Review of Evidence on What Drives Economies of Scope and Scale in the Provision of NHS Services, Focusing on A&E and Associated Hospital Services

A report for the OHE Commission on Competition in the NHS

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Executive Summary

1. The concepts of economies of scope and economies of scale are at the heart of the issue of competition in healthcare. This report reviews the evidence on what drives economies of scope and scale in the provision of NHS services, focusing on A&E and associated hospital services. It considers the nature of the evidence base for guidance on (i) which services are required to be co-located with A&E and (ii) the minimum scale of those services. It comments on the content of the guidance (ie what does the guidance say?) and the nature of the evidence cited in support of the guidance (ie what basis is given for the guidance?), with a specific focus on whether economic evidence is used.

2. Within the timescale and with the resources available the focus was on the official guidance from the various Royal Colleges and other relevant associations and medical organisations in relation to the provision of A&E services. Material (by specialty or procedure) on volume/quality/cost relationships and on professional training requirements, beyond that appearing in the guidance on A&E services was excluded, as was academic literature. Guidance for review was identified primarily by targeted searches of the websites of relevant Royal Colleges and other professional bodies, supplemented with snowball searches of citations and Google searches.

3. In terms of the desirability for co-location with A&E, a core of seven specialties emerges consistently as most important within the guidance we reviewed, albeit with different emphasis: Critical Care/Intensive Care, Acute Medicine, General Surgery, Paediatrics, Orthopaedics, Laboratory Services and Diagnostic Imaging. Whilst these are all seen as highly preferable for co-location, there is some debate about the degree to which a sub-set of this core is essential on-site or could be provided elsewhere subject to establishment of robust networks and patient pathways, albeit usually with a proviso that this would impact on the nature of the cases that should be admitted to A&E.

4. Issues of *scale* are rarely discussed explicitly in terms of *cost* implications. Instead, it is matters of patient safety, quality of care and staff training that are usually driving the discussion of the preferable scale of provision.

5. The guidance documents included in this review cite little evidence to support the recommendations they propose or endorse in relation to *economies of scope or to issues of scale* and where this does happen, the predominant type of evidence cited is reports by other Colleges, medical organisations or government departments, followed by articles in journals such as Emergency Medicine Journal. However, the absence of cited evidence does not necessarily imply that the guidance on co-location of A&E and associated services is not

evidence based, after all many of these guidance documents, are just that – guidance or best practice guides, rather than formal appraisals or evidence reviews. As most are published by medical organisations and professional bodies, the guidance could be considered to be informed by expert clinical opinion. On the other hand, the dearth of cited evidence in documents produced by a wide range of organisations suggests there may not a large amount of evidence, especially economic evaluations, available to cite.

6. The guidance reviewed does not therefore in itself shed a great deal of light on the extent to which competition in and for the market in A&E and related services, may be feasible from an economics perspective.

7. It is clear that it will not always be feasible to have all services thought to be desirable to support A&E on a single site. The use of network arrangements as an alternative is a constant theme within the guidance and the documents we have reviewed reflect some consistent themes in relation to the nature of the trade-offs – financial and non-financial - that may be involved in such arrangements. These include potential increased risks to health from transferring or directing patients elsewhere, balanced against the gains from specialist treatment; the financial costs of establishing and maintaining network arrangements and clear protocols for patient pathways; and the costs of establishing and maintaining adequate training opportunities for those working within and outside of the main services to fulfil the requirements of professional standards (ie ensuring that staff see the required volume and mix of cases). There also appears to be a consensus that where some specialties are located away from the emergency department, there is a need to ensure staff within the emergency department receives extra training that equips them to deal with emergencies.

8. The relative financial and non-financial costs and gains from separation need to be weighed up against the costs and gains associated with having all the services provided in a single location.

9. The limited scope of the review suggests that further research would be required to fill gaps in several areas if a more comprehensive picture of scope and scale issues in hospital care is required. This includes review of the academic literature and the relevant Royal College guidance (not just related to organisation of A&E services) on the relationship between volume, cost and quality within individual specialties, and possibly for procedures within specialties; review of the national guidance on professional training in order to evaluate the basis for statements made about minimum numbers or types of staff required within each service; review of alternative models available for organising emergency and support services, perhaps informed by experience in other countries; and investigation of the factors influencing and underlying expert opinions on issues of scale and scope.

CONTENTS

GLOSSARY OF ACRONYMS

AAGBI	The Association of Anaesthetists of Great Britain & Ireland
A&E	Accident & Emergency
AM	Acute Medicine
AMU	Acute Medicine Unit
AoMRC	Academy of Medical Royal Colleges
ASA	American Society of Anesthesiologists (sic)
ASA3	ASA Physical Status Classification System: Physical Status 3: "A patient with severe systemic disease." [1]
ASGBI	Association of Surgeons of Great Britain and Ireland
ATLS®	Advanced Trauma Life Support – a course on the management of trauma patients[2]
CEM	The College of Emergency Medicine
CCT	Certificate of Completion of Training – issued to doctors who complete full approved training programmes[3]
CCU	Critical Care Unit (NB: in the wider medical literature, but not in this report, CCU is sometimes used to refer to a Coronary Care Unit)
CDU	Clinical Decision Unit "This is an area owned and run by the Emergency Department providing focused protocol-driven care for a range of patients who would otherwise be admitted into a scarce and expensive hospital bed or discharged home precipitately and possibly unsafely".[4]
CT	Computed tomography (medical imaging method)
DGH	District General Hospital
DH	Department of Health, UK

[1] For further information please refer to: http://www.asahq.org/clinical/physicalstatus.htm [Accessed 02/08/11]
[2] See http://www.rcseng.ac.uk/education/courses/atls.html [Accessed 02/08/11].
[3] http://www.gmc-uk.org/doctors/abouteligibility.asp [Accessed 02/08/11]
[4] The College of Emergency Medicine (2011) What is Emergency Medicine? A Guide, February 2011. Available at: http://www.collemergencymed.ac.uk/Public/What%20is%20Emergency%20Medicine/default.asp [Accessed 02/08/11]

ED	Emergency Department
EM	Emergency Medicine
EP	Emergency Physician
ESL	Essential Services Laboratory (biochemistry, haematology, blood transfusion, basic microbiology, infection control and mortuary services)
EWTD	European Working Time Directive
GI	Gastrointestinal
HDU	High Dependency Unit
IBTCIM	Intercollegiate Board for Training in Intensive Care Medicine
ICU	Intensive Care Unit
ISTC	Independent Sector Treatment Centre
MAU	Medical Assessment Unit
MRCS	Member of the Royal College of Surgeons
MRI	Magnetic Resonance Imaging
NCEPOD	National Confidential Enquiry into Patient Outcome and Death
NHSD	NHS Direct
NHSIII	NHS Institute for Innovation and Improvement
NICE	National Institute for Health and Clinical Excellence
NICU	Neonatal intensive care unit
OOH	Out-of-hours
PACS	Picture Archiving and Communication System
PEM	Paediatric Emergency Medicine
PICU	Paediatric intensive care unit
PNP	Paediatric Nurse Practitioner
POCT	Point of care testing
RCO	Royal College of Ophthalmologists
RCoA	The Royal College of Anaesthetists
RCOG	Royal College of Obstetricians and Gynaecologists

RCP	The Royal College of Physicians
RCPCH	The Royal College of Paediatrics and Child Health
RCSE	The Royal College of Surgeons of England
SCBU	Special care baby unit
SpRs	Specialist Registrars
SSPAU	Short stay paediatric assessment unit
ST	Specialty Training – the beginning of specialised postgraduate training
ST3 & ST4	Specialty Training – higher specialty training after core medical training (CMT) has been completed
UCC	Urgent Care Centre
US	Ultrasound
WIC	Walk in centre

INTRODUCTION

POLICY CONTEXT

Introducing competition for the provision of health care services is a central part of the current government's plans. In the hospital sector, the degree to which it is feasible to foster competition will in part depend on the extent to which it is possible to deliver elements of the hospital's range of "products" separately from each other. If such separation is infeasible or is feasible only at a high cost, then competition in (and even for) the market may be constrained.

The concepts of economies of scope and economies of scale are at the heart of this issue and the aim of the report is to review the evidence on what drives economies of scope and scale in the provision of NHS services, focusing on A&E and associated hospital services. In particular, what is the evidence base for guidance about:

- services required to be co-located with A&E, and
- the minimum scale of those services

The report aims to document the guidance on the issues of co-location of services and required minimum scale of those services, in terms of the content of the guidance (ie what does the guidance say) and the nature of the evidence cited in support of the guidance (ie what basis is given for the guidance), with a specific focus on whether economic evidence is used.

SCOPE OF STUDY

The study was limited by the timescale and resources available and therefore the main focus agreed for this study was official guidance from the various Royal Colleges and other relevant associations and medical organisations in relation to the provision of A&E services. It does not cover:

- Academic literature unless cited in the guidance.
- Material (by specialty or procedure) on volume/quality/cost relationships beyond that appearing in the guidance on A&E services.
- Guidance related to professional training requirements beyond that appearing in the guidance on A&E services.

- Documents on specific NHS capital building schemes that include an A&E department.
- Press releases.

METHOD

The stages we have followed are:

Stage 1: Identify relevant guidance

Stage 2: Identify the evidence base for the guidance (following up cited material)

Stage 3: Present the results of findings

Stage 4: Discussion of the findings, including implications for competition

The strategy employed to locate relevant guidance is described below.

1. Identify initial list of organisations, professional bodies etc who might have issued guidance relating to the (re) configuration of A&E departments and associated services.

2. Search the websites of these organisations to identify publications and 'grey evidence' which might be relevant.

The guidance is likely to be located in different places and formats, including:

A. Reports specifically on the configuration of A&E or some other acute service.
B. Nested within reports with much broader remits.
C. Nested in documents relating to the provision of services relating to a specific condition(s) or specific group of patients.

Therefore, searches of these websites were carried out using one or more of the following approaches depending on the structure and organisation of the particular website:

- Using the website's own search facility
- Using the website's built-in publication search facility
- Browsing the titles of all the publications listed on the website
- Google searches of the website

The core search terms were "A&E", "emergency", and "configuration", but additional terms tailored to the site being searched were also sometimes used.

A list of the websites included in the search is provided in Appendix 1.

3. Criteria for selecting material to review :

Material was selected to review if the title of the publication gave some indication that the document related to guidance regarding the provision of A&E and related services. For instance if the title included terms relating to:

- A&E, emergency or acute care/services
- Service provision/(re)configuration, (co-)location of services
- Guidance, requirements, recommendations, good practice, review.

4. Review the documents identified in stage 2 and extract relevant information.

5. Limited snowball search following up references, and other potential sources of information (eg other relevant organisations) mentioned in relevant documents.

6. Follow up cited guidance documents that have been produced by the Department of Health and NHS.

7. Non-comprehensive Google search on key terms:

a. "configuration" AND "A&E"
b. "reconfiguration" AND "emergency" AND "services" .

8. Limited number of ad hoc Google searches.

The list of documents reviewed but not cited is included separately from the bibliography, in Appendix 2.

DEFINITIONS

(1) Guidance – we use this as a generic term to describe material from Royal Colleges and other relevant medical associations which make statements about the configuration of A&E and supporting services. We distinguish in the report (where possible) between recommendations, requirements and best practice or standards, although this is not always clear from the documents.

(2) Evidence – we use this term to describe the material cited by the above documents in support of the statements made.

(3) We use both Accident and Emergency (A&E) departments and Emergency Departments (EDs) to indicate emergency services.

ECONOMIES OF SCALE AND SCOPE

At a simple level, economies of scope arise where it is less costly to produce two or more products (or services) in one firm (or organisation) than to produce each separately so that as the scope or variety of services offered increases, unit costs are reduced. Such circumstances often arise where there are assets or inputs shared by more than one production process, and where the assets tend to be specialised or indivisible. Economies of scale generally are found where fixed costs of production are high in relation to variable costs such that long-run average costs fall as the scale of production increases. Such economies may exist across all lines of production or just within one product or service area and are often attributable to technological factors or to the potential for division of labour and specialisation.

Whilst there are several theoretical issues to debate around the nature of the assets, the way in which assets are shared and the source of scale economies, the important feature from the perspective of competition in health care, is that the existence of economies of scope and scale may create a barrier to entry for new providers for whom production of just one of the related set of goods/services would be difficult to achieve and more costly. Alternatively, a new entrant may need to commit to provision of the whole range of services, rather than just one, which could also present a substantial barrier.

In a publically funded system like the NHS, the presence of economies of scope and scale can also potentially create issues even in circumstances where it *is* possible for a new provider to enter. If the new provider produces just one of the services previously jointly supplied by the incumbent then unless/until the incumbent can reduce their fixed costs, the public funder will pick up the tab for the increased unit costs of producing the remaining services.

When considering the issues of scope and scale in relation to guidance on A&E and related services, it is often difficult to separate the two concepts. Discussion about the desirability of co-locating specific services is often based implicitly on views about what would be the scale of operation required to support a particular type or number of professional staff or to run a service out of hours. This is discussed further in the section on economies of scale.

ECONOMIES OF SCOPE

GUIDANCE AROUND WHICH SERVICES NEED TO BE CO-LOCATED WITH A&E

OVERVIEW OF THE GUIDANCE

In England, Accident and Emergency (A&E) departments currently play a pivotal role in both the assessment and treatment of patients requiring urgent care, and in transferring patients to other specialties and services. The configuration of emergency and acute hospital services has thus been the focus of a number of publications by the Royal Colleges, medical associations, government departments and other organisations, with these publications typically taking the form of, or at least including, guidance, recommendations and/or good practice examples.

For instance, the College of Emergency Medicine, the Royal College of Physicians, The Royal College of Surgeons of England and the NHS National Leadership Network have all issued guidance around which services are key to running an effective A&E department.

We begin with presenting the broad guidance from these organisations about which services need to be co-located with an A&E department. By broad guidance, we mean guidance which explicitly lists all the services which that organisation considers key to supporting an A&E department, as opposed to guidance documents which look at specific specialties but do not provide an overview of all the services which should be co-located with an A&E department. The latter type of guidance is discussed later in this report when we look at particular specialties in more detail.

As views about service configuration have evolved over time, we present the material chronologically, finishing with the Royal College of Surgeons of England's report from 2011.

BROAD GUIDANCE ON CO-LOCATION OF SERVICES

THE ROYAL COLLEGE OF PHYSICIANS (2002):

"The clinical services needed by patients who come or are brought to A&E departments include initial assessment, resuscitation, major trauma care, acute medical care, intensive care, high dependency care and coronary care, supported by comprehensive investigative services. It is self-evident that these services should be closely linked and that some must be co-located." (Royal College of Physicians, 2002b, 3)

NHS National Leadership Network (2006):

The services required to support an A&E department were reviewed by the NHS National Leadership Network in 2006. They produced a list of services which they described as "the absolute minimum level of acute care which must be provided on-site to ensure a safe Emergency Department – provided that emergency care networks can ensure prompt access to other important services at local partner hospitals" (NHS National Leadership Network, 2006, 32).

Supported on-site by 24-hour access to:

- Acute Medicine
- Level 2 Critical Care
- Non-interventional Coronary Care Unit
- Essential Services Laboratory (ESL) (biochemistry, haematology, blood transfusion, basic microbiology, infection control and mortuary services)
- Diagnostic Radiology (X-ray, ultrasound and CT scan)

Supported by 24-hour local multi-hospital network access (not necessarily on-site) to:

- Emergency Surgery
- Trauma and Orthopaedics
- Paediatrics
- Obstetrics & Gynaecology
- Mental Health
- Specialised Surgery
- Interventional Radiology

No evidence was cited to justify why some services could be provided through networked provision rather than on-site, but the document emphasises that service configuration will depend on local factors such as distance, travel time, demographic characteristics and the strength of the networks.

The Academy of Medical Royal Colleges (2007)

The Academy of Medical Royal Colleges states: "The optimum support for an A&E department consists of the seven key specialties of acute medicine, critical care, imaging (including 24-hour computed tomography (CT)), laboratory services, paediatrics, surgery and orthopaedics."(Academy of Medical Royal Colleges, 2007, A18)

"The absolute minimum support for the A&E department is 24-hour on-site acute medicine, critical care unit, imaging (including 24-hour CT) and laboratory services." (Academy of Medical Royal Colleges, 2007, A18)

THE COLLEGE OF EMERGENCY MEDICINE (2008)

The College of Emergency Medicine in 'The Way Ahead' (2008) argues that there are seven key specialties which are required to support an A&E department:

- Critical Care Unit (CCU)/Intensive Care Unit (ICU)
- Acute Medicine
- General Surgery
- Paediatrics
- Orthopaedics
- Laboratory Services
- Diagnostic Imaging

However, they concede that not all inpatient teams will be able to sustain full services on all current sites (The College of Emergency Medicine, 2008b, 14). The minimum services for a hospital with an emergency department comprise acute medicine, intensive care (with anaesthesia), diagnostic imaging (including 24-hour CT scanning) and laboratory services (including a blood bank). If general surgery, orthopaedics and paediatrics are not on-site then the recommendation is for "robust and safe" arrangements for management of severe illness or injury in these groups, including guidance on where they should be taken and subsequent transfer. In addition, it is recommended that more senior emergency doctors may be required in such departments in order to take decisions and stabilise patients who need to be transferred.

Indeed, the College of Emergency Medicine emphasises that "one size does not fit all" and there are additional challenges delivering high quality care to remote populations (The College of Emergency Medicine, 2008b, 21).

THE ROYAL COLLEGE OF SURGEONS OF ENGLAND (2011)

In 2011, the Royal College of Surgeons of England's working party looking at standards for unscheduled surgical care agreed that hospitals with an ED which accepts undifferentiated patients must provide 24-hour on-site surgical opinion, and where emergency general and orthopaedic services are provided the following services are interdependent:

- anaesthetics, critical care (intensive therapy unit/high dependency unit) and acute pain
- acute medicine
- interventional and diagnostic radiology
- pathology
- gastroenterology
- cardiology
- bronchoscopy
- endoscopy
- elderly care and rehabilitation medicine.

The working party also argued that: "If children are admitted as emergencies, inpatient paediatrics and specialist children's facilities are required. Arrangements for other surgical specialties will be required as appropriate" (The Royal College of Surgeons of England, 2011, 12).

The Emergency Floor

The co-location argument has been taken further in the context of location of services *within* a hospital to establish an "emergency floor". The key rationale appears to be integration of the expertise required to deal with emergency admissions: "we recommend that in large acute hospitals that receive critically ill patients, the 'front door' should comprise an 'emergency floor' with co-location of the emergency department, the Acute Medicine Unit (AMU), critical care, and other acute and urgent care facilities and key support services, including the ambulance service. This would foster greater integration and collaboration and would improve the interface between these key services, bringing together their different skill mixes and expertise within a single setting. In turn, this would facilitate more effective streaming of patients to the right place for their ongoing care." (The Royal College of Physicians, 2007, xi). A similar argument has been made by the College of Emergency Medicine in the context of the links between acute medicine (AM) and emergency medicine (EM): "… [the report]… acknowledges the differences between EM and AM and notes the areas of commonality and the areas of exclusive skills. One of the key tenets of this report is the concept of the 'emergency floor' with co-location of the ED, acute medical admissions unit, critical care, and other acute and urgent care facilities and key support services. This arrangement will allow for smoother integration of all services." (The College of Emergency Medicine, 2008b, 51).

However, as the arguments appear to be less about the essential configuration of services required to support A&E and more about the ideal internal organisation of services on a site, we do not consider this further here.

GUIDANCE RELATING TO SPECIFIC SERVICES/SPECIALTIES

Looking at the broad guidance we observe that the seven specialties referred to in the College of Emergency Medicine's report 'The Way Ahead' emerge as consistent themes within the guidance we have reviewed, albeit with different emphasis. We discuss each of these key services below.

Further details on the guidance and cited evidence behind that guidance are provided for each specialty in Appendix 3.

1. ACUTE MEDICINE

This is a broad category and there is overlap with critical care and emergency medicine itself, but in general there is a view that emergency departments and acute medical care should be closely linked. There is various guidance on the nature of Medical Assessment and Medical Admission Units (AMUs), but the general thrust is that acute medicine and A&E services should not be separated or run completely separately, even within the same hospital. However, despite the expressed need for close working, the complementary, rather than interchangeable, nature of the specialties has been highlighted, particularly in relation to the skills of physicians. Thus the College of Emergency Medicine notes that acute physicians do not have skills in the management of trauma or children which together comprises 75% of the workload of emergency departments.

Within acute medicine, there is a view that in large hospitals dealing with the most critically ill patients (level 3), access to critical care with full ventilator support is required (The Royal College of Physicians, 2007, xiv) whereas in those dealing with level 2 patients, safe transfer arrangements must be in place if higher level care is required. An acute medical unit should ideally be located on the same floor as emergency care and have seven day access to a range of diagnostic and treatment procedures (diagnostic gastrointestinal (GI) endoscopy, echocardiography, diagnostic ultrasound, bronchoscopy and computed tomography (CT) and magnetic resonance imaging (MRI)) or a means of accessing these easily from within a network in the case of smaller AMUs. Hospitals without an emergency department still require access to acute medical care according to agreed pathways and access to advice from other units.

ACUTE MEDICINE – GUIDANCE & SUPPORTING EVIDENCE

Content of guidance	Source	Evidence cited					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
AMU one of the 'seven key specialties'. ED must have 24/7 support services from AMU.	CEM, 2008		✓				
AMU should be in close proximity to ED to facilitate direct access for differentiated acute medical problems.	RCP, 2007	✓					
Divisions between AMU and ED in terms of staffing, organisation and working can "hinder effective care" and "the safety of acutely ill patients may be compromised".	RCP, 2002		✓				
All hospitals in an acute care network admitting patients with acute medical illnesses should have an AMU even if they have no ED.	RCP, 2007	✓					
AMU interdependent with emergency general and orthopaedic services.	RCSE, 2011	✓					

2. GENERAL SURGERY

For hospitals accepting undifferentiated emergency cases, access to 24-hour on-site surgical opinion (at ST3 level or above) or to a doctor with equivalent status and a supporting surgical team is seen as important (The Royal College of Surgeons of England and British Orthopaedic Association, 2000).

Where emergency general and orthopaedic services are provided, the following are seen as important because of clinical interdependencies: acute medicine, anaesthetics, critical care, interventional and diagnostic radiology, pathology, gastroenterology, cardiology, bronchoscopy, endoscopy, elderly care and rehabilitation medicine. Inpatient paediatrics and specialist children's services are seen as requirements where children are admitted as emergencies. There is a recognition that some services may be provided as part of a network across a geographical area, and in such cases planning of transfer and access to required personnel are seen as vital. It is clear that having general surgery creates

requirements or recommendations for a range of other related services to be provided on-site and or be easily available.

The Royal College of Surgeons of England report generic general surgery standards which state that an emergency general surgery service requires “adequate theatre access, senior radiological support (including interventional radiology), senior anaesthetic support and critical care facilities” (The Royal College of Surgeons of England, 2011, 49) and argue that patient safety and efficiency are improved by locating all emergency patients within one area (The Royal College of Surgeons of England, 2011, 50). They also advocate that in specialties with a high emergency workload consultants do not cover more than one site (The Royal College of Surgeons of England, 2011, 20).

Within general surgery there is some guidance about the necessity for individual services (mainly paediatrics which is dealt with below). For instance, the Vascular Society (2007) makes national recommendations where hospitals are receiving unselected surgery. Emergency vascular services on-site are recommended only where there are sufficient trained staff (two or more vascular surgeons) and associated support from interventional radiology and access to emergency operating theatres; otherwise transfer to appropriate vascular units is recommended, within a co-ordinated emergency network. The Royal College of Obstetricians and Gynaecologists (RCOG) sets out standards for provision of emergency gynaecological surgery, where access is required to: diagnostic support services (ultrasound, radiology, haematology and biochemistry) and emergency operating theatres. Complex cases may require access to critical care facilities, to other specialist services and to psychological support - although “ideally” on-site, effective care pathway arrangements need to otherwise be made for these services.

“Access to theatres can be a major problem. It is the view of ASGBI that all hospitals admitting emergency general surgical patients should have a dedicated, fully staffed, theatre available at all times for this clinical workload.” (Association of Surgeons of Great Britain and Ireland, 2007, 7)

GENERAL SURGERY– GUIDANCE & SUPPORTING EVIDENCE

Content of guidance	Source	Evidence cited					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
One of the 'seven key specialties'.	CEM, 2008		✓				
24 hr access to General surgery is required if hospital receiving patients as emergencies or who are acutely ill.	RCP, 2002	✓					
A service which should preferably be on site or alternative pathways need to put in place.	CEM, 2008		✓				
A&E departments without General surgery on site need more emergency physicians to treat patients.	CEM, 2008		✓				
A&E departments without General surgery on site need clear procedures for dealing with common problems requiring general surgery, e.g. Acute abdominal pain.	CEM, 2008		✓				
Separation of emergency and elective surgery is recommended to improve the quality of care delivered to patients. But services should preferably be provided on the same site due to imaging and equipment needs.	RCSE, 2011		✓				

SEPARATION OF ELECTIVE AND EMERGENCY SURGERY

In addition to the arguments about co-location of surgery with A&E services, there is another debate relevant to competition which concerns the relationship between elective and emergency surgery. The physical separation of emergency from elective care in terms of services, facilities and rotas is recommended in a number of guidance documents, for instance: “There must be a clear and identifiable separation of delivery of emergency and elective care” (Association of Surgeons of Great Britain and Ireland, 2007, 6). A variety of reasons are given including to avoid elective care being disrupted by emergency admissions and vice versa and to allow senior staff to focus on emergencies. In addition, opportunities for training in both aspects of care can be arranged more effectively; and more efficient management and commissioning may be facilitated: “The benefits of this [separation] are generally accepted. They include more dedicated management and improvements in clinical care, training and education. This may assist in contract discussions and in liaison with primary care.” (Association of Surgeons of Great Britain and Ireland, 2007, 6)

The argument is made especially in relation to general surgery, trauma and orthopaedics and neurosurgery and the Royal College of Surgeons argues that to deliver an effective emergency general surgery service the entire surgical team "needs to be free of all other commitments, except in a few hospitals with low emergency workload." (The Royal College of Surgeons of England, 2011, 20). However, it is also noted that separate facilities at the same site is preferable to separate locations in order to share imaging and equipment, reduce delays, provide safer and more efficient care and facilitate training (The Royal College of Surgeons of England, 2011, 14).

It has been noted that separation of services may well produce increased costs for emergency and complex cases, but reduced costs for dealing with routine elective cases. (The Royal College of Surgeons of England, 2007). In itself, this may not be an issue but given the nature of the payment mechanisms currently in place under Payment by Results, if each type of care is offered by different providers, there may be financial consequences. So for example, a review of reconfiguration possibilities in South East London showed that redistribution of emergency and elective services between hospitals would result in "winners" who gained financially from providing care for extra "high margin" elective cases; and "losers" who lost out financially due to the need to treat more "low margin" complex and emergency cases (The King's Fund, 2011, 14). The financial implications of shifting all or some elective care away from the emergency/complex care are raised in a number of the documents and there seems to be a view that the current payment mechanism does not reflect accurately the true costs of providing each type of care. Whether this is the case or not, is a matter for further investigation but the issues are very relevant for competition. If it is just the case that emergency cases impose higher costs than elective cases, then as long as the payment mechanism could be designed to reflect this accurately there is in principle no issue for competition because a provider of either type of service will be reimbursed adequately.

However, if it is the case that the joint costs of production of elective and emergency care are lower than for providing each separately, then this solution would not be ideal because at a system level the NHS would be paying more overall. This is clearly an issue that is seen as important in relation to the links between the provision of emergency and other types of care and would benefit from further investigation as the broader questions are beyond the scope of this review.

3. ORTHOPAEDICS

Consideration of orthopaedic services is linked closely with major trauma. The requirements for major trauma centres have received much attention but as these are not the same as standard emergency care, we do not consider trauma units in detail here.

However, there is an expectation that acute general hospitals with A&E facilities of different sizes will probably deal with trauma cases. Major acute hospitals that are at the centre of a trauma service (designated as level 1) and receive cases from other hospitals require a wide range of services which are listed in a joint report by the Royal College of Surgeons of England and the British Orthopaedic Association (2000, 43).

Indeed, because orthopaedics is the second most common destination specialty for admissions from A&E the Academy of Medical Royal Colleges states: "It is clearly preferable to have such a high volume service on-site. If there is no on-site emergency orthopaedic service, ideally the A&E department should not receive trauma ambulance cases. There should be clear protocols for the ambulance service that they should not take trauma cases to those departments. Where geographical circumstances or existing arrangements necessitate the reception of patients with serious bony injuries in departments without on-site orthopaedic support, protocols must be established for their care in consultation between the regional orthopaedic unit and the A&E departments involved." (Academy of Medical Royal Colleges, 2007, A15)

According to the RCSE "A unit accepting orthopaedic surgical emergencies has daily access (including weekends) to routine trauma lists which are independent of general emergency theatres." (The Royal College of Surgeons of England, 2011, 57)

ORTHOPAEDICS – GUIDANCE & SUPPORTING EVIDENCE

Content of guidance	**Source**	**Evidence cited**					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
One of the 'seven key specialties'.	CEM, 2008		✓				
Preferably on-site or "robust and safe pathways need to be in place" for orthopaedic emergency patients.	AoMRC, 2007	✓					
	CEM, 2008		✓				
When not on-site, the ED requires more senior emergency physicians.	CEM, 2008		✓				

4. PAEDIATRICS

The provision of emergency and acute services for children is a topic which has received extensive coverage in the guidance documents we reviewed.

The Royal College of Paediatrics and Child Health (2007) acknowledge that "... it is not possible for every ED or hospital to offer full paediatric services including inpatient services or critical care."

However, access to paediatric support is vital. The Paediatric Intensive Care Society's 'Standards for the Care of Critically Ill Children' (The Paediatric Intensive Care Society, 2010) state that "On each hospital site there should be 24 hour cover by a consultant paediatrician who is able to attend within 30 minutes and does not have responsibilities to other hospital sites." [Standard 14].

"Hospitals without on-site assessment or in-patient services for children should have guidelines for accessing paediatric medical advice agreed with a local paediatric medical unit and regularly reviewed." [Standard 13].

The Royal College of Surgeons of England argues that inpatient paediatrics and specialist children's facilities are required if children are admitted as emergencies (The Royal College of Surgeons of England, 2011, 12).

In contrast, the NHS Institute for Innovation and Improvement's report 'Delivering Quality and Value – Focus on: Children and Young People Emergency and Urgent Care Pathway' (2008) argues that "effective and safe emergency and urgent care can be delivered without on site inpatient beds" (p15) and presents a case study of reconfiguring paediatric A&E and inpatient services at East and North Hertfordshire NHS Trust (p17) which suggests that providing paediatric inpatient services on a different site to the ambulatory paediatric unit has resulted in a decrease in admissions and most children do not need to be transferred to the hospital with the paediatric inpatient facilities. However, they concede that ambulatory paediatric units "will only work effectively if there are the facilities to transfer children to the nearest children's ward" (NHS Institute for Innovation and Improvement, 2008, 35).

In the guidance we examined there is, however, consensus that emergency paediatric surgery should only take place in hospitals which can have suitably trained staff and facilities to treat children.

"Emergency surgery is only undertaken in hospitals with comprehensive paediatric facilities, 24/7 paediatric cover, paediatric nursing support and paediatric-competent anaesthetic support." (The Royal College of Surgeons of England, 2011, 53)

"Emergency theatres are staffed by a paediatric-competent theatre team."(The Royal College of Surgeons of England, 2011, 54)

However, the Department of Health explain that not every District General Hospital (DGH) needs to provide emergency surgical care for children. “A comprehensive emergency surgical service could be provided by concentrating services for a larger population or networking with other local hospitals.” (Department of Health, 2006, 35)

The RCSE also suggests that all settings which accept emergency specialist paediatric surgical patients should have neonatal intensive care facilities available at all times (The Royal College of Surgeons of England, 2011, 56).

PAEDIATRICS-GUIDANCE & SUPPORTING EVIDENCE

Content of guidance	**Source**	**Evidence cited**					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
Co-location preferable but not always possible.	CEM, 2008		✓				
	RCPCH, 2007	✓					
Staffing implications of not co-locating ED & paediatrics	CEM, 2008		✓				
	RCPCH, 2007			✓		✓	
ED patient volumes requiring PEM-trained consultant in ED	CEM, 2008	✓					
	RCPCH, 2007	✓					
Implications for staffing of paediatrics department	RCPCH, 2007	✓					
ED patient volumes requiring paediatric ED	RCPCH, 2009	✓					
ED’s role in meeting training needs for PEM	RCPCH, 2009		✓				
Need for closer links between paediatrics and emergency medicine	RCPCH, 2009		✓				
ED need for paediatric advice	RCPCH, 2007	✓					
Utilising local networks.	RCPCH, 2007	✓					
Emergency paediatric ophthalmology	RCO, 2009	✓					

5. CRITICAL CARE UNIT (CCU)/INTENSIVE CARE UNIT (ICU)

Critical care and intensive care facilities are considered core services for Emergency Departments (The College of Emergency Medicine, 2008b, 14) even though only a small proportion of patients attending an A&E department have life-threatening problems (Academy of Medical Royal Colleges, 2007, A15). For example, the Royal College of Physicians report estimates suggesting that up to one in ten acute medical emergencies require critical care at either level 1 or 2 (Royal College of Physicians, 2002b, 16).

"Interdependent clinical elements are variously provided by A&E departments, medical assessment and medical admission units, and critical care, as well as the acute specialty services." (Royal College of Physicians, 2002b, 7)

The Intensive Care Society says "For clinical reasons, the ICU should be easily accessible to the departments from which patients are usually admitted, such as the accident and emergency department, recovery room, surgical and medical wards." (The Intensive Care Society, 1997, 12)

CRITICAL CARE UNIT (CCU)/INTENSIVE CARE UNIT (ICU)

Content of guidance	Source	Evidence cited					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
A core service and one of the 'seven key specialties'.	CEM, 2008		✓				
Hospitals receiving patients as emergencies or those who are acutely ill must provide critical care facilities.	RCP, 2002	✓					
ED requires 24/7 support from intensive care.	CEM, 2008		✓				
Up to 10% of acute medical emergencies require critical care (levels 1 or 2)	RCP, 2002		✓	✓		✓	
The physical location of critical care impacts on quality of service delivery because close proximity of services is likely to improve communication and collaboration.	RCP, 2002			✓			
Service interdependent with emergency general and orthopaedic services.	RCSE, 2011	✓					

6. LABORATORY SERVICES

Laboratory services and blood banks are considered an essential service for hospitals admitting emergency or acutely ill patients (The College of Emergency Medicine, 2008b; Royal College of Physicians, 2002b), with timely access to pathology (haematology, coagulation, clinical chemistry and microbiology) playing a vital role in the diagnosis and effective treatment of patients and consequently in preventing unnecessary hospital admissions which place additional costs on the hospital.

But while the guidance consistently advocates the need for 24/7 availability of laboratory services it is not always explicit about the extent to which the Emergency Department and laboratory services need to be co-located. This perhaps reflects the fact that almost all hospitals with A&E departments have laboratories on-site already (or at least did in 2005 - see (Academy of Medical Royal Colleges, 2007, A19)).

That said, the Academy of Medical Royal Colleges (2007, A18) states that "The absolute minimum support for the A&E department is 24-hour on-site acute medicine, critical care unit, imaging (including 24-hour CT) and laboratory services."

Similarly, in the context of discussing regional trauma networks, the Royal College of Surgeons of England's Intercollegiate Group on Trauma Standards (2009) states that major trauma centres, which form a small subset of hospitals with A&E departments, require a "staffed laboratory available for immediate analysis of blood and other specimens 24 hours a day, 7 days a week"(p44).

However, not all hospitals will have access to 24/7 laboratory services and in 2006 the configuration of NHS Pathology Services formed the subject of a review by Lord Carter, after which a series of pilot projects aimed at identifying the optimal configuration of pathology services were announced (Royal College of Pathologists, 2006). Subsequently reconfiguring NHS Pathology Services on a hub and spoke basis has been mooted (The Royal College of Pathologists, 2010).

The RCSE, for instance, cite as best practice 24-hour availability by telephone of pathology advice relating to haematology (The Royal College of Surgeons of England, 2011, 38), suggesting that some components of laboratory services can be delivered remotely. However, the provision of advice is different to carrying out urgent diagnostic tests, where the desirability of close proximity is clearly greater.

The key arguments articulated in the guidance about the relationship between A&E and laboratory services are shown in the table below.

LABORATORY SERVICES-GUIDANCE & SUPPORTING EVIDENCE

Content of guidance	Source	Evidence cited					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
Laboratory services are a core service for an emergency hospital and one of the 'seven key specialties'.	CEM, 2008	✓					
Hospitals admitting patients as emergencies or who are acutely ill must provide "comprehensive investigative" services.	RCP, 2002	✓					
An ED must have 24/7 access to laboratory services including a blood bank.	CEM, 2008		✓				
Guidance standards suggest 24 hr consultant-led laboratory service.	RCSE, 2011	✓					
Best practice guidance suggests availability of core tests 24/7 based on types of sub-specialty of emergency surgery carried out within the hospital.	RCSE, 2011	✓					
Pathology service interdependent with emergency general and orthopaedic services.	RCSE, 2011	✓					
Clinical guidance suggests 24hr availability of clinical biochemistry tests.	RCSE, 2011	✓					
24 hr availability of infectious diseases and infection control advice.	RCSE, 2011	✓					
Haematology and blood transfusion standards suggest 24 hr availability of certain pathology tests.	CEM, 2008	✓					
Best practice guidance suggests clinical telephone haematology advice available 24/7.	RCSE, 2011	✓					
Early access to diagnostics can prevent unnecessary hospital admissions.	CEM, 2008	✓					
Poor access and in particular lack of 24/7 access can hinder effective care.	RCP, 2002		✓				
Risks of misdiagnosis of some conditions if decision based on clinical assessment alone.	CEM, 2008	✓					

7. DIAGNOSTIC IMAGING

Like laboratory services diagnostic imaging services such as x-rays, ultrasound and computed tomography are a key service for A&E departments, and access to these services is required 24 hours a day.

The need to co-locate imaging departments near A&E departments is referenced in several guidance documents (The Royal College of Surgeons of England, 2011; The College of Emergency Medicine, 2008b).

"Where imaging will affect immediate outcome, emergency surgical patients have access to CT [computed tomography], plain films and US [ultrasound] within 30 minutes of request" (The Royal College of Surgeons of England, 2011, 35).

The Royal College of Radiologists and the College for Emergency Medicine stress the importance of locating some diagnostic imaging equipment "within or immediately adjacent to the ED" (The Royal College of Radiologists, 2007).

"Timely access to diagnostic services (particularly radiology), interventional radiology and emergency theatre time is often poor and is a major factor detracting from the efficiency with which emergency cases are delivered." (Association of Surgeons of Great Britain and Ireland, 2007, 7)

DIAGNOSTIC IMAGING-GUIDANCE & SUPPORTING EVIDENCE

Content of guidance	**Source**	**Evidence cited**					
		None	College publication(s)	Government department publications	NHS publications	Clinical journal articles	Economic evaluation
Core service	CEM, 2008	✓					
ED must have 24/7 support from diagnostic imaging (including 24-hour x-rays, ultrasound and computed tomography)	CEM,2008		✓				
Every resuscitation room should have an ultrasound machine.	CEM, 2008	✓					
The CT scanner should be within or immediately adjacent to the ED.	CEM, 2008	✓					
	College of Radiologists, 2007		✓				
Diagnostic imaging is interdependent with emergency general and orthopaedic services.	RCSE, 2011	✓					

8. Other services and specialties

A range of other services or procedures are at times mentioned in relation to supporting A&E services, or to supporting the services which are essential to A&E, but to consider the evidence for each procedure is beyond the scope of the review. These include "... 24/7 urgent access to 'life saving' interventions such as GI endoscopy, bronchoscopy, interventional radiology within the emergency care network, ideally located on the same site as the AMU."(The Royal College of Surgeons of England, 2011, 32). In addition there are services which are seen as interdependent with general surgery and orthopaedics, which in addition to bronchoscopy and endoscopy, include gastroenterology and cardiology. Psychiatric services, elderly care, rehabilitation medicine, general practice and ophthalmology are also mentioned.

9. Networks & Service configuration models for emergency services

A key theme within the body of guidance surrounding acute and emergency medicine relates to different models of service configuration and central to many of these models is the provision of some services via a network of hospitals. The relevance of this to issues of scope and scale is that it reflects recognition that although there may be inter-dependencies between specialties and services, it will not always be feasible, or even desirable, to duplicate emergency services on every site and that alternative models exist. It is also a response to the trend to concentration and specialisation in some specialties, for reasons that are related not only to financial concerns but also as a means of implementing best practice where evidence suggests that better patient outcomes can be achieved in specialised settings.

The tension between financial and clinical issues as the driver behind configuration is apparent in some of the guidance reviewed, so for example the College of Emergency Medicine (2008b), argues that amalgamation of Emergency Departments may be advantageous in areas where EDs are less than 10km apart, but that when EDs are further apart there is "no clinical case for centralising the vast majority of ED care" and the benefits of centralisation need to be balanced against increased risks associated with ill patients having to travel further (The College of Emergency Medicine, 2008b, 21). If the nearest ED is more than 20km away they argue emergency services should be retained (The College of Emergency Medicine, 2008b, Para 2.5). Similarly, the Royal College of Surgeons (2006) states that service reconfiguration should be based on patient need "rather than on managerial, financial or political expediency".

However, several of the Royal Colleges advocate commissioning acute and emergency services as a network. For instance, the Royal College of Paediatrics and Child Health argue that: "Out-of-hours urgent care services, emergency departments and acute assessment services, paediatric intensive care units and acute surgical specialties, should all be commissioned as an integrated network." (Royal College of Paediatrics and Child Health, 2009a, 6). The Royal College of Surgeons states "Increasingly, services will need to be provided on a networked basis, that is via an interconnected system of service providers. ... Expertise and resources will be drawn from the entire network, enabling patients to be treated at the most appropriate hospital depending on the complexity of the case, the resources available and the competence of staff at the receiving hospital." (The Royal College of Surgeons of England, 2011, 14).

Some guidance advocates centralisation of services for specific emergency care pathways which in turn suggests that a network arrangement will be required. For example, "There is a strong case for regionalisation of services for the treatment of serious trauma and ST elevation myocardial infarcts[5] although such patients represent a small minority of ED attendances." (The College of Emergency Medicine, 2008b, Para 2.5).

It is clear from the guidance reviewed that networks are likely to be an essential part of providing safe and integrated emergency care where that care necessarily involves aspects of provision drawn from more than one site. There will be implications for competition in terms of the requirement to maintain such network arrangements where a range of different providers are involved. We return to this theme in our conclusions.

The guidance also offers details of other types of organisational models for some elements of emergency care and these are summarised in Appendix 5.

EVIDENCE TO SUPPORT THE GUIDANCE

The majority of the guidance documents included in this review cite little or no evidence to support the recommendations or requirements they propose or endorse.

However, many of the documents which do not reference any specific studies or evaluations support their recommendations with statements about the consequences of not having access to specific services or the benefits which could accrue from following the guidance: for instance, that including a short-stay paediatric assessment unit "could enable substantially fewer hospital inpatient admissions" (Royal College of Paediatrics and Child Health, 2009a, 6).

[5] ST elevation myocardial infarction (STEMI)

And as most of the documents reviewed in this paper are published by medical organisations and professional bodies, the guidance could, therefore, be considered to provide, or be informed by, expert clinical opinion.

Indeed, in those documents which provide references to support or justify their guidance/recommendations/requirements, the predominant type of evidence cited is reports by other Colleges, medical organisations or government departments, followed by articles in journals such as Emergency Medicine Journal.

On the one hand, the absence of cited evidence does not necessarily imply that the guidance on co-location of A&E and associated services is not evidence based, after all many of these guidance documents, are just that – guidance or best practice guides, rather than formal appraisals or evidence reviews. On the other hand, the dearth of cited evidence in documents produced by a wide range of organisations suggests there is not a large amount of evidence, especially economic evaluations, to cite.

SCALE

GUIDANCE AND EVIDENCE AROUND THE MINIMUM SCALE OF A&E SUPPORT SERVICES

It was not within the scope of this review to consider the extensive academic literature on the relationship between volume, cost and quality in health care services generally, nor to search for separate guidance on service provision in every specialty or for individual procedures where volume may be a key issue in provision. We looked instead for instances where the guidance covered by this review (with a focus on A&E services) mentioned issues related to scale in provision of A&E services and the services that support it. The tables below provide details.

It is clear that scale is rarely discussed explicitly in terms of *cost* implications and we have not found many examples, as shown in the first set of tables. Implicitly, the recognition that it is often not possible to provide all services required to support A&E on a single site, necessitating network and clinical pathway arrangements as alternatives, may reflect the assumption that it would not be cost-effective to provide each service on every site. So the Royal College of Surgeons notes that rural hospital trusts which have to provide A&E services because they are an essential service may not be able to lower their costs by locating some services on other sites as easily as those hospitals in more central locations. (The Royal College of Surgeons of England, 2006, 29). Similarly, discussion of different models of provision and organisation (eg for paediatric emergency care; hub and spoke and

networks; small, medium and large hospitals) is presumably based on views about what it is feasible to provide at hospitals of different sizes, which again may reflect financial issues. Mention of "efficiency" or "scale" (without any detail) is occasionally used in a fairly loose way. For example, "we would recommend that for acute and essential services, such as emergency surgery, commissioning in England takes place across GP consortia to enable a sufficient catchment population size to ensure sustainability and best use of resources. Neighbouring commissioning consortia will need to collaborate in order to ensure high quality, safe emergency surgical services can be provided at scale." (The Royal College of Surgeons of England, 2011, 16)

There have been debates about the volume and mixture of workload required to ensure financial sustainability in pathology, laboratory testing and also radiology, although not always directly in relation to emergency care. These are services identified as being necessary to support emergency care (either on-site or networked) and there are some brief references made to the financial implications ("destabilisation") of moving high volume, routine work or elective care away from a hospital which needs to retain the higher level specialist work in support of a range of specialties.

More commonly, the issues of scale are related to staffing requirements and thus indirectly to patient safety and quality concerns. Therefore, requirements for particular types and numbers of trained staff to be available 24/7 or available to advise on emergency care within a specific timeframe are set out in some instances. Such recommendations will have implications for minimum scale of a service, as it will not be feasible to have such staff on-site at hospitals where numbers of patients seen are very low or where staff are not being utilised across different specialties. The need to ensure that staff giving advice or input into emergency care are trained and experienced in particular specialties, may also have implications for scale (and scope) if such training involves being able to see certain numbers or types of patients and the European Working Time Directive is key in this respect (Dawson et al., 2004).

It is clear that scale and scope are closely linked in relation to training issues as requirements to have expertise available to emergency care from one specialty sometimes depends on staff acquiring that expertise from another related specialty within the hospital. The Academy of Medical Royal Colleges Working Party (2007) presented detailed views on the organisation of a range of acute services with explicit attention paid to the interdependency between specialties, to training requirements in terms of staffing numbers (sometimes in relation to size of hospital), and the links into emergency care. It drew on previous reviews of acute services as well as submissions from Royal Colleges from each medical specialty. Details of their recommended standards for individual specialties are included in the tables below, but a consistent theme in their discussion is that withdrawal of some services may have an adverse impact on the ability of the hospital to train and retain staff required for another related service. For example, emergency care relies on intensive

care which in turn relies on specialist anaesthetists. The Academy view is that the sustainability of a critical care rota would be difficult if there was no need for any other anaesthetic services in the hospital, for example the complete withdrawal of all operative surgery. The hospital would depend heavily on being part of a network with rotation of staff between that and other larger hospitals.

In addition, provision of diagnostic, imaging and laboratory procedures is often specified, sometimes with time limits for access to the procedure or for obtaining results. Again, this will have implications for the minimum scale of organisation as equipment and staff costs may be substantial. There are a number of statements about minimum number of beds to be available for a certain population served, but without detail of the basis for the numbers provided.

Thus it appears that rather than costs explicitly, it is matters of patient safety, quality of care and staff training that are usually driving discussion of the scale of provision, but even then such matters are sometimes implicit in the guidance we have reviewed. Much more detailed research would be required in order to ascertain the nature of the evidence based on the costs and benefits of different models and scale of provision of individual specialties and procedures. However, from the review we have undertaken we suggest that staffing and training appears to be a major consideration in relation to the scale of A&E and supporting services and it is likely that these in turn are linked to views on quality and safety issues. Detailed investigation of the training requirements within specialties and specific recommendations for training for those providing emergency care would be needed to establish the degree to which such requirements necessitate provision of a particular set of services on a single site, or whether there is scope for it to be delivered via network arrangements in which the personnel move around between sites (Dawson et al., 2004).

TABLES OF EVIDENCE

(A) Explicit mention of scale and costs

	Guidance	**Source**	**Evidence cited**
Critical Care Units	"The optimum size of critical care units (CCUs) is difficult to ascertain; very small (or very large) units are difficult to manage. Fewer than eight level 3 beds may not be sustainable because of the need for adequate numbers of staff at all times." "There is some degree of economy of scale as the number of beds is increased, but over a certain level a second team of doctors becomes necessary because of the intensity of input required by these patients. There are no economies of scale in small units and, with limited patient exposure (that is 'case mix'), such units would not be recognised for training by the IBTICM."	(Academy of Medical Royal Colleges, 2007, 52)	Standards based on previous reviews of acute care and inputs from all Royal Colleges to Working Party.

	Guidance	Source	Evidence cited
Pathology and Laboratory Service	"The indiscriminate and uncontrolled removal of the high volume, low cost element of the service runs the risk of destabilising the financial base that allows the provision of the more expensive, high technology service elements. This in turn will have an impact on the ability to pursue the research and development element inherent in all large laboratories, crucial for the evolution of the service and the continuing provision of high quality diagnostics for patients. The proposed development of managed pathology networks will allow the movement of services between NHS laboratories, while maintaining the integrity and capacity of the overall service."	(Academy of Medical Royal Colleges, 2007)	Cites Report of the review of NHS pathology services in England, August 2006. (Carter Review)
Histopathology	The provision of emergency OOH frozen section service must be considered in any facility where surgery occurs. There is concern that redistribution (centralisation) of acute services might take with it slightly less acute services which generate a large quantity of routine work (for example cancer) and thus destabilise histopathology services.	(Academy of Medical Royal Colleges, 2007)	Evidence submitted by Royal College; no other reference cited.
Ophthalmology	"the loss of services such as ophthalmology or dermatology from a medium-sized acute trust to an ISTC might have a serious impact on the financial viability of other services or the trust as a whole because, in multispecialty hospitals these specialties tend to be net contributors to the hospital budget. There is already evidence that this is happening in one major ophthalmic teaching unit in the UK where the commissioning of a number of independent sector treatment sectors (ISTCs) locally is resulting in the loss of a large proportion of cataract surgery from the unit and is threatening the viability of the unit's ophthalmic emergency service"	(Academy of Medical Royal Colleges, 2007)	Cites J McGill; personal communication.
Surgery	"The knock-on effects of unit closure on other services cannot be quantified." "Some Trusts have no choice but to offer duplicate services on more than one site – this is especially relevant to rural hospitals where the distance between hospital sites dictates that essential services such as A&E be offered in more than one place. Such duplication of services inevitably raises the reference cost and there is no mechanism within the current national tariff structure to recognise this additional burden" "Failure, either financial or clinical, of certain key departments may affect the viability of entire units and hospitals, including the ability to provide emergency services."	Royal College of Surgeons, 2006	Results of a working party and visits to trusts.

(B) Implicit Scale Issues

Emergency Medicine/A&E generally

Guidance	Source	Evidence cited
The Royal College of Surgeons recommends that a safe major A&E should serve a population of no fewer than 300,000.	(Royal College of Surgeons of England 2006 cited by the King's Fund (The King's Fund, 2011, 11) .	The original RCSE document appears to use the 300,000 figure to refer to the minimum catchment area for an acute general hospital, rather than specifically in relation to a safe size for A&E (which is what the King's Fund report suggests).
24/7 emergency medicine consultant cover. 7 key specialties: acute medicine, intensive care, imaging (24/7 CT), lab services, paediatrics, surgery, orthopaedics Minimum support is above minus paediatrics, surgery and orthopaedics.	(Academy of Medical Royal Colleges, 2007, 56)	These are standards derived from previous reviews of Royal Colleges and submissions to the working party.
"Hospitals that are too small to maintain a full range of medical and surgical specialties must have sound arrangements for obtaining advice from other units and for the transfer of patients for treatment elsewhere."	(Royal College of Physicians, 2002b, ix)	None cited.

Paediatrics

Guidance	Source	Evidence cited
"All paediatric departments supporting an on-site ED seeing more than 16,000 children per year should aim to appoint a paediatrician with sub-specialty training in paediatric EM. Their role will be to work in the ED as well as in paediatric assessment/admission units."	(Royal College of Paediatrics and Child Health, 2007, 32)	None cited.
"EDs seeing more than 16,000 children per annum should employ a consultant in the ED with sub-specialty training in paediatric EM. Hospital paediatric departments with an on-site ED seeing more than 16,000 children per annum should aim to appoint a paediatrician with sub-specialty training in paediatric EM. The appointment of consultants from both backgrounds is an advantage, and is essential for larger EDs."	(Royal College of Paediatrics and Child Health, 2007, 37)	None cited.
"For EDs to be training departments for paediatric EM, the College of Emergency Medicine (CEM) recommends an annual attendance of at least 16,000 children. For this reason, this edition recommends a revised cut-off of 16,000 children per annum as defining a medium-sized ED."	(Royal College of Paediatrics and Child Health, 2007, 18)	Refers to the College of Emergency Medicine recommendation.

Guidance	Source	Evidence cited
Small and medium size hospitals (15,000 attendees, 3000 admissions, 3750 deliveries) – rota of 8 consultant paeditaricians; HDU cover – dedicated consultant for neonatal unit, 1 competent junior doctor; SHO or advanced practitioner. Middle grade rota of 9, junior rota of 6. Large hospitals (25000 attendees, 5000 admissions, 6250 deliveries) – double rotas at consultant and middle grade level (14-16 consultants, 18 SpRs).	(Academy of Medical Royal Colleges, 2007, 56)	These are standards derived from submissions by Royal Colleges.
CEM pathway standards: Clinical expertise: "The College recommends that every ED with more than 16,000 children's visits per annum must have minimum of one PEM-trained consultant. All EDs should have a named consultant who leads for children's issues in the department."	(The College of Emergency Medicine, 2008b, 23)	None cited.
"Where enough children are seen, a separate children's emergency department should be developed."	(Royal College of Paediatrics and Child Health, 2009a, 46)	None cited.

Anaesthesia

Guidance	Source	Evidence cited
"Induction and maintenance of general anesthesia in children in EDs requires specially trained clinical staff, together with a range of appropriate equipment and drugs. In most places this will only be provided by anaesthetic specialists, although larger EDs may have EM consultants and trainees who are competent and experienced in paediatric anaesthesia." "Hospitals with a low throughput of children should ensure that these skills are maintained. This can be achieved by staff secondments or rotations to other centres".	(Royal College of Paediatrics and Child Health, 2007, 30)	Second quote cites (Department of Health, 2006)
"Hospitals need to ensure that their anaesthesia and/or intensive care services are staffed to a level which allows them to respond in a timely manner to care for emergency patients in the ED. The RCoA Audit guidelines make recommendations about response times for anaesthetists to the ED. Local response times should be audited and standards set."	(The Royal College of Anaesthetists, 2011, para 3.2)	Audit guidelines mentioned are: Raising the standard. A compendium of audit recipes. 2nd Edition. Section 6.1: Anaesthesia in the accident and emergency department. *RCoA*, London 2006. (www.rcoa.ac.uk/index.asp?PageID=125)

Guidance	Source	Evidence cited
The level of anaesthetic service for emergency activities, including surgery, is provided by competent anaesthetists who are either consultants or, if non-consultants, have unimpeded access to consultants and consultant supervision. Best practice: Emergency anaesthesia in ASA3 and above patients should be provided by consultant anaesthetists. In hospitals receiving patients with major injury and trauma, there is a sufficient level of appropriately experienced medical and non-medical staff to provide a 24-hour emergency service. Trained anaesthetic assistance is present at all times in all clinical areas where anaesthetics are administered, including the emergency and radiology departments. All consultant anaesthetists and anaesthetic trainees working in emergency surgery and trauma have specific training in the skills required for this area.	(The Royal College of Surgeons of England, 2011, 43)	Refers reader to 'The Royal College of Anaesthetists' Guidelines for the Provision of Anaesthetic Services' for more specific guidance and support.
24/7 consultant-led service, immediate response cover by minimum on-call rota of 8 doctors including specialist and associate specialist grades and SpRs. Consultant:trainee ratios 1:1; larger hospitals need more tiers of on call eg for obstetrics.	(Academy of Medical Royal Colleges, 2007, 56)	These are standards derived from previous reviews of Royal Colleges and submissions to the working party

Surgery

Guidance	Source	Evidence cited
"The working party agree that hospitals accepting undifferentiated patients via the ED must have access to 24-hour on-site surgical opinion (at ST3 level or above) or a trust doctor with equivalent ability (ie MRCS with ATLS® provider status), with a supporting team both senior and junior to this surgeon."	(The Royal College of Surgeons of England, 2011, 5)	None cited.
Standard for unscheduled surgical care: "Hospitals accepting undifferentiated medical patients have access to 24-hour, on-site surgical opinion (ie of ST3 or above or a trust doctor with equivalent ability (ie MRCS with ATLS® provider status). If on-site surgical opinion is not available, the unit does not accept undifferentiated patients."	(The Royal College of Surgeons of England, 2011, 21)	None cited.

Guidance	Source	Evidence cited
The RCSE issues guidance around the staffing levels required to deliver an effective emergency general surgery service, including that a major hospital the emergency general surgery team will comprise "a consultant surgeon (CCT holder), middle grade (MRCS holder), core trainee and foundation doctor"(The Royal College of Surgeons of England, 2011, 49) and that major procedures may require three surgeons. As best practice guidance they therefore highlight the need for "cover arrangements during busy periods".	(The Royal College of Surgeons of England, 2011, 49).	None cited.
Emergency Standards – Standards for Surgical gives best practice guidance on the speed with which patients requiring different types of emergency general surgery are treated, suggesting that staffing levels need to be adequate to treat patients in line with clinical best practice. "Management of critically ill patients requires assessment at MRCS level, critical care support and consultant surgeon (CCT) input within 30 minutes and rapid access to CT (The Royal College of Surgeons of England, 2011, 50).	(The Royal College of Surgeons of England, 2011, 50)	None cited.
"The pressures of the New Deal, EWTD, the shortage of skilled surgical manpower and the requirement for High Dependency and Intensive Therapy Units mean that, for most surgical specialties, there is an inescapable need to provide elective and emergency surgical services in larger hospitals for complex in-patients."	(Senate of Surgery of Great Britain and Ireland, 2004, 2)	None cited, but provides a list of background documents at the end of the report.

Orthopaedics

Guidance	Source	Evidence cited
An Acute General Hospital taking surgical emergencies should have 24-hour, fully-staffed Intensive Treatment Unit beds, provided in a ratio of 1:40,000 population as well as high dependency unit beds".	(British Orthopaedic Association, 2007, 11)	The Royal College of Anaesthetists and The Royal College of Surgeons of England. Report of Joint Working Party on Graduated Patient Care. January 1996.

Psychiatry

Guidance	Source	Evidence cited
Consultant sessions: "A named consultant psychiatrist should have responsibility for liaising with the A&E department and for having overall responsibility for the service offered by the mental health department. The previous report advised that, for a medium-sized A&E department in a district general hospital (DGH), there should be a minimum of five consultant sessions available, to provide a service to the DGH, including the A&E department. There is no reason to alter this advice."	(Royal College of Psychiatrists and British Association for Accident and Emergency Medicine, 2004, 54)	None cited.

Acute Medicine

Guidance	Source	Evidence cited
Consultant lead in acute medicine per site and larger units will require several consultants in acute medicine. All units to have SpRs (ST3) and above 24/7. Multidisciplinary team; min 2 ward rounds per day.	(Academy of Medical Royal Colleges, 2007, 52)	Standards based on previous reviews of acute care and inputs from all Royal Colleges to Working Party.

Intensive Care

Guidance	Source	Evidence cited
Minimum of 2 (preferably 3) ward rounds per day. 24/7 intensive care cover by consultants, trained medical practitioner and staff capable of managing an airway emergency in under 3 minutes.	(Academy of Medical Royal Colleges, 2007, 52)	Standards based on previous reviews of acute care and inputs from all Royal Colleges to Working Party.
HDU Beds: Data from a one-month needs assessment exercise conducted at the Royal Victoria Infirmary, Newcastle "indicate a need for one HDU bed per 10–15 medical admissions, although significantly more would be needed to cope with peaks in demand. An alternative calculation based on a survey in Mid and North Trent suggested approximately one HDU bed is needed per 75 acute beds."	(Royal College of Physicians, 2002a, 15)	No reference details are provided for the needs assessments referred to in the report.

Critical Care

Guidance	Source	Evidence cited
"Only a small proportion (5–10%) of A&E patients will have a problem that *might* be immediately life-threatening and only 1–2% a problem requiring immediate critical care intervention. However, in a department serving a population of 250,000, this means that 3,000–6,000 patients per year have a possibly immediately life-threatening problem and 600–1,200 will need immediate critical care. In a population of this size - and even in smaller populations that are geographically isolated - critical care will be essential. By this is meant the knowledge, skills and experience required to care for the critically ill patient."	(Academy of Medical Royal Colleges, 2007, A15)	None cited.
"Some hospitals will struggle to provide viable critical care, especially if all surgical operating and outpatient work is withdrawn."	(Academy of Medical Royal Colleges, 2007, A19)	None cited.

Radiology

Guidance	Source	Evidence cited
"Risk of deskilling of the workforce (clinical radiologists and radiographers) if elective work goes to independent sector treatment centres (ISTCs), with a separate workforce and a non-integrated service."	(Academy of Medical Royal Colleges, 2007, A32)	None cited.
"Risk to acute trust comprehensive service if elective work is removed, with reduction in staff available to provide 24/7 cover."	(Academy of Medical Royal Colleges, 2007, A68)	None cited.

CONCLUSIONS

SUMMARY OF FINDINGS

This review focused on the guidance produced by Royal Colleges and other relevant medical associations on the configuration of A&E and supporting services. A great deal has been written on this subject and this review has: (a) summarised what has been said in relation to the co-location of services and minimum scale of services; and (b) commented on the evidence cited in support of these views. In relation to the two main questions posed at the outset, the review has found:

1. There appears to be a broad consensus about a set of "core" services required to be co-located where emergency care is provided. There is some debate about the degree to which a sub-set of this core is essential on-site or could be provided elsewhere subject to establishment of robust networks and patient pathways. There is far less explicit information available on the minimum scale of provision.

2. The evidence to support the guidance does not appear to draw upon economic evaluation. There is a high degree of circularity of argument as many documents cite other similar documents rather than primary sources. Expert opinion is a prevalent theme within the types of guidance cited and very often it is deemed to be "self-evident" that a particular organisation of services is required. Whilst this evidence may well be valid, it is not usually based on economic analysis.

In terms of the *drivers* of scope and scale, usually:

- There is little explicit discussion of the issues of costs in relation to scale or scope.
- Most of the discussion refers instead to patient safety, quality or professional training issues.

IMPLICATIONS FOR COMPETITION

The guidance reviewed does not in itself shed a great deal of light on the extent to which competition in and for the market in A&E and related services, may be feasible from an economics perspective. Our suggestions for further research address some of the outstanding issues. However, we have some observations that may be relevant to discussion of competition more generally, which we explore below.

It is clear that it will not always be feasible to have all services thought to be desirable to support A&E on a single site. The use of network arrangements as an alternative is a constant theme within the guidance - for instance, "A few (A&E) units are operating without one or even two supporting services such as paediatrics, surgery or orthopaedics. These operate in networks with other hospitals with ambulance diversion and transfer of patients." (Academy of Medical Royal Colleges, 2007, A19).

If support services or parts of those services are provided in a separate location from the A&E department, for whatever reason, the guidance documents we have reviewed reflect some consistent themes in relation to the nature of the trade-offs - financial and non-financial - that may be involved. These include:

- Increased risk to health from transferring or directing patients elsewhere if treatment is unavailable on-site. In some cases, such risks may be weighed against the gains from specialist treatment.

- The financial costs of establishing and maintaining network arrangements and clear protocols for patient pathways.
- No details of the level of costs are given, but they may be substantial given the involvement of several providers and that they will be required to operate seamlessly within emergency situations. This may involve:

    - Staff training at all locations on the nature of the protocols
    - Organisation of bed capacity to allow for transfers
    - Communication facilities
    - IT costs especially for rapid transfer of imaging, test results, telemedicine etc
    - Transport arrangements with ambulance services and extra training for ambulance staff if they are transferring emergency cases
    - Management costs to run the network
    - Operation of staffing rotas which may be more demanding if there are fewer specialties across which to share staff.

- The costs of establishing and maintaining adequate training opportunities for those working within and outside of the main services to fulfil the requirements of professional standards (ie ensuring that staff see the required volume and mix of cases)

- There appears to be a consensus that where some specialties are located away from the emergency department, there is a need to ensure the staff within the emergency department receive extra training that equips them to deal with emergencies.

The relative financial and non-financial costs and gains from separation need to be weighed up against the costs and gains associated with having all the services provided in a single location.

The importance of these issues in relation to the issue of competition will depend in part on whether the service/part of service is physically provided elsewhere or whether it is provided within the same location, but by a different provider.

The latter is important because even where economies of scope exist, it is not strictly necessary that a single provider has to provide all services. If the source of scope economies is indivisible shared assets (physical or human) then if it is feasible for a provider to contract for use of the assets for some purposes or during some periods, there is potential for more than a single provider to be in the market. There will of course be transactions costs involved in such an arrangement which are likely to be higher where the assets are more complex than single items of equipment.

The contractual and organisational issues outlined above are relevant considerations in any competitive arrangement regardless of the nature of the ownership of the providers. However, within the current institutional context, contractual and network arrangements that involve partnerships between different types of provider (public, private, charitable) may require additional attention to deal contractually with complex matters of staff training, use of shared resources and access arrangements for dependent services.

The essence of any type of network arrangement is that the individual service components are meant to create an integrated service which requires professions to work together as team players, not just as individual specialists. If contractual arrangements are required between provider organisations from different sectors (whether on separate sites or co-located), an added dimension will be the need for trust and close co-operation between those from each sector. There is a large body of literature relating to the nature of contracting for health care services and some of the themes explored there are highly relevant to arrangements between parties involved in provision of emergency care where there are many contractors and where there is an element of unpredictability.

Further Research

The limited scope of the review suggests that further research would be required to fill gaps in the following areas if a more comprehensive picture of scope and scale issues in hospital care is required:

- Review of the academic literature and the relevant Royal College guidance (not just related to organisation of A&E services) on the relationship between volume, cost and quality within individual specialties, and possibly for procedures within specialties.
- A review with a specific focus on the implications of the provision of emergency and elective care jointly or separately, within specific specialties and for certain procedures. If the literature is not very illuminating in terms of the economic implications of configuration, then a more in-depth, case study approach may be required which examines cost structures within hospitals.
- Review of the national guidance on professional training in order to evaluate the basis for statements made about minimum numbers or types of staff required within each service.

Other relevant themes which may deserve attention include:

- Review of the alternative models available for organising emergency and support services, perhaps informed by experience in other countries.
- Consideration of alternative rota provisions for ensuring timely availability of expert opinion.
- Evaluation of alternative options for the organisation of professional training.
- Consideration of the transactions costs likely to be involved when placing some services off-site, perhaps informed by current cases where such arrangements exist and including exploration of the nature of the contracts required.
- Investigation of the factors influencing and underlying expert opinions on issues of scale and scope.

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APPENDICES

APPENDIX 1 - LIST OF ORGANISATIONS WHOSE WEBSITES WERE SEARCHED FOR PUBLICATIONS

Organisation	Website
Academy of Medical Royal Colleges	http://www.aomrc.org.uk
Association of Anaesthetists of Great Britain and Ireland (ASGBI)	http://www.aagbi.org/
Association of British Neurologists	http://www.theabn.org
The Association of Coloproctology of Great Britain and Ireland	http://www.acpgbi.org.uk
Association of Surgeons of Great Britain and Ireland	http://www.asgbi.org.uk
The Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland	http://www.augis.org
British Association of Oral and Maxillofacial Surgeons	http://www.baoms.org.uk
The British Orthopaedic Association	http://www.boa.ac.uk
British Association of Paediatric Surgeons (BAPS)	http://www.baps.org.uk/
British Society for Gastroenterology (BSG)	http://www.bsg.org.uk/
The British Society for Surgery of the Hand	http://www.bssh.ac.uk
British Thoracic Society	http://www.brit-thoracic.org.uk
The College of Emergency Medicine	http://www.collemergencymed.ac.uk/
General Medical Council (GMC)	http://www.gmc-uk.org/
The National Association of Assistants in Surgical Practice (NAASP)	http://www.naasp.org.uk
The Royal College of Anaesthetists (RCOA)	http://www.rcoa.ac.uk
The Royal College of Nursing	http://www.rcn.org.uk/
The Royal College of Obstetricians and Gynaecologists	http://www.rcog.org.uk/
The Royal College of Ophthalmologists	http://www.rcophth.ac.uk
The Royal College of Paediatrics and Child Health	http://www.rcpch.ac.uk/
The Royal College of Pathologists	http://www.rcpath.org
The Royal College of Physicians of London	http://www.rcplondon.ac.uk/
The Royal College of Psychiatrists	http://www.rcpsych.ac.uk
The Royal College of Radiologists	http://www.rcr.ac.uk
The Royal College of Surgeons of England	http://www.rcseng.ac.uk/
Society for Cardiothoracic Surgery in Great Britain & Ireland	http://www.scts.org/
The Society of Acute Medicine	http://www.acutemedicine.org.uk/

APPENDIX 2 - LIST OF DOCUMENTS REVIEWED BUT NOT CITED IN THE REPORT

MEDICAL COLLEGES:

The Academy of Medical Royal Colleges

Managing Urgent Mental Health Needs in the Acute Trust: A guide by practitioners, for managers and commissioners in England and Wales (2008) .....

Managing Urgent Mental Health Needs in the Acute Trust – Background report (2008) .....

Guidance on commissioning NHS hospital-based care involving anaesthesia, pathology and radiology services (2004) .....

The College of Emergency Medicine (CEM)

Clinical Standards for Emergency Departments (2010) .....

Letter re Major Trauma Networks (2009) .....

The Royal College of Paediatrics and Child Health (RCPCH)

RCPCH response to Our NHS, Our Future () .....

The Royal College of Pathologists

Breaking the bottleneck (2004) .....

The Royal College of Physicians

Consultant physicians working with patients, 4th edition (2008) .....

Isolated Acute Medical Services Current organisation and proposals for the future (2002) .....

The Royal College of Radiologists

Changing out-of-hours radiology practice: a response by The Royal College of Radiologists to five NCEPOD reports (2009) .....

How many radiologists do we need? A guide to planning hospital radiology services (2008)

The Royal College of Surgeons of England

Good Surgical Practice (2008) .....

Direction of Travel for Urgent Care: a discussion document (2007) .....

Delivering surgical services: options for maximising resources (2007) .....

Separating emergency and elective surgical care (2007) .....

Provision of Trauma Care Policy Briefing (2007) .....

Surgery for Children – Delivering a First Class Service (2007).....

The Future of the Medical Workforce – NHS Employers discussion document – Response from The Royal College of Surgeons of England (2007).....

Centralisation and Specialisation of Hospital Services (2006) .....

Developing a Modern Surgical Workforce (2005).....

MEDICAL ASSOCIATIONS:

British Association of Paediatric Surgeons

Paediatric Surgery: Standards of Care (2002).....

British Medical Association (BMA)

Healthcare in a rural setting - The local provision of specialised acute and emergency services (2005) .....

British Orthopaedic Association (BOA)

Children's Orthopaedics and Fracture Care (2006).....

MEDICAL SOCIETIES

British Geriatrics Society

The Older Person in the Accident & Emergency Department (2008) .....

British Society of Gastroenterology

Care of Patients with Gastrointestinal Disorders in the United Kingdom (2006)

The Intensive Care Society

Standards for the Management of Patients After Cardiac Arrest – Standards and Guidelines (2008) .....

Point of Care Testing (POCT) in critical care (2004) .....

Guidelines for the transport of the critically ill adult – Standards and guidelines (2002) .....

Standards for Intensive Care Units (1997).....

The Society of Acute Medicine

Acute Medicine & Emergency Medicine Position Statement (undated).....

The Vascular Society

The Provision of Emergency Vascular Services (2007) .....

JOINT REPORTS

The Royal College of Surgeons of England / The Society for Cardiothoracic Surgery

Joint Statement: Public consultation on reconfiguration of paediatric cardiac surgery (2011).....

NHS ORGANISATIONS/BODIES:

Healthcare for London

Report of the Acute Care Clinical Working Group () .....

NHS Clinical Advisory Groups

Regional Networks for Major Trauma, NHS Clinical Advisory Groups Report (2010) .....

NHS Medical Education England

Foundation for Excellence – An Evaluation of the Foundation Programme (Commissioned by MEE and carried out by Professor John Collins [Nuffield Department of Surgical Sciences, University of Oxford and Green Templeton College, Oxford]) (2010) .....

Time for Training – A Review of the impact of the European Working Time Directive on the quality of training. Report by Professor Sir John Temple, Commissioned by MEE (2010).....

NHS Wales

Specialties regarded as 'core', 'non-core' and 'networkable' with respect to Emergency Department services. (2009).....

Summary of Some Potential Models of Unscheduled Care (2009) .....

The Hospital Element of Unscheduled Care – Phase 2 Report (undated) .....

National Public Health Services Wales

Rapid Review of Hospital Element of Unscheduled Care Services in North Wales: Literature Review on Best Practice in Unscheduled Care Services (2009).....

National Patient Safety Agency

The transfusion of blood and blood components in an emergency, Rapid Response Report NPSA/2010/017, October 2010. Supporting information (2010) .....

Emergency support in surgical units: Dealing with haemorrhage. Rapid Response Report 3 (2007) .....

Office of the Strategic Health Authorities

Emergency Services Review – Good Practice in Delivering Emergency Care: A Guide for Local Health Communities (2009).....

GOVERNMENT ORGANISATIONS:

Care Services Improvement Partnership / National Institute for Mental Health in England

More than just staffing numbers – A workbook for acute care workforce redesign and development (2008) ..

Department of Health

Regional Trauma Networks – Clinical Advisory Group Document (2010) .....

Commissioning for emergency and inpatient care for people with diabetes (2009) .....

Commissioning Safe and Sustainable Specialised Paediatric Services – A Framework of Critical Inter-Dependencies (2008) .....

Report of the Review of the NHS Pathology Services in England, Chaired by Lord Carter of Coles – An Independent Review for the Department of Health (2006) .....

Tips for quick wins – Improving responses for children and young people requiring emergency or urgent care (2005) .....

Department of Health, Social Services & Public Safety

Accident & Emergency nursing ... A contribution to the Future, Working Paper No. 1 (2000) .....

National Audit Office

Major trauma care in England (2010) .....

OTHER HEALTH BODIES/ORGANISATIONS/CHARITIES ETC:

Primary Care Foundation

Primary Care and Emergency Departments (2010) .....

Centre for Workforce Intelligence

Trauma workforce – data collection and scoping report, CFWI Regional Trauma Network Team (2011) .....

National Confidential Enquiry into Patient Outcome and Death (NCEPOD)

Emergency Admissions: A journey in the right direction? (2007).....

The Nuffield Trust

Local Medical Emergency Units – Learning Set Interim Report (2001) .....

APPENDIX 3 - TABLES OF GUIDANCE AND SUPPORTING EVIDENCE

1. ACUTE MEDICINE

ACUTE MEDICINE UNIT (AMU)

Detail	**Source**	**Evidence / Guidelines**
"We recommend that acute medicine services should be in close geographical proximity to the emergency department, to facilitate direct access to the AMU for differentiated acute medical problems for the community."	(The Royal College of Physicians, 2007, xiv)	None cited.
Lists as one of the 'seven key specialties', but acknowledged that not inpatient teams will be able to sustain full services on all current sites. "The College view is that an ED must have 24/7 support services from Acute Medicine ...".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
"We recommend that all hospitals within an acute care network admitting patients with acute medical illnesses (even those without emergency departments) should establish AMUs as the focus for acute medical care."	(The Royal College of Physicians, 2007, xiv)	None cited.
Reports on how "a division between A&E and acute medicine, with separate staffing, organisation and working in A&E departments, medical assessment units, medical admissions units, high dependency and critical care units" as a factor which can "hinder effective care" and states that "the safety of acutely ill patients may be compromised."	(Royal College of Physicians, 2002b, 2) (Royal College of Physicians, 2002b, 7)	Reporting on the findings in: Federation of Royal Colleges of Physicians of the UK. *Acute medicine: the physician's role. Proposals for the future.* A working party report of the Federation of Medical Royal Colleges. London: RCP, 2000.
RCSE lists as a service which is interdependent with emergency general and orthopaedic services.	(The Royal College of Surgeons of England, 2011, 5)	None cited.

Supporting service	Detail	Source	Evidence / Guidelines
Medical assessment and/or medical admission units	The RCP and the Faculty of Accident & Emergency Medicine: "We *recommend* that medical assessment and/or medical admission units should be in place in all hospitals that receive unselected emergency patients. They are essential for the sound assessment and immediate care of acutely ill or injured patients, and for the efficient working of both medical and non-medical staff. (The way in which critical care services may be developed in relation to acute medicine is the subject of a College working party report.)"	(Royal College of Physicians, 2002b, ix)	None cited.
Medical assessment units, medical admission units, observation wards and alpha wards	"To function well these units should be close to the A&E department with a designated consultant physician in a managerial role."	(Royal College of Physicians, 2002b, 15)	None cited, but argues that: "There are no studies comparing different organisational arrangements, e.g. with A&E teams, a specialist acute physician or the physician of the day running the unit."
	"Such units are a common feature of A&E departments and acute medicine and should be in place in all hospitals that receive unselected emergency patients. They are essential for the assessment and immediate care of acutely ill or injured patients, and for the efficient working of both medical and non-medical staff."	(Royal College of Physicians, 2002b, 17)	None cited.
Medical admission unit	"The physical relationship between A&E departments, MAUs, HDUs and ICUs is important in providing optimal care to the severely ill. In many UK hospitals, planning of these areas has been, of necessity, haphazard. MAUs in particular have often been established rapidly on medical wards with little thought about the provision of either resuscitation areas or high dependency facilities. The need to reproduce many of the facilities already available in the A&E department is another issue that is rarely considered when judging the effectiveness of these units."	(Royal College of Physicians, 2002a, 15)	None cited.

Supporting service	Detail	Source	Evidence / Guidelines
	Data from a one-month needs assessment exercise conducted at the Royal Victoria Infirmary, Newcastle "indicate a need for one HDU bed per 10–15 medical admissions, although significantly more would be needed to cope with peaks in demand. An alternative calculation based on a survey in Mid and North Trent suggested approximately one HDU bed is needed per 75 acute beds."	(Royal College of Physicians, 2002a, 15)	

2. General Surgery

Supporting service	Detail	Source	Evidence / Guidelines
General Surgery	Lists as one of the 'seven key specialties', but acknowledged that not inpatient teams will be able to sustain full services on all current sites. Mentions as a service which preferably should be on-site, or "robust and safe pathways need to be in place for the management of severe illness or injury in these groups".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
	Requires: "adequate theatre access, senior radiological support including interventional radiology), senior anaesthetic support and critical care facilities".	(The Royal College of Surgeons of England, 2011, 49)	Refers the reader to the Association of Surgeons of Great Britain and Ireland (www.asgbi.org.uk) for more specific guidance and support.
	"Where key support services such as Orthopaedics, General Surgery or Paediatrics are not on site, then there is a greater need for more senior EPs to assess, stabilise and treat patients prior to discharge or transfer. There also need to be clear procedures for dealing with common problems, for example, acute abdominal pain and the pyrexial child."	(The College of Emergency Medicine, 2008b, 15)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a)
24hr surgical services	RCP and the Faculty of Accident & Emergency Medicine endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide this.	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.

Supporting service	Detail	Source	Evidence / Guidelines
Surgical opinion	"The working party agree that hospitals accepting undifferentiated patients via the ED must have access to 24-hour on-site surgical opinion (at ST3 level or above) or a trust doctor with equivalent ability (ie MRCS with ATLS® provider status), with a supporting team both senior and junior to this surgeon."	(The Royal College of Surgeons of England, 2011, 5)	None cited.
	Standard for unscheduled surgical care: "Hospitals accepting undifferentiated medical patients have access to 24-hour, on-site surgical opinion (ie of ST3 or above or a trust doctor with equivalent ability (ie MRCS with ATLS® provider status). If on-site surgical opinion is not available, the unit does not accept undifferentiated patients."	(The Royal College of Surgeons of England, 2011, 21)	None cited.
	"STANDARD: In all hospitals receiving undifferentiated patients to their EDs, a patient for whom an emergency surgical assessment is required will receive the same within 30 minutes of referral being made in the case of a life- or limb-threatening emergency, and within 60 minutes for a routine emergency referral. The member of the on-call surgical team responding to the request is at ST3 level or above, or a trust doctor with equivalent ability (ie MRCS with ATLS® provider status). Should the designated first on-call surgeon be unable to attend due to other emergency duties (eg emergency theatre or dealing with a separate life-threatening emergency elsewhere in the hospital), protocols are in place for another member of the surgical team, of similar or a greater level of competence, to be available to attend the ED, within the above time scale. Best practice: • All requests for an emergency surgical opinion to the ED are met with a prompt and appropriate response by a surgeon with the required level of competence. • Where the required surgical specialty provision is 'off-site', strictly audited clinical pathways must be in place to ensure the necessary prompt response for life and limb threatening conditions is achieved 24/7."	(The Royal College of Surgeons of England, 2011, 30)	Refers the reader to the College of Emergency Medicine for more specific guidance and support.

Supporting service	Detail	Source	Evidence / Guidelines
Separation of emergency and elective surgery by preferably located on same site.	"The Royal College of Surgeons recommends a separation of emergency and elective surgical services (preferably on the same site due to imaging and equipment needs, particularly for highly specialised procedures) to improve the quality of care delivered to patients."	(The Royal College of Surgeons of England, 2011, 14)	References: The Royal College of Surgeons of England (2007) Separating emergency and elective surgical care: Recommendations for practice. London: RCS.

ANAESTHESIA

Detail	Source	Evidence / Guidelines
"The College view is that an ED must have 24/7 support services from ...Intensive Care/Anaesthesia ...".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
"Induction and maintenance of general anaesthesia in children in EDs requires specially trained clinical staff, together with a range of appropriate equipment and drugs. In most places this will only be provided by anaesthetic specialists, although larger EDs may have EM consultants and trainees who are competent and experienced in paediatric anaesthesia." "Hospitals with a low throughput of children should ensure that these skills are maintained. This can be achieved by staff secondments or rotations to other centres".	(Royal College of Paediatrics and Child Health, 2007, 30)	Second quotes cites (Department of Health, 2006).
"NCEPOD commented in their 200714 report that patient care for critically ill and injured patients may be compromised by inexperienced doctors providing anaesthesia, compounded by a lack of trained assistance, inadequate supervision and problems with availability of drugs and equipment."	(The Royal College of Anaesthetists, 2011, para 3.2)	Refers to the following report: Trauma: Who cares? A report of the National Confidential Enquiry into Patient Outcome and Death. NCEPOD, London 2007 (www.ncepod.org.uk/2007report2/Downloads/SIP_summary.pdf).

Detail	Source	Evidence / Guidelines
"The safe management of these vulnerable patients depends on close liaison between emergency physicians and anaesthetists to ensure that clear guidelines are in place, and that audit and discussion of complications are undertaken regularly. A designated consultant anaesthetist should be responsible for ensuring that services meet the recommendations laid out in this and other guidelines." "Hospitals need to ensure that their anaesthesia and/or intensive care services are staffed to a level which allows them to respond in a timely manner to care for emergency patients in the ED. The RCoA Audit guidelines make recommendations about response times for anaesthetists to the ED. Local response times should be audited and standards set."	The Royal College of Anaesthetists, 2011, para 3.2)	Cites the following: Implementing and ensuring safe sedation practice for healthcare procedures in adults. Report of an Intercollegiate Working Party chaired by The Royal College of Anaesthetists. AoMRC, London 2001 (www.rcoa.ac.uk/docs/safesedationpractice.pdf). Raising the standard. A compendium of audit recipes (2nd Edition) section 6: Anaesthesia and Sedation outside theatres. RCoA, London 2006 (www.rcoa.ac.uk/index.asp?PageID=125). Safe Sedation, Analgesia and Anaesthesia within the Radiology Department. *RCR*, London 2003 (www.rcr.ac.uk/publications.aspx?PageID=310&PublicationID=186).
"The quality of the anaesthetic service provided in Emergency Departments has been criticised and the first on-call anaesthetist has been considered too inexperienced."	(The Royal College of Anaesthetists, 2006)	Cites: Teale KFH, Selby IR, James MR. General anaesthesia in Accident and Emergency Departments. *J Accid Emerg Med* 1995;12:259–261.
"A trained assistant should be present whenever anaesthesia is administered in the Emergency Department."	(The Royal College of Anaesthetists, 2006)	Cites: Association of Anaesthetists of Great Britain and Ireland. The anaesthesia team. *AAGBI*, London 2005 (see: www.aagbi.org/pdf/the_anaesthesia_team.pdf).
"There should be a nominated consultant responsible for anaesthetic services in the Emergency Department."	(The Royal College of Anaesthetists, 2006)	Cites: Association of Anaesthetists of Great Britain and Ireland. The role of the anaesthetist in the emergency service. *AAGBI*, London 1991 (see: www.aagbi.org/pdf/emergenc.pdf).
RCSE lists as a service which is interdependent with emergency general and orthopaedic services.	(The Royal College of Surgeons of England, 2011, 5)	None cited.

Detail	Source	Evidence / Guidelines
The level of anaesthetic service for emergency activities, including surgery, is provided by competent anaesthetists who are either consultants or, if non-consultants, have unimpeded access to consultants and consultant supervision. Best practice: Emergency anaesthesia in ASA3 and above patients should be provided by consultant anaesthetists In hospitals receiving patients with major injury and trauma, there is a sufficient level of appropriately experienced medical and non-medical staff to provide a 24-hour emergency service. Trained anaesthetic assistance is present at all times in all clinical areas where anaesthetics are administered, including the emergency and radiology departments. All consultant anaesthetists and anaesthetic trainees working in emergency surgery and trauma have specific training in the skills required for this area.	(The Royal College of Surgeons of England, 2011, 43)	Refers reader to 'The Royal College of Anaesthetists' Guidelines for the Provision of Anaesthetic Services' for more specific guidance and support.
"3.6.4 Anaesthesia – immediate (within one hour) In some patients, particularly those with uncontrolled bleeding, surgery is regarded as part of resuscitation; anaesthetists, as part of the multidisciplinary team, should ensure surgery is not delayed. Such patients require care from a consultant anaesthetist and one other anaesthetist − at least until they are stabilised. "	(The Royal College of Surgeons of England, 2011, 44)	Refers reader to 'The Royal College of Anaesthetists' Guidelines for the Provision of Anaesthetic Services' for more specific guidance and support.

3. Orthopaedics

Detail	Source	Evidence / Guidelines
Lists as one of the 'seven key specialties', but acknowledged that not inpatient teams will be able to sustain full services on all current sites. Mentions as a service which preferably should be on-site, or "robust and safe pathways need to be in place for the management of severe illness or injury in these groups".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
"Where key support services such as Orthopaedics, General Surgery or Paediatrics are not on site, then there is a greater need for more senior EPs to assess, stabilise and treat patients prior to discharge or transfer. There also need to be clear procedures for dealing with common problems, for example, acute abdominal pain and the pyrexial child."	(The College of Emergency Medicine, 2008b, 15)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
"This is the second most common destination for admissions from the A&E department. It is clearly preferable to have such a high volume service on-site. If there is no on-site emergency orthopaedic service, ideally the A&E department should not receive trauma ambulance cases. There should be clear protocols for the ambulance service that they should not take trauma cases to those departments. Where geographical circumstances or existing arrangements necessitate the reception of patients with serious bony injuries in departments without on-site orthopaedic support, protocols must be established for their care in consultation between the regional orthopaedic unit and the A&E departments involved."	(Academy of Medical Royal Colleges, 2007, A15)	None cited.

4. Paediatrics

Detail	Source	Evidence/Guidelines
Lists as one of the 'seven key specialties', but acknowledged that not all inpatient teams will be able to sustain full services on all current sites. Mentions as a service which preferably should be on-site, or "robust and safe pathways need to be in place for the management of severe illness or injury in these groups".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).

Detail	Source	Evidence/Guidelines
"If children are admitted as emergencies, inpatient paediatrics and specialist children's facilities are required."	(The Royal College of Surgeons of England, 2011, 12)	None cited.
Standard for unscheduled surgical care: "All children are admitted and operated on in an environment and with facilities and staff that meet the standards for children's surgery."	(The Royal College of Surgeons of England, 2011, 21)	None cited.
"Where key support services such as Orthopaedics, General Surgery or Paediatrics are not on site, then there is a greater need for more senior EPs to assess, stabilise and treat patients prior to discharge or transfer. There also need to be clear procedures for dealing with common problems, for example, acute abdominal pain and the pyrexial child."	(The College of Emergency Medicine, 2008b, 15)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
"Where an ED sees more than 16,000 children per annum and there is inpatient Paediatrics, there should be one PEM-trained consultant from an EM background and one PEM consultant from a Paediatric background." "The majority of children attending an ED come with injuries. It is more logical and efficient to site the Paediatric ED with the main ED than within the children's hospital ward. Those cases requiring resuscitation and major trauma cases will be brought to the main ED resuscitation room so co-location of the Paediatric ED is the optimum configuration."	(The College of Emergency Medicine, 2008b, 18)	None cited.
CEM Pathway standards: Clinical expertise: "The College recommends that every ED with more than 16,000 children's visits per annum must have minimum of one PEM-trained consultant. All EDs should have a named consultant who leads for children's issues in the department."	(The College of Emergency Medicine, 2008b, 23)	None cited.
"The Intercollegiate *Services for Children in Emergency Departments* (RCPCH, 2007c), recommends expansion of the numbers of paediatricians in emergency medicine, more involvement of consultant paediatricians in emergency departments and provision of a children's nurse on every shift. These recommendations have not yet been achieved."	(Royal College of Paediatrics and Child Health, 2009a, 45)	Refers to RCPCH report (Royal College of Paediatrics and Child Health, 2007).

Detail	Source	Evidence/Guidelines
"Where enough children are seen, a separate children's emergency department should be developed."	(Royal College of Paediatrics and Child Health, 2009a, 46)	None cited.
Small units proximal to larger units: Long day acute services largely based around ED and SSPAU: "Where there are departments assessing children who do not have immediate access to medically trained paediatric staff there should be access to other clinical staff trained in the recognition resuscitation and stabilisation of the acutely ill child."	(Royal College of Paediatrics and Child Health, 2009b, Appendix B)	Cites: (Department of Health, 2006).
"For EDs to be training departments for paediatric EM, the College of Emergency Medicine (CEM) recommends an annual attendance of at least 16,000 children. For this reason, this edition recommends a revised cut-off of 16,000 children per annum as defining a medium-sized ED."	(Royal College of Paediatrics and Child Health, 2007, 18)	Refers to the College of Emergency Medicine recommendation.
"... it is not possible for every ED or hospital to offer full paediatric services including inpatient services or critical care."	(Royal College of Paediatrics and Child Health, 2007, 20)	Cites: Emergency Care Framework for Children and young people in Scotland. Scottish Executive. 2006, Edinburgh: http://www.scotland.gov.uk/Publications/2006/09/19153348/0 DoH. Emergency Access – clinical case for change: Report by Sir George Alberti, the National Director for emergency access. Department of Health. 2006, London : http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4140903&chk=mXL0z4

Detail	Source	Evidence/Guidelines
"If EDs in the UK lose on-site, 24-hour paediatric services, commissioners may plan to divert paediatric attendances to other centres. However, EDs will continue to receive very sick children even in centres where "bypass" arrangements have been made with the ambulance service, because parents with very sick children (particularly babies and infants) will attend the nearest facility. If paediatric on-site support is lost, the paediatric skills of the ED staff must be enhanced. This applies particularly to distinguishing minor from more serious illness, life support skills, stabilisation and transfer skills, and child protection awareness." "Acute Trusts in this situation should consider the employment of senior paediatrically-trained doctors and nurses, for example registrars in EM (ST4, or equivalent experience in a non-training grade), consultants with sub-specialty training in paediatric EM, sessions from an appropriately trained consultant paediatrician, and/or Paediatric Nurse Practitioners (PNPs). Anaesthetic and surgical competencies must be safeguarded." "Where paediatric advice is not available on site, a balance has to be struck between referral to a paediatric centre for assessment and/or admission, or later out-patient management. The development of an observation area can assist in this decision and avoid unnecessary transfers." "Such short-stay units can successfully replace in-patient units, and in some areas have proved popular with families. Opening hours should reflect attendance patterns and those of surrounding units. Collaboration between senior doctors and nurses in the ED and the in-patient children's services ensures optimum functioning of such units."	(Royal College of Paediatrics and Child Health, 2007, 21)	The only part of this which is referenced is the statement about short-stay units which refers to the following: Guglia E, Marchi AG, Messi G, et al. Evaluation of temporary observation and short hospital stay pediatric emergency department. *Minerva Pediatr* 1995;47:533-9. Mace SE. Pediatric observation medicine *Emerg Med Clin North Am* 2001; 19:239-54. LeducK, Haley-Andrews S, Rannie M. An observation unit in a pediatric emergency department: one children's hospital's experience. *J Emerg Nurs* 2002;28:407-13. Cooke MW, Higgins J and Kidd P. Use of emergency observation and assessment wards: a systematic literature review. *Emerg Med J* 2003;20:138-142.
"UCCs and EDs need access to paediatric medical advice."	(Royal College of Paediatrics and Child Health, 2007, 22)	None cited.

Detail	Source	Evidence/Guidelines
"All paediatric departments supporting an on-site ED seeing more than 16,000 children per year should aim to appoint a paediatrician with sub-specialty training in paediatric EM. Their role will be to work in the ED as well as in paediatric assessment/admission units."	(Royal College of Paediatrics and Child Health, 2007, 32)	None cited.
"EDs seeing more than 16,000 children per annum should employ a consultant in the ED with sub-specialty training in paediatric EM. Hospital paediatric departments with an on-site ED seeing more than 16,000 children per annum should aim to appoint a paediatrician with sub-specialty training in paediatric EM. The appointment of consultants from both backgrounds is an advantage, and is essential for larger EDs."	(Royal College of Paediatrics and Child Health, 2007, 37)	None cited.
"If a hospital is overwhelmed with attendances, and in particular if there is limited access to paediatricians, paediatric intensivists, paediatric anaesthetists or paediatric surgeons, there should be provisions in the hospital major incident plan to utilise the services of a local network to support the hospital."	(Royal College of Paediatrics and Child Health, 2007, 42)	None cited.
"Paediatric ophthalmic accident and emergency cases must be seen in an appropriately equipped and staffed setting, this may be in a general accident and emergency unit, a dedicated paediatric accident and emergency unit, a general eye unit or a dedicated paediatric eye unit. Children admitted with acute eye problems should be placed on a ward with the appropriate ophthalmic and paediatric nursing expertise."	(The Royal College of Ophthalmologists, 2009, 2)	None cited.
Royal College of Psychiatrists best practice criteria 46.1: "Young people who have self-harmed should normally be admitted overnight to a paediatric ward."	(Royal College of Psychiatrists, 2006, 29)	National Institute of Clinical Excellence (NICE) and the National Collaborating Centre for Mental Health (2004) The short-term physical and psychological management and secondary prevention of self-harm in primary and secondary care (National Clinical Practice Guideline Number 16) full guidance: http://www.nice.org.uk/page.aspx?o=213665

Supporting service	Detail	Source	Evidence / Guidelines
Short stay paediatric assessment units	"The provision of short-stay paediatric assessment units allows observation of children whose appropriate clinical management is uncertain, without having to resort to hospital admission. Such units, accompanied by access to senior medical opinions early in the child's care journey, should enable substantially fewer hospital inpatient admissions. Such reductions could enable the reconfiguration of small and medium units near one another, avoiding the need for two acute middle grade rotas so contributing to the creation of a sustainable medical workforce."	(Royal College of Paediatrics and Child Health, 2009a, 6)	None cited.
	"The provision of short-stay paediatric assessment units, ideally close to the emergency department, allows observation of children when their clinical course is uncertain, without having to resort to hospital admission (RCPCH, 2009b). Such units, accompanied by access to senior medical opinions early in the child's 'acute journey', would enable significant reductions in hospital admissions. Short-stay paediatric assessment units should be staffed by children's nurses, who could also work across the emergency department and the inpatient units (Kimball and Vinci, 2009)." "Substantial reductions in inpatient admissions could enable the reconfiguration of small and medium units close to one another and so avoid the need for two acute middle grade rotas NHS Institute for Innovation and Improvement **(**NHS III, 2008a). It is essential that there are both good communication systems and appropriate transport and retrieval services in place between the reconfigured units and the PICU."	(Royal College of Paediatrics and Child Health, 2009a, 46)	(Royal College of Paediatrics and Child Health, 2009c) Kimball and Vinci (2009) Children in emergency departments: who should provide their care. Archives of Disease in Childhood; 94:573-576. (NHS Institute for Innovation and Improvement, 2008)

Supporting service	Detail	Source	Evidence / Guidelines
Short stay paediatric assessment units	"The impetus to develop such units has been further increased by the current drive to reconfigure inpatient paediatric services. There is currently a focus on delivering urgent care using different providers, going beyond the traditional primary/secondary care model. These include NHSD, WICs and Urgent Care Centres. Such services need to be integrated with children's urgent/emergency services." "In areas where full inpatient hospital beds for children are difficult to access or are distant from the initial point of contact, provision of such units in a patient's geographical area will mean fewer young children with minor-to-moderate self-limiting illnesses being transferred to secondary inpatient units."	(Royal College of Paediatrics and Child Health, 2009c, 4)	None cited.
	"...SSPAUs can improve the provision of safe emergency services for children and that they should be developed more widely"	(Royal College of Paediatrics and Child Health, 2009c, 3)	None cited.
	"The ideal SSPAU model will depend on local circumstances, such as presence of an inpatient paediatric unit, support from community nursing teams, ED structure, and presence of a liaison paediatrician."	(Royal College of Paediatrics and Child Health, 2009c, 5)	None cited.
Paediatric intensive care (PIC)	"... is usually provided in regional centres in an organised local / regional network"	(Royal College of Paediatrics and Child Health, 2007, 30)	Cites: DoH. Paediatric intensive care: a framework for the future. Report the National Co-ordinating Group on Paediatric Intensive Care the Chief Executive of the NHS Executive. Department of Health.1997, London: http://www.dh.gov.uk/assetRoot/04/03/43/42/04034342.pdf
	"For airway or respiratory support, hospitals should ensure that high dependency and intensive care level support can be delivered to the child within a safe period of time. Protocols should be agreed within the hospital to ensure rapid availability of skilled personnel."	(Royal College of Paediatrics and Child Health, 2007, 30)	None cited.

5. Critical Care Unit (CCU)/ Intensive Care Unit (ICU)

Critical care unit / Intensive care unit (ICU) / High dependency unit / Intensive therapy unit

Detail	Source	Evidence / Guidelines
Lists as one of the 'seven key specialties', but acknowledged that not inpatient teams will be able to sustain full services on all current sites.	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a)
Core service for an Emergency Hospital.	(The College of Emergency Medicine, 2008b, 12)	None cited.
"The College view is that an ED must have 24/7 support services from ...Intensive Care/Anaesthesia ...".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a)
"It is estimated that up to 10% of acute medical emergencies require critical care at levels 1 or 2. These developments have important implications for the organisation of the delivery of services to the acutely ill patient and especially the way physicians working in acute general medicine interact with the multidisciplinary teams based principally within the intensive care unit and the A&E department."	(Royal College of Physicians, 2002b, 16)	Cites: Cooper N. Patient at risk! Clin Med JRCPL 2001;1:309–11. Royal College of Physicians. The interface between acute general medicine and critical care. A working party report. London: RCP, 2002. Department of Health. Comprehensive critical care – a review of adult critical care services. London: DH, 2000.
"The physical location of critical care facilities is known to impact on the quality of service delivery. *Comprehensive critical care* recommended that where possible all such areas (ICUs, HDUs, post-anaesthetic recovery etc.) should be co-located, and that the concentration of all emergency services in a single location should be considered in future service developments. Moves to concentrate services in this manner are likely to have significant implications for the way in which those practising acute medicine interact with critical care services. Close proximity of services is likely to lead to improved communication, collaboration and delivery of care to the severely ill patient."	(Royal College of Physicians, 2002a, 5)	Department of Health. Comprehensive critical care. A review of adult critical care services. London: DH, 2000.

Detail	Source	Evidence / Guidelines
RCSE lists as a service which is interdependent with emergency general and orthopaedic services.	(The Royal College of Surgeons of England, 2011, 5)	None cited.
RCP and the Faculty of Accident & Emergency Medicine endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide facilities for critical care.	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.

6. Laboratory services

Supporting service	Detail	Source	Evidence / Guidelines
Diagnostics	"There is abundant evidence that the safe delivery of care bundles and pathways needs timely access to investigations. The risks of misdiagnosis of some conditions are too high to be left to clinical assessment alone. Early access to diagnostics can also prevent unnecessary hospital admission."	(The College of Emergency Medicine, 2008b, 13)	None cited.
Investigative services	The RCP and the Faculty of Accident & Emergency Medicine endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide "comprehensive investigative … services".	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.
	Reports on how "poor access to investigations, and no 24-hour, 7-day week service" is a factor which can "hinder effective care".	(Royal College of Physicians, 2002b, 2)	Reporting on the findings in: Federation of Royal Colleges of Physicians of the UK. Acute medicine: the physician's role. Proposals for the future. A working party report of the Federation of Medical Royal Colleges. London: RCP, 2000.

Supporting service	Detail	Source	Evidence / Guidelines
Laboratory services	Lists as one of the 'seven key specialties', but acknowledged that not inpatient teams will be able to sustain full services on all current sites. "The College view is that an ED must have 24/7 support services from ... laboratory services, including blood bank.".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
	Core service for an Emergency Hospital.	(The College of Emergency Medicine, 2008b, 12)	None cited.
Blood bank	"The College view is that an ED must have 24/7 support services from ... laboratory services, including blood bank.".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).

Pathology

Detail	Source	Evidence/Guidelines
"As a minimum point of care testing in the ED should be available to assess: • Arterial blood gases • Haemoglobin • Electrolytes • Urinalysis • Glucose • Lactate • Pregnancy testing" "Ideally results should be available within one hour."	(The College of Emergency Medicine, 2008b, 13)	None cited.

Detail	Source	Evidence/Guidelines
RCSE lists as a service which is interdependent with emergency general and orthopaedic services.	(The Royal College of Surgeons of England, 2011, 5)	None cited.
Generic standards for all disciplines: "There is a consultant-led, 24-hour laboratory service. Best practice: Repertoire of tests includes availability of core tests 24/7 based on types of sub-specialty emergency surgery within hospital. Guidance for appropriate use is jointly agreed between clinical and laboratory teams, supported by advice on interpretation of results. Paediatric knowledge within relevant pathology laboratories is provided where children are treated. Best practice: Availability of appropriate laboratory facilities and relevant advice on result interpretation and liaison with clinical teams. Input of key laboratory disciplines in hospital."	(The Royal College of Surgeons of England, 2011, 37)	Refers the reader to The Royal College of Pathologists for more specific guidance and support.
"Pathology – discipline specific standards – haematology and blood transfusion: 24-hour test availability including FBC, sickle cell screen, coagulation screen, group and save, and availability of blood components. Best practice: Repertoire of tests, and guidance for appropriate use, to be jointly agreed between clinical and laboratory teams. Availability of paediatrics tests, where required, with relevant reference ranges and ability to interpret results. Clinical telephone haematology advice available 24/7."	(The Royal College of Surgeons of England, 2011, 38)	Refers the reader to The Royal College of Pathologists for more specific guidance and support.
"Pathology – clinical biochemistry: 24-hour availability of tests including urea and electrolytes, liver function, C-reactive protein, glucose, lactate, amylase, calcium, magnesium, blood gases and human chorionic gonadotrophin." Best practice: "Repertoire of tests bases on sub-specialty surgery. Appropriate use of tests (including those to be available out of hours) to be jointly agreed between clinical and laboratory teams with stated turnaround times. POCT for blood gases available in key areas (ED, theatres, critical care)."	(The Royal College of Surgeons of England, 2011, 39)	Refers the reader to The Royal College of Pathologists for more specific guidance and support.

Detail	Source	Evidence/Guidelines
"Availability of paediatric tests if paediatric surgery service provided."	(The Royal College of Surgeons of England, 2011, 40)	Refers the reader to The Royal College of Pathologists for more specific guidance and support.
"Pathology – medical microbiology and infection control: 24-hour availability of comprehensive infectious diseases and infection control advice. Best practice: Close liaison is required between the emergency surgeons and the microbiology/infectious diseases service to identify unusual infections and minimise the risk of transmission of infection within the hospital environment. Agreed protocols should be in place to take relevant samples before the administration of antibiotics for diagnostic and public health purposes."	(The Royal College of Surgeons of England, 2011, 40)	Refers the reader to The Royal College of Pathologists for more specific guidance and support.
"Pathology – histopathology: For paediatric surgery, hospitals must ensure appropriate facilities available to expedite diagnosis of Hirschsprung's disease."	(The Royal College of Surgeons of England, 2011, 41)	Refers the reader to The Royal College of Pathologists for more specific guidance and support.

7. DIAGNOSTIC IMAGING

Supporting Service	Detail	Source	Evidence/Guidelines
Diagnostic imaging	"The ED must have access to plain radiography 24 hours a day. The images should be available on a digital PACS system for review in the ED and by colleagues in other clinical areas within the hospital, for example intensive care and the trauma and orthopaedic departments. All radiographs must be reviewed by a radiologist/radiographer. Immediate, 'hot' reporting is ideal but as a minimum the report should be available for review within 48 hours."	(The College of Emergency Medicine, 2008b, 13)	None cited.
	Core service for an Emergency Hospital.	(The College of Emergency Medicine, 2008b, 12)	None cited.
	Lists as one of the 'seven key specialties', but acknowledged that not inpatient teams will be able to sustain full services on all current sites. "The College view is that an ED must have 24/7 support services from ...diagnostic imaging (including 24-hour CT) ...".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
Ultrasound	"Every resuscitation room should have an ultrasound machine." "In some areas, ultrasound services may be provided by radiology. If this is the case, systems must be in place to ensure a timely 24/7 service."	(The College of Emergency Medicine, 2008b, 13)	None cited.
24 hr access to x-rays, ultrasound and computed tomography	Core service for an Emergency Hospital	(The College of Emergency Medicine, 2008b, 12)	None cited.
Computed tomography (CT)	"The College recommends that the CT scanner should be available within or immediately adjacent to the ED. This facility should be available 24 hours a day."	(The College of Emergency Medicine, 2008b, 14)	None cited.

Supporting Service	Detail	Source	Evidence/Guidelines
Computed tomography (CT)	"The College view is that an ED must have 24/7 support services from ...diagnostic imaging (including 24-hour CT) ...".	(The College of Emergency Medicine, 2008b, 14)	Highlights that the issues have been reviewed in the following: (Academy of Medical Royal Colleges, 2007; The College of Emergency Medicine, 2008a).
	"The College strongly supports the recommendation that any hospital admitting acute emergencies should have 24 hour access to CT. This recommendation was included in the recently published document Acute health care services, coordinated by the Academy of Medical Royal Colleges. The Royal College of Radiologists' Standards Sub-Committee is currently developing standards for on-call radiology provision which should help to address this." "The College believes that CT scanners, which now play a crucial role in the evaluation of acutely ill patients, should be sited within or adjacent to trauma and admissions units."	(The Royal College of Radiologists, 2007)	Refers to (Academy of Medical Royal Colleges, 2007)
Radiology	"Protocols should be agreed with colleagues in Radiology regarding the referral process for CTs for head injury, stroke, pulmonary embolus, major trauma and abdominal pain. There should be electronic transfer of images for reporting within one hour."	(The College of Emergency Medicine, 2008b, 14)	None cited.
	Requirements for an acute or emergency service • "A radiologist should be immediately contactable at all times on a fixed rota basis when on call." "If particular radiological services cannot be consistently offered within the local acute hospital NHS trust, there should be clarity about alternative pathways or routes of referral."	(The Royal College of Radiologists, 2009, 6)	None cited.
	RCSE lists as a service which is interdependent with emergency general and orthopaedic services.	(The Royal College of Surgeons of England, 2011, 5)	None cited.

Supporting Service	Detail	Source	Evidence/Guidelines
Diagnostic radiology	Generic Radiology Standard: "All imaging departments in hospitals that admit emergency surgical patients have access to appropriately staffed 24/7 plain films, ultrasound, CT and MRI. Where MRI is not available, clear patient pathways are in place to obtain the necessary imaging from a different provider. Best practice: Where imaging will affect immediate outcome, emergency surgical patients have access to CT, plain films and US within 30 minutes of request. When MRI is required and not available patients are transferred to the appropriate centre. Advice on appropriate imaging is available immediately." "Imaging departments ensure that imaging facilities are sited appropriately to minimise the transfer of acutely ill patients and are equipped to a standard that is safe for emergency patients."	(The Royal College of Surgeons of England, 2011, 35)	Refers reader to The Royal College of Radiologists for more specific guidance and support.
Magnetic resonance imaging (MRI)	"Access must be available for urgent MRI 24 hours a day for those conditions where immediate surgical intervention may be necessary (for example, spinal cord compression)."	(The College of Emergency Medicine, 2008b, 14)	None cited.

8. CLINICAL DECISION UNITS / OBSERVATION WARDS

Supporting service	Detail	Source	Evidence/Guidelines
Clinical decision unit/ observation ward	"Many EDs see such units as an integral part of their work. If the ED does not have this facility then inevitably there will be more short stay admissions to hospital and potentially more unsafe discharges from the ED. The admissions criteria for short-stay observation should be agreed in conjunction with the inpatient teams and the commissioners/purchasers of the service." "The CDU/observation ward will be run by the ED clinical team."	(The College of Emergency Medicine, 2008b, 15)	None cited.
	Core service for an Emergency Hospital.	(The College of Emergency Medicine, 2008b, 12)	None cited.
Observation / assessment unit	"UCCs and EDs need access to ... observation / assessment units."	(Royal College of Paediatrics and Child Health, 2007, 22)	None cited.
ED CDU /observation ward	Core facility.	(The College of Emergency Medicine, 2008b, 13)	None cited.
	"Many EDs see such units as an integral part of their work. If the ED does not have this facility then inevitably there will be more short stay admissions to hospital and potentially more unsafe discharges from the ED. The admissions criteria for short-stay observation should be agreed in conjunction with the inpatient teams and the commissioners/purchasers of the service." Principles of CDU: • "The CDU/observation ward will be run by the ED clinical team" • "Regular review by a senior ED doctor is recommended and a consultant led ward round twice in 24 hours" • "Dedicated medical and nursing presence will be required" • "The maximum length of stay will be 24 hours, although many patients will stay for less than 12 hours".	(The College of Emergency Medicine, 2008b, 15)	None cited.
Patient monitoring services	RCP and the Faculty of Accident & Emergency Medicine endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide "comprehensive… patient monitoring and treatment services".	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.

9. Interventional Radiology

Supporting Service	Detail	Source	Evidence/Guidelines
Interventional radiology	"For the safety of patients, it is necessary that acute hospital trusts have formal and robust arrangements to ensure provision of emergency services 24 hours a day every day, of the year. The provision of interventional radiology is no exception and all patients regardless of geography and hospital size should have access to interventional techniques if required."	(The Royal College of Radiologists, 2008, 4)	None cited.
	RCSE lists as a service which is interdependent with emergency general and orthopaedic services.	(The Royal College of Surgeons of England, 2011, 5)	None cited.
	Generic radiology standards: "Hospitals providing emergency surgical services have access to 24/7 interventional radiology. Interventional radiology services are staffed by fully trained interventional radiologists, interventional nurses and interventional radiographers. Best practice: Interventional radiology services are ideally on the same site as the emergency services. Where they are not, or where high end intervention is necessary, there are clear and unambiguous patient pathways to deliver those services through a network solution (see transfer of patients above). " "Vascular and interventional facilities are situated close to emergency room facilities. They are safe for emergency patients." Best practice: "Vascular and interventional facilities are of theatre standard and accessible to emergency patients and the staff attending." "Interventional radiology services have an identified consultant radiologist available 24/7." "Best practice: Interventional radiology services for emergency patients are available within one hour of request."	(The Royal College of Surgeons of England, 2011, 36)	Refers the reader to The Royal College of Radiologists for more specific guidance and support.

10. OTHER MEDICAL SPECIALTIES

Supporting service	Detail	Source	Evidence / Guidelines
Specialist eye unit	"Hospital emergency eye care may be provided by either a general accident and emergency unit or a specialist eye unit." "Each eye unit should provide an emergency service for ophthalmic accidents and emergencies both during office hours (9am to 5pm Monday to Friday) and out with these hours."	(The Royal College of Ophthalmologists, 2009, 1)	None cited.
	It is important that where initial presentation of emergency conditions is to a general A&E department, the eye unit provides adequate training and support to the doctors staffing that department. Thus we can ensure that the management of minor conditions is appropriate and that prompt referrals are made where they are necessary and avoided where they are not.	(The Royal College of Ophthalmologists, 2009, 3)	None cited.

11. URGENT CARE CENTRES

Supporting service	Detail	Source	Evidence / Guidelines
Urgent Care Centres (UCCs)	The College of Emergency recommends they are co-located with Emergency Departments.	(The College of Emergency Medicine et al., 2009, 2)	Refers to DH policy suggesting the establishment of Urgent Care Centres. NHS London, A Framework for Action, July 2007 and (The College of Emergency Medicine, 2008b).
	CEM suggest that the definition and purpose of UCCs and polyclinics is unclear at present. "The College has clear views that the ED already fulfils many of the functions of an UCC and therefore there is no clinical reason for locating such facilities in front of an ED. We find the term 'Urgent Care Centre' misleading with no clear definition of the case mix, staffing or how they relate to the ED. There is no evidence of the clinical or financial benefits of this model. The College has issued a position statement on this subject and views such proposals as clinically unproven and against the principle of patient choice of access to proper emergency care."	(The College of Emergency Medicine, 2008b, 19)	Indicates that there is no evidence about the clinical or financial benefits of UCCs. Refers to the following CEM position statement: (The College of Emergency Medicine et al., 2007) and (The College of Emergency Medicine, 2008c).
	"Local urgent care and emergency care for children should, wherever possible, be co-located so that children can be triaged to the most appropriate service on arrival at hospital."	(Royal College of Paediatrics and Child Health, 2009a, 6)	None cited.
	"... a logical and overdue development".	(Royal College of Paediatrics and Child Health, 2009a, 45)	None cited.
	"Co-location of UCCs and EDs often carries a number of benefits for children, especially if a period of observation would be beneficial. If the UCC is not adjacent to an ED, basic first aid, basic life support, paediatric resuscitation equipment etc, are required."	(Royal College of Paediatrics and Child Health, 2007, 22)	None cited.

12. GP OUT-OF-HOURS SERVICE

Supporting service	Detail	Source	Evidence / Guidelines
GP out-of-hours service	"This is an area where there are new models of care being proposed. If a health community needs a primary care centre for out-of-hours work, then there is sense in co-locating such primary care centres near the ED. EPs have many of the skills required for the assessment and treatment of urgent and emergency conditions. EPs may find they increasingly work in this area. The College wishes to work with the Royal College of General Practitioners (RCGP) and to improve standards of training in this area."	(The College of Emergency Medicine, 2008b, 19)	None cited.
	"The College believes that co-location of out-of-hours primary care services is sensible."	(The College of Emergency Medicine, 2008b, 22)	Says that there are some "excellent examples of cooperative working between the ED and out-of-hours services" but doesn't reference this.
	CEM does not agree with "placing a UCC in front of the ED doors to 'filter' patients, mainly for financial reasons."	(The College of Emergency Medicine, 2008b, 22)	None cited.
	CEM pathway standard: clinical expertise: "Unselected patients presenting to a hospital with an ED should have the choice of being seen in the ED. Patients with less acute illness may be more appropriately seen by a co-located primary care 'out-of-hours unit' ". "Assessment at the 'front door' should be performed by experienced ED clinicians and patients directed to the most appropriate practitioner."	(The College of Emergency Medicine, 2008b, 23)	None cited.

13. FACILITIES

Supporting service/facilities	Detail	Source	Evidence/Guidelines
Up-to-date facilities for resuscitation, emergency care and ambulatory care	Core service for an Emergency Hospital	Core service for an Emergency Hospital	None cited.
Facilities for the prompt triage of patients to appropriate care pathways	RCP endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide this.	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.
Facilities for prompt assessment, observation and initial care of patients	RCP endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide this.	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.
Facilities for immediate resuscitation	RCP endorse the view that hospitals receiving patients as emergencies or who are acutely ill must provide this.	(Royal College of Physicians, 2002b, ix)	States that they 'endorse the view', but doesn't give any further information.
Resuscitation facilities	"Resuscitation facilities and team must be immediately available in the A&E department for every kind of patient. Prolonged resuscitation may be better provided in a properly staffed and equipped medical ward adjacent to the A&E department, but resuscitation facilities should not be duplicated unnecessarily."	(Royal College of Physicians, 2002b, 13)	None cited.

Supporting service/facilities	Detail	Source	Evidence/Guidelines
Operating theatre	"STANDARD: All hospitals receiving undifferentiated patients to their EDs have 24/7 emergency operating facilities available, on site, capable of being accessed and staffed to allow the timely management of a range of life- or limb-threatening surgical emergencies." "Best practice: Hospitals accepting undifferentiated patients requiring immediate lifeand/ or limb-preserving surgery are equipped and staffed 24/7 to manage the likely range of surgical emergencies. "	(The Royal College of Surgeons of England, 2011, 31)	Refers the reader to The College of Emergency Medicine for more specific guidance and support.
Educational and admin space within dept.	Core service for an Emergency Hospital	(The College of Emergency Medicine, 2008b, 12)	None cited.
Inpatient beds	"Patients waiting on trolleys for prolonged periods due to lack of inpatient beds represents sub-optimal patient care. Such delays are an international problem with evidence that patients with prolonged 'trolley times' have an increased length of stay in hospital and possibly increased mortality and morbidity. The lodging of large numbers of patients on trolleys awaiting admission (access block) compromises the ability of the ED to treat patients and adds to distress for patients, carers and staff." "A sustainable system to eliminate delay would require an average bed occupancy of 85%. Realistically, the financial agenda in most acute Trusts will not allow any unused capacity. However, a hospital should have sufficient capacity to deliver the four-hour access standard."	(The College of Emergency Medicine, 2008b, 14)	None cited.
	Pathway standard: "Hospitals should have enough inpatient capacity to ensure that patients are not kept waiting for admission to a hospital bed."	(The College of Emergency Medicine, 2008b, 23)	None cited.

Supporting service/facilities	Detail	Source	Evidence/Guidelines
Inpatient team	Support from inpatient teams and efficient procedures for admission to hospital is listed as a core service for an Emergency hospital.	(The College of Emergency Medicine, 2008b, 12)	None cited.

APPENDIX 4 - NON-A&E EMERGENCY SERVICES CO-LOCATION GUIDANCE & EVIDENCE

(eg Service 1 requires support from service 2)

Service 1	Service 2	Detail	Source	Evidence
Acute Medicine	Critical care	"We recommend that large acute hospitals dealing with complex acute medicine must have onsite access to level 3 critical care (ie intensive care units with full ventilatory support)."	(The Royal College of Physicians, 2007, xiv)	None cited.
AMU	Critical care	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... critical care ....".	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Cardiology	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... cardiology, ...".	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.

Service 1	Service 2	Detail	Source	Evidence
AMU	Diagnostic and treatment procedures (diagnostic GI endoscopy, echocardiography, diagnostic ultrasound, bronchoscopy and CT and MR imaging)	"We recommend that the AMU should have scheduled seven-day access to diagnostic and treatment procedures such as diagnostic GI endoscopy, echocardiography, diagnostic ultrasound, bronchoscopy and CT and MR imaging – with easy and convenient access for larger AMUs in large acute hospitals, and available to smaller AMUs via clearly defined pathways within the local emergency care networks."	(The Royal College of Physicians, 2007, xiv)	None cited.
		"The AMU has scheduled seven-day access to diagnostic and treatment procedures such as diagnostic GI endoscopy, bronchoscopy, echocardiography, diagnostic ultrasound, CT and MRI. Specialist opinion for patients on the AMU is provided promptly."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Life saving interventions, eg GI endoscopy	"We recommend that there should also be 24/7 urgent access to 'life saving' interventions such as GI endoscopy within the emergency care network, ideally located on the same site as the AMU in large acute hospitals."	(The Royal College of Physicians, 2007, xiv)	None cited.

Service 1	Service 2	Detail	Source	Evidence
AMU	Life saving interventions, eg GI endoscopy	"There is 24/7 urgent access to 'life saving' interventions such as GI endoscopy, bronchoscopy, interventional radiology within the emergency care network, ideally located on the same site as the AMU."	(The Royal College of Surgeons of England, 2011, 34)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Dermatology	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... dermatology, ..."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Diabetes and endocrinology	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... diabetes and endocrinology, ..."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Gastroenterology	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ..., gastroenterology, ..."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.

Service 1	Service 2	Detail	Source	Evidence
AMU	Geriatric medicine	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: geriatric medicine ...."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Infectious diseases	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include:... infectious diseases, ..."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Mental Health	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... mental health teams."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.

Service 1	Service 2	Detail	Source	Evidence
AMU	Neurology	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... neurology, ..."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Respiratory Medicine	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... respiratory medicine ... ".	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
AMU	Rheumatology	"Clearly defined contact pathways for named senior clinical opinion (speciality trainee or consultant) are on a rota for all specialties likely to require regular interaction with the AMU. These include: ... rheumatology ...".	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.

Service 1	Service 2	Detail	Source	Evidence
AMU	Specialties	"Specialty teams develop rotas of clearly identified, adequately experienced staff who can provide advice or attend and review patients expeditiously on the AMU within a maximum of four hours of a request and ideally sooner."	(The Royal College of Surgeons of England, 2011, 34)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
Emergency Surgery	Acute Medicine Unit (AMU)	Standard: "Access routes for emergency surgery are on the same site and co-located with the major AMUs within a network, where possible. Surgical units need ready access to acute medical services for patients with medical comorbidities and for those who develop acute medical complications."	(The Royal College of Surgeons of England, 2011, 32)	Refers the reader to the Royal College of Physicians for more specific guidance and support.
Emergency Surgery	Acute Medicine Unit (AMU)	"Acute medicine has prompt access to senior surgical review of acutely ill patients and vice versa." "Best practice: Surgical patients have similar access to level 2 beds whether shared with acute medicine in a combined unit or in critical care services."	(The Royal College of Surgeons of England, 2011, 33)	Refers the reader to the Royal College of Physicians for more specific guidance and support.

Service 1	Service 2	Detail	Source	Evidence
Emergency surgery	Anaesthesia	Generic anaesthesia standard: "All patients undergoing emergency surgery requiring anaesthesia should be seen by an anaesthetist for assessment and pre-operative optimisation; the exact timing of this visit will be dependent upon the urgency of surgery."	(The Royal College of Surgeons of England, 2011, 42)	Refers the reader to 'Royal College of Anaesthetists' Guidelines for the Provision of Anaesthetic Services' for more specific guidance and support.
Emergency surgery	Anaesthesia	Standard for unscheduled surgical care: "The unit has the required resources and equipment to stabilise and resuscitate the patient at all times." "If the receiving unit is unable to provide these services, agreed protocols are in place for ambulance by-pass or transfer to a designated appropriate receiving unit."Standard for unscheduled surgical care: "The unit has the required resources and equipment to stabilise and resuscitate the patient at all times." "All patients considered as 'high risk' have their operation carried out under the direct supervision of a consultant surgeon and consultant anaesthetist; early referral for anaesthetic assessment is made to optimise peri-operative care."	(The Royal College of Surgeons of England, 2011, 18)	None cited.

Service 1	Service 2	Detail	Source	Evidence
Emergency surgery	Critical care	Standard for unscheduled surgical care: "The unit has the required resources and equipment to stabilise and resuscitate the patient at all times." "If the receiving unit is unable to provide these services, agreed protocols are in place for ambulance by-pass or transfer to a designated appropriate receiving unit."	(The Royal College of Surgeons of England, 2011, 18)	None cited.
Emergency surgery	Critical care	"Critical care facilities are available at all times for emergency surgery. If this is not the case, agreed protocols for transfer are in place."	(The Royal College of Surgeons of England, 2011, 46)	Refers reader to the Intensive Care Society for more specific guidelines and support. Standards for Consultant Staffing of Intensive Care Units. The Intensive Care Society. www.ics.ac.uk/intensive_care_professional/standards_and_ guidelines/standards_for_consultant_staffing_2002 (cited 11 February 2011). Standards for Nurse Staffing in Critical Care. The Intensive Care Society. www.ics.ac.uk/intensive_care_professional/standards_and _guidelines/nurse_staffing_in_critical_care_2009 (cited 11 February 2011). Standards for Intensive Care Units. The Intensive Care Society. www.ics.ac.uk/intensive_care_professional/standards_and_ guidelines/standards_for_intensive_care_2007 (cited 11 February 2011).

Service 1	Service 2	Detail	Source	Evidence
		"Critical care input is available either directly or through an outreach team to advise and support the management of emergency surgical patients on the wards. Agreed escalation protocols result in appropriate and timely critical care referral."	(The Royal College of Surgeons of England, 2011, 47)	Refers reader to the Intensive Care Society for more specific guidelines and support.
Emergency surgery	Intensive care	Generic intensive care standard: "Intensive care requirements are considered for all patients needing emergency surgery. There is close liaison and communication between the surgical, anaesthetic and intensive care teams peri-operatively with the common goal of ensuring optimal safe care in the best interests of the patient." "Level 2 and level 3 bed provision is sufficient to support the anticipated emergency surgical workload." "Best practice: Standards defined by the ICS"	(The Royal College of Surgeons of England, 2011, 46)	Refers reader to the Intensive Care Society for more specific guidelines and support.
Emergency surgery	Nursing and allied health professionals.	To provide continuity of care.	(The Royal College of Surgeons of England, 2011, 18)	None cited.

Service 1	Service 2	Detail	Source	Evidence
Emergency surgery	Operating theatres including full emergency theatre staffing	Standard for unscheduled surgical care: “The unit has the required resources and equipment to stabilise and resuscitate the patient at all times.” “If the receiving unit is unable to provide these services, agreed protocols are in place for ambulance by-pass or transfer to a designated appropriate receiving unit.”Standard for unscheduled surgical care: “The unit has the required resources and equipment to stabilise and resuscitate the patient at all times.”	(The Royal College of Surgeons of England, 2011, 18)	None cited.
Emergency surgery	24-hour radiology	Standard for unscheduled surgical care: “The unit has the required resources and equipment to stabilise and resuscitate the patient at all times.” “If the receiving unit is unable to provide these services, agreed protocols are in place for ambulance by-pass or transfer to a designated appropriate receiving unit.”	(The Royal College of Surgeons of England, 2011, 18)	None cited.

Service 1	Service 2	Detail	Source	Evidence
Emergency surgery	Ward bed access	Standard for unscheduled surgical care: "The unit has the required resources and equipment to stabilise and resuscitate the patient at all times." "If the receiving unit is unable to provide these services, agreed protocols are in place for ambulance by-pass or transfer to a designated appropriate receiving unit."	(The Royal College of Surgeons of England, 2011, 18)	None cited.
Gynaecology	Diagnostic support services (ultrasound, radiology including magnetic resonance imaging and computed tomography, haematology and biochemistry)	"It is essential that there is ready and timely access…"	(Royal College of Obstetricians and Gynaecologists, 2009, 2)	None cited.

Service 1	Service 2	Detail	Source	Evidence
Gynaecology	Operating theatres	"…there must be adequate theatre provision for gynaecological emergencies in working hours. Although surgical evacuation of the uterus for miscarriage is often seen as a minor procedure, the risks of delay should be recognised (infection and bleeding). In addition, it is appropriate that these women should expect timely and sensitive care at an emotionally vulnerable time. Clearly, in cases of medical emergency (for example, ruptured ectopic pregnancy with haemodynamic instability) the clinical features will determine the priority to be given in relation to other surgical emergencies."	(Royal College of Obstetricians and Gynaecologists, 2009, 2)	None cited.
Gynaecology	Critical care facilities	"… complex cases may need access to a critical care facility (for example, severe ovarian hyperstimulation syndrome). Ideally, these facilities should be on the same hospital site. However, where this is not the case, an effective care pathway for ready access to a nearby critical care facility is essential."	(Royal College of Obstetricians and Gynaecologists, 2009, 2)	None cited.

Service 1	Service 2	Detail	Source	Evidence
Gynaecology	Specialist / tertiary level services	"In a small number of emergencies, access to specialist or tertiary level services will be needed. Again, a robust care pathway must be in place for these women."	(Royal College of Obstetricians and Gynaecologists, 2009, 2)	None cited.
Gynaecology	Psychological support services	"… some women may need psychological support. Suitable care pathways and services must be in place for those women who need extra support, especially following pregnancy loss."	(Royal College of Obstetricians and Gynaecologists, 2009, 3)	None cited.
Gynaecology	Governance	"... a full range of governance systems and processes must be in place and working to identify and register risks associated with the emergency gynaecological service. Emergency gynaecological surgery must be the subject of regular audits of clinical processes and outcomes."	(Royal College of Obstetricians and Gynaecologists, 2009, 3)	None cited.
Interventional radiology	Anaesthesia	"If a radiology department provides an emergency interventional service for which general anaesthesia may be required, plans for staffing this anaesthetic service should be made, particularly outside normal working hours."	(The Royal College of Anaesthetists, 2011, Para 3.3)	Cites: Webb ST, Farling PA. Aneurysmal subarachnoid haemorrhage. Anaesth 2005; 60:560–564. Varma MK et al. Anaesthetic considerations for interventional neuroradiology. Br J Anaesth 2007; 99:75–85.

Service 1	Service 2	Detail	Source	Evidence
Paediatric intensive care unit	Critical care	Standardised arrangements for transfer between these services.	(Royal College of Paediatrics and Child Health, 2007, 30)	None cited.
Paediatric intensive care	Medical imaging	Standardised arrangements for transfer between these services.	(Royal College of Paediatrics and Child Health, 2007, 30)	None cited.
Paediatric intensive care	Operating theatres	Standardised arrangements for transfer between these services.	(Royal College of Paediatrics and Child Health, 2007, 30)	None cited.
Paediatric urgent care	Paediatric emergency care	Co-located where possible so that "children can be triaged to the most appropriate service on arrival at hospital."	(Royal College of Paediatrics and Child Health, 2009a, 6)	None cited.
Radiology	Anaesthesia	"A wide range of services require anaesthesic support outside the operating theatre. The Most common areas are: the radiology department for both emergency and routine diagnostic procedures (CT and MRI)."	(The Royal College of Anaesthetists, 2011, Introduction)	No evidence cited, but Para 3.3 says "The frequency with which complex procedures are carried out in the radiology department is increasing. Patients requiring general anaesthesia in the radiology department may have life-threatening conditions."

Service 1	Service 2	Detail	Source	Evidence
Specialist eye unit	Blood tests, microbiology service	"There should be the necessary facilities to obtain urgent blood tests such as erythrocyte sedimentation rate or plasma viscosity and a microbiology service to receive and process specimens for culture and provide immediate interpretation of gram stains obtained in infective conditions."	(The Royal College of Ophthalmologists, 2009, 1)	None cited.
Short stay paediatric assessment unit	Paediatric ward	Type A SSPAU model.	(Royal College of Paediatrics and Child Health, 2009c, 6)	None cited.
Urgent Care Centres (UCCs)	Digital imaging services	"Digital imaging systems, e.g. PACS are desirable."	(The College of Emergency Medicine et al., 2009, 3)	None cited.
Urgent Care Centres (UCCs)	Radiographic facilities	"Provision of radiographic facilities for the UCP HPs, is highly desirable."	(The College of Emergency Medicine et al., 2009, 4)	None cited.
Urgent Care Centres (UCCs)	Paediatrics	UCCs need access to paediatric medical advice.	(Royal College of Paediatrics and Child Health, 2007, 22)	None cited.

APPENDIX 5 – MODELS OF DELIVERING ACUTE SERVICES

1. MODELS OF DELIVERING ACUTE PAEDIATRIC SERVICES

Model	**Services**
Small units, proximal to larger units	Emergency department (ED); Short stay paediatric assessment unit (SSPAU).
Small units, remote from larger units, level 1 special care baby unit (SCBU)	ED; SSPAU; 24/7 paediatric inpatient unit; consultant non-resident overnight; consultant presence 12-16/24; trainees resident 24/7.
Medium sized units, level 2 neonatal intensive care unit (NICU)	ED; SSPAU; majority of consultants contribute to acute on-call; overnight admission unit; level 2 NICU; consultant resident 24/7 but consultant may be non-resident if appropriate resident competences are available; trainees resident 24/7.
Medium sized units, level 3 NICU	ED; SSPAU; overnight admission unit; level 3 NICU; 2 x consultant resident 24/7; trainees resident 24/7
Larger units, level 3 NICU, some specialist services	ED; SSPAU; overnight admission unit; level 3 NICU; PICU; specialist services minority requiring 24/7 hands on care; 3 x consultant resident 24/7; consultant may be non-resident if appropriate resident competencies are available.
Comprehensive larger units, level 3 NICU, surgical specialties, specialist services (6-8 for UK)	ED; SSPAU; overnight admission unit; level 3 NICU; PICU plus support for paediatric surgery; specialist services minority requiring 24/7 hands on care; 3 x consultant resident 24/7; consultant may be non-resident if appropriate resident competencies are available.
Source: All material extracted from (Royal College of Paediatrics and Child Health, 2009b, Appendix B) – cites Royal College of Paediatrics and Child Health, Modelling the Future II, 2008	

2. Short Stay Paediatric Assessment Unit models

Model	Details	Evidence
A: co-location with the paediatric ward	None given.	None cited.
B: co-location with ED, run by the paediatric department and ED	None given.	"There is encouragement from the Academy of Medical Royal Colleges and the College of Emergency Medicine to consider the development of such facilities, as on-site inpatient paediatric services become less prevalent. There is less published evidence from these units, but what has been published is encouraging."(Royal College of Paediatrics and Child Health, 2009c, 7)
Type C: co-location with ED, run by ED in a specialist paediatric hospital	"This type of unit is also likely to be staffed by dedicated Paediatric ED staff, including consultants. There may be variable levels of liaison with the paediatric department. These assessment units with be adjacent to large paediatric EDs with a critical mass of numbers and staffing." (Royal College of Paediatrics and Child Health, 2009c, 8) "Increasing evidence shows this type of observation unit to be efficient and safe for children." (Royal College of Paediatrics and Child Health, 2009c, 8)	None cited.

3. SUMMARY OF SPECTRUM OF TYPES OF CARE FOR ACUTE AND EMERGENCY SERVICES

The exact distribution of services will depend on local needs.

Primary care

Provides assessment and treatment of most less serious acute problems.

Community hospital/urgent care centres

Also provides some imaging/tests, simple treatments such as suturing/plaster of Paris.

Local hospital

Provides 24-hour services including A&E, acute medicine, imaging including CT, laboratory services, level 3 critical care (intensive care), general surgery and orthopaedics where safe. In exceptional circumstances where on-site surgery is not provided, the hospital must not accept unselected medical patients.

District hospital

In addition to local hospital services provides 24-hour specialist services such as paediatrics, some surgical specialties and possibly obstetrics.

District hospital with highly specialised services

In addition to district hospital services will provide highly specialised services.

SOURCE: ACADEMY OF MEDICAL ROYAL COLLEGES 2007, PAGE 9.