097.
26. Campbell R, Pound P, Morgan M, Daker-White G, Britten N, Pill R, et al. Evaluating meta-ethnography: systematic analysis and synthesis of qualitative research. *Health Technology Assessment*. 2011;15(43).