



**SEARCH STRATEGY TO IDENTIFY EVIDENCE IN  
RELATION TO FUTURE PROVISION OF ACCIDENT  
AND EMERGENCY SERVICES**

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## **1. Aim of Search Strategy**

- 1.1 To identify literature in relation to the provision of accident and emergency care services, with specific reference to issues of capacity, efficiency, organisation, safety, overcrowding, public perception, staff roles and volume and in relation to themes covering emergency care practitioner, GP led services, immediate care, medical emergency assessment, minor injury and illness, mobile emergency services, patient transfer and pre-hospital triage.
- 1.2 To identify literature in relation to the involvement of the medical specialities and sub-specialities of anaesthesiology, cardiology, cancer, colorectal surgery, elderly care, ENT, respiratory, orthopaedics, stroke, surgery and vascular surgery in relation to accident and emergency service provision.

## **2. Approach**

Initial discussions between members of the review team and the Knowledge Services Manager, NHS Ayrshire and Arran highlighted the areas felt to be important to concentrate on for the literature searching.

The decision was made to divide the subject into three broad groups of searches:

- Generic themes related to Emergency Services or unplanned care
- Innovative methods of organising emergency care services
- The interface between emergency care and clinical sub-specialities

In view of the timescale available for conducting searches, it was agreed that there was insufficient time to adopt a full systematic review methodology and therefore specificity of searches took precedence over sensitivity. Only electronic bibliographic databases were considered in the first instance. A decision was also taken that reference lists from the relevant primary and review articles identified would not be reviewed initially and that there would be no searching of grey literature or hand searching of relevant key journals.

In the initial instance it was agreed that the databases to be searched would be Medline using MESH headings supplemented with keyword searches. Searches were also carried out across CINAHL, EMBASE, ALL EBM review databases and HMIC using keyword searches, covering the years 1996-2007. All of these were carried out using the OVID online interface.

It was decided to limit the size of set to be searched to no more than 700 articles for each subject. Where inspection showed that 90 % of the hits were irrelevant, searches were further refined by applying the OVID focus limit in MESH subject headings (see Appendix 1). Where free text searching was carried out keyword and title limits were used where necessary.

### **3. Identification of search terms**

Topics were then circulated to representatives of NHS Ayrshire and Arran and NHS Lanarkshire (including relevant clinical groups) to ensure no major areas or aspects had been missed. The construction of the final searches was an iterative process, with modifications applied to strategies as it became clear which terms were giving the most relevant articles. Tables giving the themes searched for and the subject headings and keywords used are reproduced below, within each section relating to groups of searches.

### **4. Searches**

#### **4.1 Emergency Services**

Initially Medline was searched over several expanded MESH headings ( Emergency Medical Services, Trauma Center, Emergency Treatment, Wounds and injuries, Accidents, Emergency nursing and Traumatology) (see Appendix 2). It was quickly found that a number of these were producing results that were not specific enough, with too many articles relating to the treatment of specific conditions rather than more general overarching research looking at the organisation and delivery of emergency services being retrieved. So the preferred MESH headings were exp Emergency Medical Services/, exp trauma center/ and exp Emergency service, hospital/, with focus being applied where the sets were still too sensitive.

Keyword searches for (Emergenc\$, injur\$, trauma\$, accident\$, A&E, casualt\$) also produced larger sets than could be comfortably handled, so the searches were refined to: (emergenc\$ or trauma or A&E or casualty).ti,ab AND (unit or service or department or facilit\$).ti,ab

#### **4.2 Generic themes**

The searches laid out below were combined with the terms identified above for Emergency services. MESH headings were expanded to capture nested terms, and where necessary focused if the search was proving too sensitive. The default for keyword searches was .mp (keyword) or .ti,ab,sh (search restricted to title, abstract and subject headings) unless the number of hits retrieved was too great in which case they were restricted to .ti (title only). (see Appendix 3 for examples).

Theme	MESH headings	Keywords
Capacity	Health Services Needs and Demand Utilization review Hospital bed capacity	Volume, Activity, Demand, Capacity, Utilization
Efficiency	Treatment outcome Costs and cost analysis Quality of health care Efficiency, organizational	Effective\$, Benefit\$, Improv\$, Efficen\$, Quality, Outcome\$, Performance\$
Organisation	Health Services Needs and Demand Physician's practice patterns Organizational innovation Efficiency, organisational Health services accessibility/og Community health services/og	Efficienc\$, innovat\$, improvement\$, hospitalist\$, physician\$, doctor\$, consultant\$, medical staff\$
Patient safety, Overcrowding	Medical errors	Patient safety, patient adj3 safety, overcrowding, diversion
Public perception	Public opinion Misuse of medical services Public relations	Patient\$, Public, User\$, Consumer\$, Customer\$, Carer\$, View\$, Perception\$, Impression\$, Opinion\$, Satis\$
Staff roles	Professional role Nurse practitioners Physician assistants Emergency medical technicians Nurse clinicians Allied health personnel Radiology Physicians	Professional role, nurse practitioner\$, physician assistant\$, emergency medical technician\$, paramedic\$, allied health professional\$, nurse clinician\$, radiologist\$, physician\$
Volume/peak activity		Activity, Demand, Capacity, Utilization, Flow, Circadian, Season\$, Volume, Dail\$, Weather, Week\$, Month\$

**Table 1 Search Terms for Generic Themes**

### 4.3 Innovative methods of organising emergency care services

These searches were combined with the terms identified above for Emergency services. MESH headings were expanded to capture nested terms, and where necessary focussed if the search was proving too sensitive.

The concentration here was searching on keywords to pick up particular methods of delivering emergency care.

Theme	MESH headings	Keywords
Extended care practitioner		Nurse AND (expert, clinician, practitioner, consultant), physician assistant\$, extend\$ AND (role, scope, practi\$, care)
GP led services	Primary Health care Family practice Subacute care	GP\$, general practiti\$, walk-in
Immediate care		Immediate care, immediate respon\$, first respon\$
Medical emergency assessment	Diagnostic services Admitting department, hospital	Clinical decision unit, Rapid assessment\$, diagnostic service\$, assessment unit\$, access center, medical emergency team\$, receiving service\$, direct specialty receiving service,
Minor injury/illness		Minor injur\$, minor illness, moderate injur\$, moderate illness
Mobile emergency services	Mobile health units Ambulances/og,st	Emergency retrieval, ERS, mobile medical team\$, mobile intensive care, mobile, ambulance\$, prehospital
Patient transfer	Patient transfer	Interhospital transport, patient transit, interfacility transport, patient transfer\$, interhospital transfer\$
Prehospital triage	Triage	Triage, prehospital
Rapid response		Rapid, Immediate, Care, Response
Scandinavia		Scandinav\$, norw\$, denmark, Danish, finland, finnish, swed\$
See and treat/fast track		Fast-track\$, see ADJ2 treat, treat ADJ2 leave,
Telemedicine	Exp Telemedicine/	Telemedicine, telemed\$, teleradiology, remote, consult\$
Unscheduled care		Unscheduled, unplanned

**Table 2** Search Terms for Innovative Methods of Organising Emergency Medical Services

#### 4.4 Interface between emergency care and other clinical sub-specialities

These searches were approached from two aspects: emergency care; and general consideration of workload, manpower and staffing of each clinical area.

MESH headings used : Workload; Work schedule tolerance; Hospital administration; Models, organizational; Health services administration; Health Manpower; Personnel staffing and scheduling; Organization and administration; Medical staff, hospital; Nursing staff; Health care organization; Keywords: personnel, staffing, scheduling, manpower, workload, administration, organi?ation\$, staff\$, workforce, workforce planning, volume, capacity, utili?ation, demand



















Theme	MESH headings	Keywords
Anaesthesiology	Anaesthesiology/ma, og Anesthesiology Nurse Anesthetists	Anaesthet\$, anesthet\$,
Cardiology	Cardiology Service, Hospital Cardiology	Cardi\$ care, coronary care, cardi\$ service
Cancer	Cancer care facilities Oncology service, hospital	Cancer services
Colorectal surgery	Colorectal surgery/ma,og,ec,ut	Colorect\$, Rectal Surg\$
Elderly	Aged Geriatrics	elderly
ENT	Otolaryngology/ Otorhinolaryngologic Diseases/ec, su Otorhinolaryngologic Surgical Procedures/ec.ut	Ent, (ear adj nose), otolaryngol\$, otorhinolaryng\$
Orthopaedics	Orthopedic procedures Fracture fixation	Orthopaedic surgery
Respiratory	Respiratory care/	Respiratory medicine
Stroke	Cerebrovascular accident	Stroke, Cerebrovascular accident
Surgery		Acute surg\$, surgical services, surg\$ unit
Vascular surgery	Vascular surgical procedures/og,ma Vascular diseases/ec,su Cardiology/ma,og	Vasc\$ adj2 surg\$, vasc\$ adj surg\$

**Table 3** Search Terms for Interface Between Emergency Care and Other Clinical Sub-Specialities

## **5. Retention policy**

Where searches resulted in a large number of hits they were filtered removing items that were editorials, letters and comments. If readily identifiable, articles consisting of only one page with few or no references were discarded. The most relevant journal articles and reviews, those relating to the effects on outcomes of the method of service delivery, were retained. Those articles covering a single patient case study, or evaluations of specific medical interventions were not kept. Most foreign language material was not retained except where they were judged to be of special significance, so that the English abstract could be perused.

## **Appendix 1 Illustration of Application of OVID Focus Limit**

#	MEDLINE DATABASE FROM 1996- TO PRESENT .	Results	Display
1	Emergency Medical Services/	11303	 <a href="#">DISPLAY</a>
2	Trauma Centers/	2297	 <a href="#">DISPLAY</a>
3	Treatment Outcome/	266612	 <a href="#">DISPLAY</a>
4	"Costs and Cost Analysis"/	11049	 <a href="#">DISPLAY</a>
5	"Quality of Health Care"/	20118	 <a href="#">DISPLAY</a>
6	Efficiency, Organizational/	9397	 <a href="#">DISPLAY</a>
7	1 or 2	13378	 <a href="#">DISPLAY</a>
8	or/3-6	304955	 <a href="#">DISPLAY</a>
<b>9</b>	<b>7 and 8</b>	<b>1588</b>	 <a href="#">DISPLAY</a>
10	*Emergency Medical Services/	7793	 <a href="#">DISPLAY</a>
11	*Trauma Centers/	966	 <a href="#">DISPLAY</a>
12	*Treatment Outcome/	2252	 <a href="#">DISPLAY</a>
13	*"Costs and Cost Analysis"/	510	 <a href="#">DISPLAY</a>
14	*"Quality of Health Care"/	9801	 <a href="#">DISPLAY</a>
15	*Efficiency, Organizational/	2561	 <a href="#">DISPLAY</a>
16	10 or 11	8689	 <a href="#">DISPLAY</a>
17	or/12-15	15031	 <a href="#">DISPLAY</a>
<b>18</b>	<b>16 and 17</b>	<b>169</b>	 <a href="#">DISPLAY</a>

This was the search strategy that we used to look at the aspect of efficiency connected with emergency care service. The search was conducted in MEDLINE 1996 to present using the MESH terms above. Initially these were done in the default mode. However, when combined, the numbers were considered too large to search. Therefore the search was repeated using the FOCUS (\*) option. This resulted in a more "specific" set with a higher degree of more relevant articles. However we are aware that this then sacrifices "sensitivity" and it may be that some relevant papers have been missed. Given the timescale we were working to, we adopted this approach when any set returned results of more than 700 items.

\* Numbers highlighted in red show results for the 2 different approaches (#9 and #18).

## Appendix 2 Exploded MESH tree structure for 'Emergency Medical Services'

Expand/Collapse	Checkbox	Term	Count	Print	Expand	Contract	Link
[-]		<b>Health Care (Non MeSH)</b>					
[+]	<input type="checkbox"/>	Population Characteristics	1836	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[-]	<input type="checkbox"/>	Health Care Facilities, Manpower, and Services	0	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Health Facilities	1010	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Health Manpower	994	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Health Personnel	4479	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Health Promotion	9722	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[-]	<input type="checkbox"/>	Health Services	2946	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Adolescent Health Services	1294	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Child Care	594	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Community Health Services	3458	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Dental Health Services	545	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Dietary Services	216	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[-]	<input checked="" type="checkbox"/>	<b>Emergency Medical Services</b>	<b>5402</b>	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Emergency Medical Service Communication Systems	280	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[-]	<input type="checkbox"/>	Emergency Service, Hospital	7510	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Trauma Centers	1166	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Emergency Services, Psychiatric	432	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Poison Control Centers	328	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[-]	<input type="checkbox"/>	Transportation of Patients	1142	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Ambulances	732	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Air Ambulances	495	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
	<input type="checkbox"/>	Triage	1588	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>
[+]	<input type="checkbox"/>	Genetic Services	163	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">I</a>

### **Appendix 3 Examples of searches conducted**

#### patient transfer2

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1. exp \*Patient Transfer/
2. interhospital transport.mp.
3. exp emergency medical services/
4. patient transit.mp.
5. interfacility transport.mp.
6. ((emergenc\$ or trauma or A&E or casualty) and (unit or service or department or facilit\$)).ti.
7. 3 or 6
8. patient transfer\$.mp.
9. 1 or 2 or 4 or 5 or 8
10. interhospital transfer\$.mp.
11. 9 or 10
12. 7 and 11
13. remove duplicates from 12
14. limit 13 to english language
15. 14 and (journal article or review).pt.
16. (anon or anonymous).au.
17. 15 not 16
18. from 17 keep 4,6-8,11-14,22,25-27,31,33,38-40,42-46,52-53,55,61-62,65,68,70,73-74,80,85,87,89,91-93,101,113,115,117,119,121-123,127,130-131,135-136,143-144,148,150-154,160,162,164-166,169,172,175-176,181-183,186,188,192,197,199,202-203,218-219,222-224,226-227,229,233,237,252,260-261,263-265,267,269,271,273,281,283,286,289,291,300-301,306

#### overcrowding

1. ((emergenc\$ or trauma or A&E or casualty) adj3 (unit or service or department or facilit\$)).ti,ab.
2. patient safety.ti,ab.
3. 1 and 2
4. from 3 keep 12,14,18-19,22,29,32,35-40,42,44-45,47-49,51-52
5. (overcrowding or diversion).ti,ab.
6. 1 and 5
7. 6 not 3
8. from 7 keep 2,4-5,7,9,13,19,22,30-31,34,37-38,45,48-49,52,61-65,68-69,71,73,75,81,83-86,89,94,96,100,108,112,114,116-125,127-128,136,139,142-143,145,159
9. 4 or 8
10. from 9 keep 3-5,7,9-12,14,17-19,23-25,28,30,32,35,37,41-42,44-46,48,50-51,54-56,58-62,66,69,73-76,78