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## What are the highest priorities for research in pre-hospital care? Results of a review and Delphi consultation exercise.

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## What are the highest priorities for research in pre-hospital care? Results of a review and Delphi consultation exercise



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### ABSTRACT

#### Background

A recent national review of English ambulance services, *Taking Healthcare to the Patient: Transforming NHS Ambulance Services*,<sup>1</sup> published by the Department of Health, recommended that pre-hospital care research topics should be prioritised to ensure that service provision and development are evidence based wherever possible and that limited available funds are targeted to the most pressing needs.

#### Study objectives

To identify gaps in research evidence related to delivery of pre-hospital care; and to rank topics in order of priority for research.

#### Methods

Research priorities were initially identified by delegates at the UK Ambulance Service Association's annual conference, AMBEX 2006. An examination of research reviews in pre-

hospital care identified other research evidence gaps. Relevant websites, databases and review bibliographies were also searched. Management, service delivery and treatment recommendations in UK policy/guidance documents published since 2000 were matched to research evidence. A list of evidence gaps was circulated in a Delphi-style three-round consultation to experts in pre-hospital care, including clinicians, managers and researchers. Round 1 confirmed/identified research gaps; Round 2 focussed on ranking topics; and Round 3 reviewed the scores and provided an option to rescore. Scores were analysed using SPSS.

## **Results**

Ninety-six research issues were identified for circulation and prioritisation from 52 reviews and expert consultation and these were matched against 30 policy and guidance documents. Forty people participated in the Delphi exercise. The subject receiving highest priority for research was the development of new performance measures other than emergency ambulance response times. Other highly ranked priorities included treatment of stroke, cardiac conditions, children and people who self-harm; alternatives to Accident and Emergency (A&E) treatment; patient information sharing across care providers; access issues; decision support systems; and demand management systems for pre-hospital care. These priorities reflect three key issues: measuring activity to benefit patients; development of safe non-A&E care; and providing appropriate evidence-based clinical care in the pre-hospital environment.

## **Implications**

There are many evidence gaps related to current pre-hospital policy and practice including management, clinical and service delivery issues. This Delphi consultation combines expertise of clinicians, managers and researchers to generate consensus on future research priorities in pre-hospital care. The need to develop meaningful performance measures plus alternative methods of patient management illustrates the synergistic relationship between service delivery and performance measurement. It suggests an opportunity to identify alternatives to response times as indicators of quality of pre-hospital care. The final results from this study will be useful to commissioners when developing their strategic approach to decision making about which research should be funded to facilitate continued development of quality patient care in the pre-hospital setting.

## **Background**

A key Department of Health for England (DH) care publication, *Taking Healthcare to the Patient: Transforming NHS Ambulance Services*,<sup>1</sup> recommends that the DH commissions a programme of work to build the evidence base for the delivery of emergency pre-hospital care. As a starting point, the DH commissioned the 999 EMS (Emergency Medical Services) Research Forum - a partnership of academics, clinicians and pre-hospital care practitioners and managers, formed in 1999 - to undertake a study to review the current evidence base for the delivery of emergency pre-hospital care; to identify gaps in the evidence base; and to prioritise topics for future research.

The Forum's aim is to encourage, promote and disseminate research and evidence based policy and practice in emergency pre-hospital healthcare. The Forum has been actively promoting research through running a research stream at the Ambulance Service Association's annual pre-hospital care conference 'AMBEX', through training and holding other educational meetings. In 2007, the DH supported the Forum to run a research focused conference to showcase research and practice in pre-hospital care, which was held in November in conjunction with the British Paramedic Association (BPA) at the Joint Royal

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Colleges Liaison Committee's (JRCALC) annual conference. The Forum has plans to hold future conferences in conjunction with ambulance services across England and Wales.

In addition to the conference, the Forum was commissioned by the DH in 2007 to provide advice and support to English Ambulance Trusts in the development of their research and development structures and activities.

This study aimed to prioritise topics for research in pre-hospital care. Objectives were to:

- identify and analyse research reviews
- identify ongoing and recently completed research
- compare existing research evidence with current policy documents to identify gaps
- consult with key personnel in the field of emergency care to prioritise areas for further research.

## **Methods**

The research prioritisation exercise was conducted in three consecutive stages as outlined below:

- 1) Review of research in pre-hospital care and matching to current policy
- 2) Identification of research topics for prioritisation
- 3) Delphi consultation to prioritise areas for further research

### **Stage 1 - Methods for the review of research in pre-hospital care**

The first stage of this study to prioritise topics for research in pre-hospital care was a review of the existing research literature. The aim of this review was to identify existing evidence relating to the provision of pre-hospital emergency and unscheduled care provision by the UK ambulance services. The scope of the review included areas of care, clinical interventions (including drug therapies) and models of service delivery.

As it was beyond this study's remit to conduct a full systematic review, a 'review of reviews' in pre-hospital care was undertaken. The availability of evidence relating to research in pre-hospital care informed the inclusion criteria for reviews, which included research literature and expert opinion. Evidence-based policy-making with respect to the organisation of pre-hospital services cannot depend solely on randomised controlled trials due to the current relative absence of such evidence,<sup>2,3</sup> therefore practitioners and decision makers must also use other sources of information.

For this prioritisation exercise we identified UK policy and guidance from published documents. A search of websites and database was undertaken to identify policy documents and reviews of evidence published in English since 2000. We recorded research results reported in the reviews of evidence. Research evidence was matched to the appropriate policy statement or guideline and research gaps in each policy area were recorded. A gap was noted where a paper reported a lack of research evidence, reported that there was no evidence, or identified a need for further research to answer a specific research question. Policy, guidelines and research were grouped into main themes and sub-themes in the table 'Review of research in pre-hospital care' which can be found in Appendix 1 of the full report at: <http://www.trustresearch.org.uk/documents/Appendix%201.doc>. The strength of policy-related documents and the quality of research evidence were also noted on the table.

Policy documents and guidelines were collected from:

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- Emergency Care policy documents published by the Department of Health at: <http://www.dh.gov.uk/en/Policyandguidance/Organisationpolicy/Emergencycare/index.htm>
- Cochrane Prehospital and Emergency Health Field website
- NHS National Library for Health Emergency Care Specialist Library
- Emergency Care web pages at the Health Services Research Institute of Warwick University
- Service Delivery Organisation web pages at <http://www.sdo.lshtm.ac.uk>
- National Institute for Health and Clinical Excellence guidance
- National Service Frameworks
- References of policy documents obtained
- Joint Royal Colleges Ambulance Liaison Committee (JRCALC) website (including key points related to treatment included)

Searches for research literature were carried out in PubMed, Web of Science, the Cochrane Library, Health Management Information Consortium (HMIC), DUETs (Database of Uncertainties about the Effects of Treatment), the National Research Register and the Health Technology Assessment (HTA) research publications list. Searches were limited, where possible, to reviews undertaken since 2000. Where this was not possible, results were hand searched for relevance. Papers were screened for relevance and type of review. Search terms included *paramedic, emergency medical technician, ambulance, emergency vehicle, air ambulance, mobile emergency unit, pre-hospital, emergency, emergency medical services, urgent care, out of hours and after hours care*. References of reviews obtained were also hand searched and followed up. Members of the 999 EMS Research Forum were also asked to identify reviews for inclusion.

Ongoing and recently completed research was identified through searches of projects listed as underway or recently completed on the Health Technology Assessment (HTA) website, the Service Delivery and Organisation Programme (SDO) website and the National NHS Research Register, and through protocols listed in the Cochrane Library.

Once identified, relevant documents were also categorised and listed on the 'Review of research in pre-hospital care table' (Appendix 1):

<http://www.trustresearch.org.uk/documents/Appendix%201.doc>.

## **Stage 2 - Methods for identifying research topics for prioritisation**

For this, the second stage of the study, a list of research gaps was identified and compiled from:

- The results of the review of policy and reported evidence outlined above
- A research prioritisation exercise undertaken at AMBEX 2006 (see Appendix 5 of the full report at: <http://www.trustresearch.org.uk/documents/Appendix%205.doc>). The session, chaired by Professor Jon Nichol (999 EMS RF board member), was entitled *Research priorities for Pre-hospital Care: National and International Perspectives* and consisted of a short presentation by Michel Baer, about the European Union funded [HESCULAEP](#) (Health emergency national regional programmes for an improved co-ordination in pre-hospital setting) project, which aims to improve coordination of research in pre-hospital settings. This was followed by a group

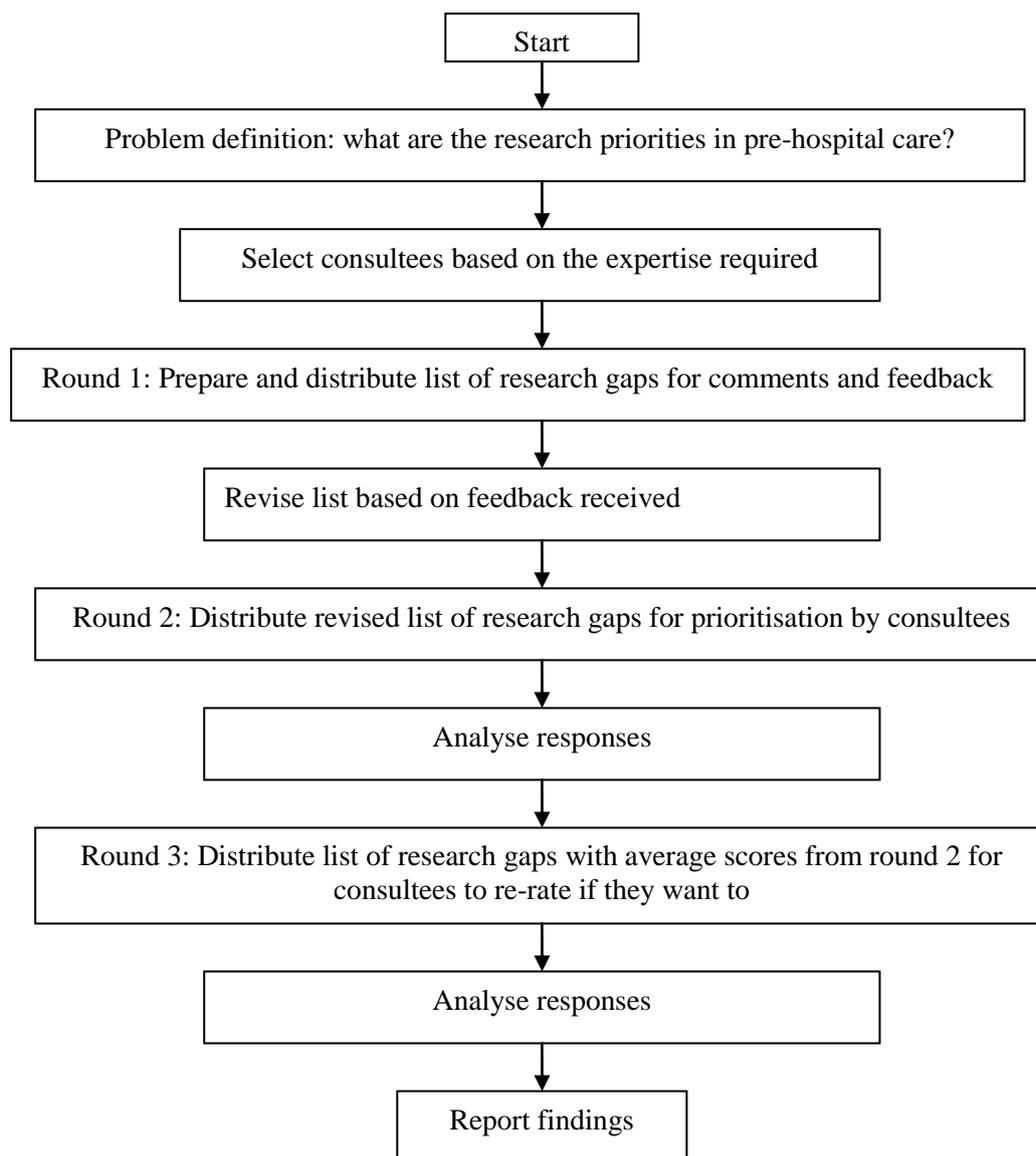
discussion during which potential research topics were circulated. Delegates were asked to add to these and to identify the three highest priorities.

For this study, this 2006 list was used as a starting point. It was supplemented with additional items identified from the review of policy and evidence described above, and the list reorganised into the format of the current review. The combined list summarises the research gaps identified from the two sources and can be found in Appendix 3 of the full report at: <http://www.trustresearch.org.uk/documents/Appendix%203.doc>.

### **Stage 3 - Methods for the Delphi consultation**

In order to prioritise the topics in pre-hospital care that were identified as needing further research, a Delphi consultation was undertaken. The Delphi method of consultation is a group facilitation exercise that seeks to obtain consensus on the opinions of 'experts' through a series of structured questionnaires (also referred to as rounds).

The Delphi technique is increasingly being used in health services research to agree priority areas. Its strength is in transforming individual opinions into group consensus through the anonymous feedback of comments, which avoids the need for defending earlier positions and allows participants to consider ideas they may have previously overlooked or considered unimportant.<sup>4,5</sup> The flowchart below outlines the Delphi consultation pathway followed for the study.



For this Delphi consultation, people were invited to comment on and prioritise the research gaps identified in the evidence base.

### **Identification and selection of sample**

A wide range of participants was invited to participate, including:

- the 999 EMS Research Forum Board
- Members of the Thematic Research network for emergency and UnScheduled Treatment (TRUST)
- Royal College of Surgeons of Edinburgh Faculty of Pre-hospital Care Research Committee
- British Paramedic Association Research and Audit Committee
- The Joint Royal Colleges Ambulance Service Liaison Committee (JRCALC)
- Ambulance Service NHS Trusts' Directors of Clinical Care (DOCCs)
- Ambulance Service NHS Trusts' Research and Development (R&D) leads
- International representatives from Europe and America
- One Ambulance Service NHS Trust Chief Executive

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- One Operations Director of an Ambulance Service NHS Trust
- INVOLVE, Involving People and the Patients' Forum
- College of Emergency Medicine
- British Association for Immediate Care (BASICS)
- Royal College of General Practitioners

Information about the research prioritisation exercise was also disseminated during the 999 EMS Research Forum session at the JRCALC Conference 2007. Invitations were included in delegate conference packs to leave their details or contact the study team if they wished to participate.

An e-mail invited participation and explained the stages of the consultation and the rationale behind it. All emails and attached documentation circulated in the Delphi consultation can be found in Appendix 4 of the full report at: <http://www.trustrresearch.org.uk/documents/Appendix%204.doc>. Contact details were provided in case further clarification or information was required. People who did not opt out were included in all subsequent rounds of the Delphi consultation.

To facilitate speed and ease of communication, the consultation was carried out via email. Three rounds of consultation were undertaken. This has been shown to be an acceptable and often preferred number of rounds in recent literature.<sup>6-9</sup> A pilot run of the exercise was undertaken by the research team to address any problems prior to full data collection.

At each stage of the consultation non respondents were sent a reminder email prior to the response deadline. The stages of the consultation are described in more detail below.

### **Round one**

The first round of consultation required participants to comment on the list of gaps that had been identified during the earlier stages of the research and to suggest any topics that they felt were missing. The list of gaps was circulated in the form of a table with topics grouped into categories. The list was then revised on the basis of feedback received.

### **Round two**

Participants were emailed the revised list of gaps in research evidence and asked to score each of the topic areas in terms of research priority, from 1 (not important) to 9 (very important). Space was provided for comments and suggested research methods beside each topic.

### **Round three**

Participants were presented with the results (in the form of mean scores) and comments from Round two and invited to adjust their scores and suggested methods after considering the views of others. Results from this round of consultation were collated and analysed and areas of research priority in pre-hospital care identified.

### **Analysis**

A database was created with each participant's contact details, including email and phone number, job title and organisation. Each participant was then assigned a unique number which was used to identify them for the rest of the study. All responses were entered by identification number into an SPSS for Windows database for analysis. Although it was recognised that participants had different areas of expertise and levels of experience, for the purposes of the Delphi consultation all responses were treated with equal weight.

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Descriptive statistics were calculated and the mean scores for each priority area were ranked from highest to lowest. If participants awarded scores at both second and third rounds, only the latter were included in the final analysis. Where participants only provided one set of scores, this was included irrespective of the round at which it was provided.

## **Results**

### **Stage 1 - Results from the review of research in pre-hospital care**

Thirty policy documents and 52 reviews of evidence were identified. Reviews of evidence were identified from the following sources:

References of reviews obtained	14
PubMed	12
Web of Science	6
Health Technology Assessment library (HTA)	6
References identified by forum members	6
Cochrane Library	5
Health Management Information Consortium (HMIC)	2
Database of Uncertainties about the Effects of Treatment (DUETs)	1
National NHS Research Register	0

Eight references were identified from more than one source: three references were identified by both PubMed and Web of Science; five references were identified by two or three of the electronic databases including Cochrane Library, PubMed, HTA or Web of Science.

The results are presented in the table in Appendix 1 at:

<http://www.trustresearch.org.uk/documents/Appendix%201.doc>.

The references are available in Appendix 2 at:

<http://www.trustresearch.org.uk/documents/Appendix%202.doc>.

The results are divided into the following three sections:

Section 1: Access to pre-hospital care

- a. Call handling and dispatch
- b. The 999 Emergency response

Section 2: Management / Operation of pre-hospital services

Section 3: Treatment in the pre-hospital environment

- a. Alternatives to ambulance response or transport to A&E
- b. Clinical interventions

The table is divided into three columns: 1) policy-related guidance and recommendations including guidelines; 2) evidence; 3) reported gaps in evidence. The evidence and gaps in evidence relating to clinical interventions (section 3) are listed by intervention.

### **Types of policy-related guidance and recommendations including guidelines**

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Where more than one type of source is listed, the highest grade of document is identified. All policy-related documents listed in the table (Appendix 1) at: <http://www.trustresearch.org.uk/documents/Appendix%201.doc>) were classified as follows:

- Policy published by the Department of Health – identified as DH 1
- Policy published by other government departments – identified as 1
- Guidance which seeks to influence or support policy decisions – identified as 2
- Comment papers and progress reports - identified as 3

DH policy is also referenced in bold to assist identification.

### **Quality of evidence**

All evidence listed in the tables is classified according to the review methodology, as follows. Where more than one type of evidence is listed, the highest grade of evidence is identified:

- Systematic review or meta-analysis – identified as I
- Comprehensive review – identified as II
- Expert opinion – identified as III

### **Ongoing / recently completed research**

Ongoing studies are listed in the table by title, author, start date and end date. Results are presented under the same headings as the review of policy, evidence and gaps.

### **Limitations**

The review only included reviews of evidence conducted since 2000. It is possible that some of the evidence presented has been overtaken by recently conducted primary research, not yet included in reviews. The methods used for this review were selected to meet the constraints of the given timescale and available funding.

### **Stage 2 - Identification of research topics for prioritisation results**

The list of gaps identified by the review of research in pre-hospital care combined with the list of topics identified at AMBEX 2006 is shown in Appendix 3 at: <http://www.trustresearch.org.uk/documents/Appendix%203.doc>.

A broad spread of 96 topics was identified, with the largest number falling under the heading of treatment in the pre-hospital environment: clinical interventions.

### **Stage 3 - Delphi consultation results**

One hundred and fifty eight individuals and 10 organisations in total were invited to participate. Four people opted out of the study at this stage.

Twenty six people responded to the first round of the consultation with comments and feedback on the initial list of research gaps; 36 topics were added at this stage and one removed.

Forty people participated in the Delphi consultation. Thirty people participated in rounds 2 and 3 (the scoring rounds) of the consultation. A summary of participants at rounds 2 and 3 is detailed below in Table 1.

**Table 1: Participant responses to Delphi rounds 2 and 3**

Number who completed Delphi consultation round 2	16
<i>999 EMS Research Forum</i>	3
<i>TRUST network members</i>	5
<i>R&amp;D leads from ambulance service trusts</i>	1
<i>International representatives</i>	2
<i>Miscellaneous*</i>	5
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Number who completed Delphi consultation rounds 2 & 3	6
<i>999 EMS Research Forum</i>	2
<i>TRUST network members</i>	2
<i>International representatives</i>	1
<i>Miscellaneous*</i>	1
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Number who completed Delphi consultation round 3 only	8
<i>999 EMS Research Forum</i>	3
<i>TRUST network members</i>	5
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<b>Total Participants</b>	<b>30</b>

\*Miscellaneous includes academics and service providers not included in other groups

Table 2 lists the topics from the prioritisation exercise with results ranked according to priority. A full table of the results, including the mean score for each item, and the number of respondents for that item is contained in Appendix 6, 'Analysis of Research Priorities Table' at: <http://www.trustresearch.org.uk/documents/Appendix%206.doc>.

**Table 2: Topics identified as gaps in research evidence - in ranked order of priority**

<i>Priority ranking (=is a tie)</i>	<i>Topic</i>
1	Development of EMS performance measures other than response times for use in performance management, audit and research
2	Pre-hospital clinical management of stroke
3	Safety, costs and benefits of alternatives to conveyance to hospital
4	Development of patient focused clinical outcomes measures
5	Methods for combining information on pre-hospital care and patient outcomes across ambulance service and other healthcare organisations
6	Developing interventions to appropriately manage the increase in 999 calls
7	Evaluation of mechanical aids for CPR

8	Nasal route for administration of pain relief
9	Alternatives to ambulance response or transport to A&E for stroke
10	Clinical pre-hospital management of confused/aggressive head injured patients
11	Alternatives to ambulance response or transport to A&E - Who should get treated where and by whom: 999; A&E; MIU; NHS Direct; GP out of hours?
12	Training of paramedics in primary care skills
13	Pre-hospital airway management
=14	Development and validation of clinical assessment systems (including decision support tools) for triage by need and urgency
=14	Costs and benefits of pre-hospital thrombolysis v percutaneous coronary intervention
16	Causes and epidemiology of the rise in demand for emergency calls
17	Alternatives to ambulance response or transport to A&E: Falls
18	Thrombolysis in different settings (urban/rural) – costs, outcomes and adverse effects
19	Alternatives to ambulance response or transport to A&E: Asthma and respiratory failure due to COPD
20	Intravenous fluid administration across whole patient pathway
21	Management of obstetric emergencies and unplanned birth outside hospital
22	Costs, benefits and risks of computerised clinical decision support systems
23	Alternatives to ambulance response or transport to A&E: Cardiac patients for primary interventions
=24	Effectiveness and availability of telephone advice for non-urgent 999 callers
=24	Data collection - what should be in the EMS patient report form and how to collect it?
=26	Variations and inequalities in access
=26	Evaluation of life support approaches versus rapid mobilisation from scene by crews
28	Alternatives to ambulance response or transport to A&E: Major trauma
=29	Alternatives to ambulance response or transport to A&E: Paediatric patients
=29	Alternatives to ambulance response or transport to A&E: Chronic conditions
31	How to reduce time from symptom onset to 999 call in patients with acute chest pain
32	Evaluation of drug and non invasive techniques for pain management

33	Pre-hospital assessment and management of self harm
=34	Skills and competencies in the EMS workforce
=34	How effective and efficient is the current model (post re-organisation) of ambulance services?
36	Pre-hospital management of patients with pulmonary oedema (CPAP/NIPPV)
37	Effectiveness of community resuscitation schemes
38	Understanding how services are being used
39	Costs and benefits of provision of basic life support and defibrillation by other emergency services e.g. fire, police
40	Evaluation of PHPLS (pre-hospital paediatric life support) training
41	Effectiveness of pre-hospital administration of buccal midazolam and intranasal midazolam
42	Alternatives to ambulance response or transport to A&E: mental health
43	Triage (telephone and face-to-face) of patients with suspected acute coronary syndrome
44	Role of pre-hospital non-invasive positive pressure ventilation (NIPPV)
=45	Occupational stress and post traumatic stress in ambulance personnel: prevalence and effectiveness of interventions
=45	Which patients benefit from helicopter ambulance operations?
47	Impact of public access defibrillators
48	Effectiveness of pre-hospital oxygen administration
=49	What are the system benefits and costs for helicopter ambulance operations?
=49	Effectiveness of pre-hospital administration of mannitol and hypertonic saline for head injury
51	Spinal immobilisation methods: use; risk; patient experience; outcomes; alternatives etc
52	What are the effects of helicopter ambulances on health outcomes for seriously injured patients?
53	What services should be part of an Emergency Medical System? What resources should be provided?
=54	Costs and benefits of first responder schemes
=54	Use of doctors in pre-hospital settings e.g. rapid response vehicles, helicopter
56	Who should triage in the ambulance call centre (e.g. nurses, paramedics etc)?
57	Alternatives to ambulance response or transport to A&E: patients with hip fractures
=58	Alternatives to ambulance response or transport to A&E: Minor treatment

	centres
=58	Comparison of ALS v BLS guidelines on pre-hospital oxygen administration
60	Evaluation of patient and carer experiences of 999 care
61	Costs and benefits of registries e.g. for cardiac arrest; diabetic patients; MINAP etc
62	Management/operations of pre-hospital services: Working across service boundaries
63	Costs and benefits of a national electronic patient report form
=64	How can helicopters best be targeted to serious blunt trauma?
=64	Comparison of doctor led (telemetry) versus paramedic (autonomous) thrombolysis
=66	Service user decision making when choosing how to access services
=66	Workforce safety - hazards in attending emergency calls
68	Evaluation of equipment for diagnosis and transmission of ECGs to provide continuous ST segment monitoring
=69	What are the priorities of service users related to emergency and unscheduled care?
=69	What is the skills requirement of air ambulance medical staff (e.g. paramedics, doctors)?
71	Pre-hospital management of nausea
=72	Management of sudden death at home
=72	Advanced Life Support better than Basic Life Support?
=74	Effects of changing GP contracts on unscheduled care services
=74	Alternatives to ambulance response or transport to A&E: Hypoglycaemia
=74	Optimum pre-hospital oxygen therapy
77	Evaluation of intravenous drugs
=78	Single contact point (i.e. one telephone number) for unscheduled or emergency care
=78	Leadership in EMS
80	MAST suit for subgroups
=81	Integration of clinical assessment systems across services
=81	Iatrogenic infection/sepsis resulting from pre-hospital care
83	Patient, practitioner and carer views about informed consent to treat/withdraw

	treatment
84	Evaluation of telephone instructions (for whom to whom?) for on-site care
85	Effectiveness and appropriateness of cannulation
86	Pre-hospital use of ECGs
87	User participation, involving patients in the planning of emergency care
88	Clinical interventions: glucagon or dextrose?
89	Impact of lignocaine following index VF arrest?
90	Real time transmission of pre-hospital ECGs
=91	Managing change in EMS e.g. service re-organisation; service development
=91	Advanced Life Support more effective than Basic Life Support with defibrillation?
93	Effectiveness of publicity campaigns for appropriate use of 999 service
94	Pre-hospital Management of pneumonia
95	Should paramedics attend all patients in pain?
96	Investigation into variations in the treatment and management of ankle fracture

Analysis of these data was also undertaken using the five major sub-headings used to group the analysis of research reviews (Appendix 1) at:

<http://www.trustresearch.org.uk/documents/Appendix%201.doc>), and the items in the research priorities table (Appendix 6) at:

<http://www.trustresearch.org.uk/documents/Appendix%206.doc>.

- (1) access to pre-hospital care: call handling and dispatch
- (2) access to pre-hospital care: the 999 emergency response
- (3) management/operations of pre-hospital services
- (4) treatment in the pre-hospital environment: alternatives to ambulance response or transport to A&E
- (5) treatment in the pre-hospital environment: clinical interventions

By listing the items within each sub-heading in order of priority, the following results were achieved.

The top three priority areas in **call handling and dispatch** were:

1. developing interventions to appropriately manage call handling and dispatch
2. the development and validation of clinical assessment systems for triage by need and urgency
3. the epidemiology of the rise in demand for emergency calls

The top three priority areas in **the 999 emergency response** were:

1. the development of EMS performance measures other than response times for use in performance management, audit and research

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2. the development of patient focused clinical outcome measures
3. the costs, benefits and risks of computerised clinical decision support systems

The top three priority areas in **the management/operations of pre-hospital services** were:

1. methods for combining information on pre-hospital care and patient outcomes across ambulance services and other healthcare organisations
2. the training of paramedics in primary care skills
3. what should be in the EMS patient form and the best data collection method

The top three priority areas in **alternatives to ambulance response or transport to A&E** were:

1. the safety, costs and benefits of alternatives to conveyance to hospital
2. alternatives to ambulance response or transport in the case of stroke
3. who should be treated where and by whom (i.e. 999, A&E, Minor Injuries Units (MIU), NHS Direct (24 hour nurse-led health advice line), GP out of hours)

The top three priority areas under the **clinical interventions** sub-heading were:

1. the management of stroke
2. the evaluation of mechanical aids for CPR
3. nasal route for the administration of pain relief in children

A full list of the major sub-headings and the priority areas within them can be found in Appendix 7 at: <http://www.trustresearch.org.uk/documents/Appendix%207.doc>.

In summary, the main themes which emerged from the items most highly prioritised in the Delphi consultation for further research were:

- Clinical performance measures across the whole EMS system
- Managing increased demand for emergency care by:
  - Safely managing increased workloads
  - Safely reducing transports to A&E for minor conditions
  - Safely bypassing A&E for some major conditions
- Providing appropriate clinical care in the pre-hospital setting, in particular for:
  - Management of stroke
  - Management of cardiac arrest
  - Pain relief
  - Management of chronic conditions
  - Management of major trauma

## Discussion

This study has identified priorities for research in pre-hospital care through an analysis of research reviews and consultation with recognised specialists in pre-hospital emergency care.

A large number of topics covering a broad range of clinical and organisational themes was included in the review. The areas identified as highest priorities for research reflect three key issues:

- measuring activity in a way which benefits patients and reflects more accurately the range and scope of pre-hospital care

- developing alternative methods of patient care management to reduce transports to A&E
- providing appropriate clinical care in the pre-hospital setting.

The development of more relevant and meaningful EMS performance measures was clearly identified as the most important issue that future research needs to address. For many years response time performance and the achievement of response time standards has been the single measure against which the quality of UK ambulance services has been judged. However, research evidence has shown that, except for a very small number of patients, response time is not a factor that affects patient outcome<sup>10, 11</sup> and is therefore not a very useful indicator of quality for the vast majority of calls to the ambulance service. Further more, response times only reflect the transport element of the service and not the care provided. The 999 workload of NHS Ambulance Services encompasses a broad range of clinical conditions with varying degrees of urgency and it is estimated that only 10% of calls are truly life-threatening.<sup>1</sup> However, use of response times as a performance measure has resulted in ambulance services being organised and managed around the needs of the minority of patients which can then result in provision of an inappropriate service for many others (for example transport to hospital for conditions that, with a different response, could be managed at home). The need to develop alternative methods of patient management was also highly rated in this prioritisation process, illustrating the synergistic relationship between delivery of appropriate services and performance measurement.

The demand for the development of new performance measures that more clearly reflect the diversity of the clinical and social needs of patients as well as the quality of care provided, has resulted in this single topic being prioritised above many other clinical issues. The next challenge is to identify suitable indicators that can provide valid and reliable clinical measures of ambulance service performance.

Two other highly rated topics also relate to information, audit and performance management: development of patient focused outcome measures (4<sup>th</sup>) and methods for combining information on pre-hospital care and patient outcomes across ambulance services and other healthcare organisations (5<sup>th</sup>). Thus, three of the top five priorities relate to measuring and recording activity in the pre-hospital environment in a way which is beneficial and meaningful for patient care.

Half of the top 20 priorities are concerned with reducing conveyance to A&E through identifying and providing opportunities for care in the pre-hospital setting, including the safety, costs and benefits of alternatives to conveyance to hospital (3<sup>rd</sup>); developing interventions to appropriately manage the increase in 999 calls (6<sup>th</sup>) and alternatives to ambulance response or transfer to A&E, including more appropriate venues for treatment, such as emergency ambulance, A&E, MIU, NHS Direct or GP out of hours (11<sup>th</sup>)

These highly rated topics reflect the concern that ambulance services should be able to develop their response to rising demand and diversity of workload based on sound research evidence.

The clinical topic of most concern was that of the pre-hospital care of patients with stroke, both in terms of clinical interventions (rated 2<sup>nd</sup>) and the need to continually refine and develop patient management pathway in line with new knowledge and service developments. Other clinical topics that emerged as current priorities included: the evaluation of mechanical

aids for CPR (7<sup>th</sup>); nasal administration of pain relief (8<sup>th</sup>); the management of head injured patients (10<sup>th</sup>); training personnel in primary care skills (12<sup>th</sup>) and pre-hospital airway management (13<sup>th</sup>).

Some of these topics are relatively new to the research agenda, (for example, pre-hospital management of stroke) and very little existing research has been identified that addresses them. Others have been on the agenda for several years (for example, pre-hospital fluid administration (ranked 20<sup>th</sup>)), but despite previous studies, these issues remain unresolved. There is much overlap between some of these priorities. For example, priority 1 (development for EMS performance measures other than response times for use in performance management, audit and research) is very similar to priority 4 (development of patient focussed clinical outcome measures). Others are inter-dependent. Thus priority 6 (developing interventions to appropriately manage the increase in 999 calls) can only be done by understanding how services are currently being used, a topic which has a much lower priority (ranked 38).

Other recommendations, while based on pre-hospital management, would have wider implications. It is obviously appropriate to investigate how patients who do not need hospital care can be managed safely in other settings. However, developing pathways to bypass A&E for stroke (ranked 9), respiratory failure (ranked 19), major trauma (ranked 28), paediatrics (ranked 29) and hip fractures (ranked 57) would re-define A&E departments and other parts of the hospital.

## **Conclusions**

This review and consultation process has clearly identified agreed priorities for research in pre-hospital care. The top research priority was consistently recorded as most important in both rounds of the Delphi consultation and there was consensus about other priority topics. The identified gaps in research evidence were confirmed by the small number of amendments to the relevant list during the preliminary round.

The results suggest that the Delphi consultation process is a suitable method for building consensus among academics, clinicians, practitioners and managers. The number and range of participants allow us to be confident that the review process which identified the gaps list is accurate and valid. However, despite the rigorous process employed throughout this research, the limitations of using a small purposive sample must be acknowledged.

The results of this study, to prioritise research topics through a review of evidence and process of consultation, can be used to inform strategy for commissioning research in pre-hospital care, at local and national levels. It provides a robust foundation on which the Department of Health and other commissioners in the UK and internationally can build a programme of future research.

## **Recommendations**

Recommendations arising from this study include:

*Recommendation 1:* These results should be used to inform strategy for commissioning and undertaking research related to the provision of emergency pre-hospital care by:

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- UK Department of Health and the Welsh and Scottish equivalents
- UK National Institute for Health Research – including, therefore the Medical Research Council, HTA and SDO programmes
- National Ambulance Research Group
- Ambulance Service NHS Trusts

Although health policy will vary between countries, there will be common strands between these policies. The evidence base for pre-hospital research is an international one and so these results may be useful to inform research outside the UK.

*Recommendation 2:* A Delphi consultation exercise should form the preliminary stage of the work required to address the top priority for research, *the identification of performance measures other than response times*, in order to identify alternative measures. Further empirical work may subsequently be required to evaluate these.

*Recommendation 3:* Further work could be undertaken to inform the development of research commissioning briefs for topics that have been prioritised in this review and Delphi consultation.

## References

1. Department of Health (Peter Bradley) (2005). Taking Healthcare to the Patient: Transforming NHS Ambulance Services. DoH.
2. Brazier H, Murphy A.W, Lynch C, Bury G. Searching for the evidence in pre-hospital care: a review of randomised controlled trials. On behalf of the Ambulance Response time Sub-Group of the National Ambulance Advisory Committee. *Journal of Accident and Emergency Medicine*, 1999;16(1):18-23.
3. Wilson S, Cooke M, Morrell R, Bridge P, Allan T. A systematic review of the evidence supporting the use of priority dispatch of emergency ambulances. *Pre-hospital Emergency Care*, 2002;6(1):42-9
4. Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing* 2000;32(4):1008-1015.
5. Jones J, Hunter D. Consensus methods for medical and health services research. *BMJ* 1995;311:376-80.
6. Green B, Jones M, Hughes D, Willimas A. Applying the Delphi technique in a study of GP's information requirements. *Health and Social Care in the Community* 1999;7(3):198-205.
7. Proctor S, Hunt M. Using the Delphi survey technique to develop a professional definition of nursing for analysing nursing workload. *Journal of Advanced Nursing* 1994;19:1003-1014.
8. Campbell SM, Cantrill JA, Roberts D. Prescribing indicators for UK general practice: Delphi consultation study. *BMJ* 200;321:425-8.
9. Elwyn G, O'Connor A, Stacey D, Volk A, et al. Developing a quality framework for patient decision aids: online international Delphi consensus process. *BMJ* 2006;333:417-423.
10. Turner J, Nicholl J, O'Keeffe C, Dixon S. The costs and benefits of implementing the new ambulance service response time standards. Final report to the Department of Health. Medical Care Research Unit, University of Sheffield; January 2006.
11. Pons PT, Hankoo S, Bludworth W, et al. Paramedic response time: does it affect patient survival? *Academic Emerg. Med.* 2005;12(7):594-600.

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**Note**

The 999 EMS Research Forum is a partnership of international academics, clinicians and pre-hospital care practitioners and managers, formed in 1999, whose aim is to encourage, promote and disseminate research and evidence based policy and practice in 999 emergency healthcare. Since its inception, the Forum has been sponsored by the UK Department of Health and other funders to undertake training, to hold an annual conference, and to undertake other activities to promote and develop capacity in pre-hospital care research.

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