National Institute for Health and Care Excellence

Final

Chapter 1 Guideline introduction

Emergency and acute medical care in over 16s: service delivery and organisation

NICE guideline 94

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Developed by the National Guideline Centre, hosted by the Royal College of Physicians

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Foreword

In 2012, the National Institute for Health and Care Excellence (NICE) received requests to develop guidance on the organisation and delivery of services for people with acute or emergency medical conditions. The range of proposed topics was diverse, including seven-day services and out-of-hours care, the role of hospital consultants, the organisation of care for acute medical admissions, and approaches to discharge planning to reduce readmission rates. While NICE had developed clinical guidelines on acute care previously (for example, guidance on the provision of services for acutely ill patients in hospital was published in 2007), the scope of this work potentially encompassing the whole of acute care was substantially more ambitious.

The NICE Centre for Clinical Practice therefore took advice from an expert reference group to develop a draft scope, which was published in 2014. Following a written consultation exercise, NICE convened a national Stakeholder workshop involving 90 individuals and 62 organisations, held at the Royal College of General Practitioners on June 13th 2014. Six moderated working groups were formed, meeting twice during the day, to identify the key challenges in acute care service delivery, locating those challenges in the community, in hospital, and in the transition between the two. Edited transcripts from the working groups were converted into 66 themed researchable questions relating to the topics discussed, and then circulated to the Stakeholders for prioritization. Following editing and review by the Guideline Committee 41 questions were approved.

The 21 members of the Guideline Committee started their work on February 2015, finishing 24 months later. During these two years 17 data scientists and health economists have identified more than 150,000 relevant scientific articles, assessed more than 10,000 for eligibility, and analysed nearly 4000 in detail. Nearly 500 studies were included in the final guideline. To assimilate this volume of information, we formed four subgroups reporting to the plenary committee every month: this made the task manageable and allowed us to deliver the commission on time.

I would like to thank all my colleagues in the Guideline Committee, and the subgroup chairs, for their hard work, persistence, tolerance and good humour during these two years; all with busy day jobs, they have been exemplars of reliability and collaboration. The NGC team of research fellows, information specialists, administrative staff and health economists, have been indefatigable and meticulous in their work. At NICE, Clifford Middleton, Christine Carson and Professor Mark Baker have been an important source of support and guidance. Finally, Dr Philip Dyer has been an outstanding vice-chair of the committee, bringing with him the deep knowledge of a front-line compassionate clinician. I am grateful to them all.

Professor Julian Bion

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1 Introduction

This NICE Guidance is novel in a number of respects. It takes a whole-health-economy view of acute and emergency care, and is therefore the largest review conducted by NICE to date. It represents a growing willingness amongst policy-makers to use evidence to inform strategy, but this welcome development has been counterbalanced by the relative paucity of secure scientific evidence. At the same time, the pressures on the service have meant that policy has had to move ahead while evidence is gathered in parallel, running the risk that the direction of that evidence when subsequently obtained may diverge from the policy. The guideline committee has therefore been sensitive to these real world challenges, preferring to make research recommendations when evidence was not available or reliable.

Acute and emergency care is a challenge for all health services as populations age, costs rise, and technological developments extend the limits of healthcare. High volumes of emergencies impact adversely on hospital planned admissions, performance metrics, and Trust income. There have been several previous reviews of emergency care,[5,9,10,14,15,26,28-30,32] all of which applaud the quality of care provided before proceeding to explain why change is required. All recognise the need for greater integration between the different components in the acute care pathway. The reader may therefore wonder what added value yet another review might bring which has not been addressed before.

The answer to that question lies in the scope and processes used to develop the Guidance, in the context in which it has been developed, and in the need for more sophisticated research methods to evaluate and modify policy in action. As described in the Preface, the scope was developed collaboratively with the public, professionals, and policy makers. It extends from home to hospital and back again; it involves social, primary, secondary and palliative care; and covers such diverse topics as points of first contact, alternatives to hospital care, paramedics, GPs, consultants, prevention of critical illness, and reablement. This has resulted in a document three times the size of a normal NICE guideline. Selection and exclusion were necessary to complete the work within two years. A key challenge for the researchers and committee members was how to select research evidence for review. Health services policy research inevitably lacks the volume of randomised controlled trials that would be available to reviewers of drug therapies or technical interventions, while possessing a relatively large observational and opinion-based literature. We therefore adopted an evidence hierarchy in which observational studies would only be incorporated in the review in the absence of two or more relevant randomised (including cluster-randomised) trials. Readers may therefore be disappointed to find that several observational studies with which they are familiar in their area of practice have not been used to generate a recommendation. This does not mean that these studies are unimportant, and we have tried to reflect the themes of this wider literature in the 'other considerations' sections of the recommendations.

The context in which this Guidance has been produced is one of rapid change and fiscal constraint. New ways of working, such as 'hospital at home', and varied experiences with integrating care across traditional boundaries have altered perceptions of how health care might be delivered. At the same time, health policy initiatives have become more clinically-driven and research-based, often with parallel evaluation. In 2014 the Department of Health announced the establishment of the Better Care Fund[23] to relocate £5.3bn of existing resources from hospitals to community and social care in response to the combined challenges of demographic change, hospital overload, and funding constraints. An initial assessment by the National Audit Office found little evidence so far for improvements in services or efficiency savings through this approach.[18] Concurrently, NHS England's Seven Day Services initiative[24] has focused on care process standards,[25] with strong stakeholder engagement and audit of implementation. The urgent and emergency care review[17] has employed, and is generating, research evidence as it moves towards the implementation phases, and will use the outputs from this Guidance. And NHS England's 5-year plan[22] explicitly recognises the importance of research in developing effective and cost-effective health policy. The UK is fortunate

in having access to health service research funding through the National Institute for Health Research and associated bodies. This change of emphasis to evidence-based policy-making is reflected in the decision to commission this NICE Guidance.

At the same time, recognition of the need for evidence-based policy-making has exposed the lack of reliable evidence to support service reconfiguration in acute and emergency care. Newer research methodologies are needed, such as adaptive research designs[6] and the incorporation of Bayesian methods,[31] which may allow policy interventions to be tested incrementally with concurrent assessment of the effect size needed to change practice. Mixed methods employing both quantitative and qualitative analyses provide insights into mechanism of effect (or reasons for no effect)[4] as well as clarifying the impact of contextual factors,[11] analogous to defining susceptible populations for drug trials. Researchers also need to provide much greater clarity about the content or characteristics of the intervention, and of the control group or comparator: many studies examined by the Guideline Committee provided insufficient information on these two aspects to allow secure judgements to be made.

Health care is a classic example of a complex system: multiple self-organising component parts subject to different initial conditions interact non-linearly to produce varying emergent behaviours.[3] Attempts to create predictable behaviours or outputs through policy interventions are more likely to succeed in the presence of shared values and objectives, and when those interventions are based on evidence, or can be modified in the light of experience. We hope that the Guidance offered here will be useful to patients and the public, professionals, providers, purchasers and policy makers in providing the best quality care for acutely ill patients at all stages in their journey through the health system.

Julian Bion (Chair)

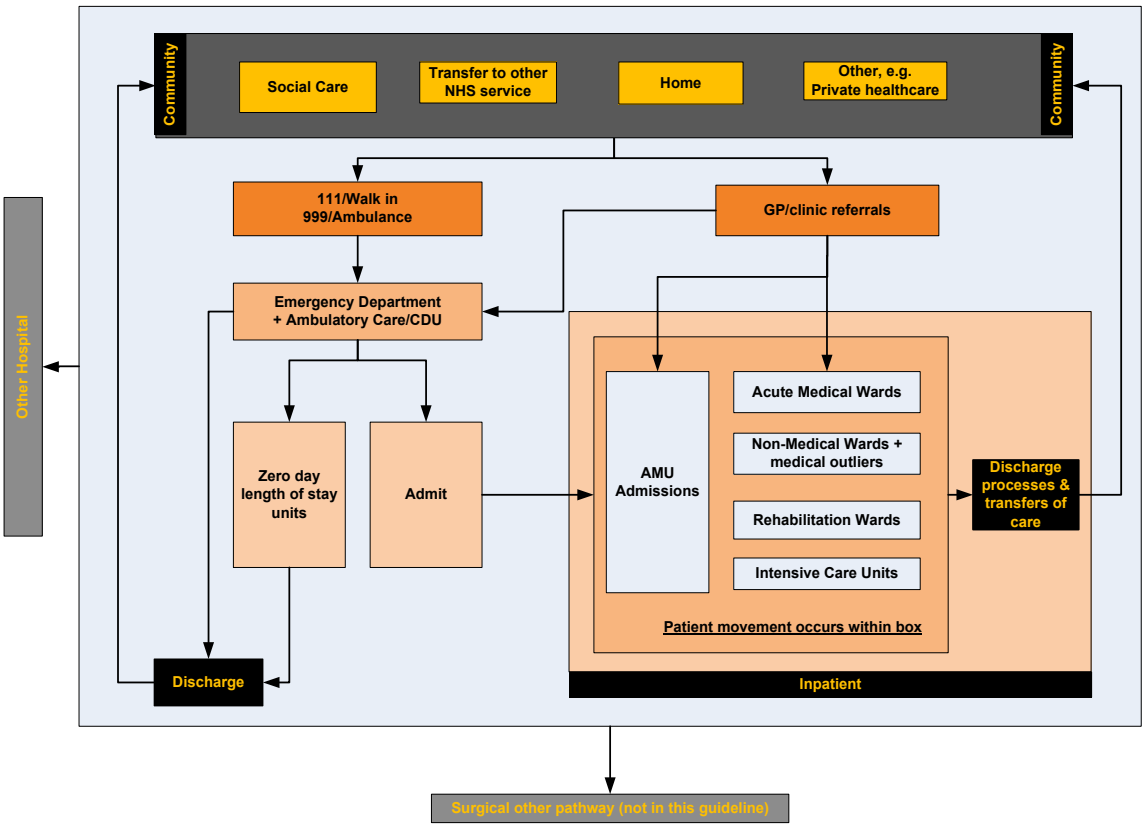
Philip Dyer (Vice-Chair)

On behalf of the Guideline Development Committee

2 Guideline summary

2.1 Pathway

Figure 1: Emergency and acute medical care pathway



2.2 Full list of recommendations and research recommendations

RR1. What is the most clinically and cost-effective use of clinical call handlers in a telephone advisory service in terms of i) the ratio of clinical to non-clinical call handlers and ii) point of access to clinical call handlers in a telephone advisory service pathway?

1. **Provide specialist and advanced paramedic practitioners who have extended training in assessing and treating people with medical emergencies**

RR2. Are paramedic remote decision-support technologies clinically and cost effective?

RR3. Is extended access to GP services, for example during early mornings, evenings and weekends, more clinically and cost effective than standard access?

RR4. Which primary care-led models of assessment of people with a suspected medical emergency in the community, such as GP home visits, are most clinically and cost effective?

2. **Provide point-of-care C-reactive protein testing for people with suspected lower respiratory tract infections.**

RR5. What is the clinical and cost effectiveness of providing GPs with access to plain X-ray radiology or ultrasound with same-day results?

3. **Provide nurse-led support in the community for people at increased risk of hospital admission or readmission. The nursing team should work with the team providing specialist care.**

RR6. What is the clinical and cost effectiveness of providing extended access to community nursing, for example during evenings and weekends?

4. **For people who are at increased risk of developing a medical emergency:**
   - **provide advanced community pharmacy-based services**
   - **consider providing advanced pharmacist services in general practices**

5. **For people at risk of an acute medical emergency, do not commission pharmacists to conduct medication reviews in the home unless needed for logistical or clinical reasons.**

RR7. What is the clinical and cost effectiveness of providing extended access to social care services, for example during early mornings and evenings, and 7 days a week?

6. **Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**

7. **Provide a multidisciplinary community-based rehabilitation service for people who have had a medical emergency.**

8. **Provide specialist multidisciplinary community-based palliative care as an option for people in the terminal phase of an illness.**

9. **Offer advance care planning to people in the community and in hospital who are approaching the end of life and are at risk of a medical emergency[b]. Ensure that there is close collaboration between the person, their families and carers, and the professionals involved in their care.**

[a] NICE has published guidelines on transition between inpatient hospital settings and community or care home settings for adults with social care needs and Intermediate care including reablement.

[b] NICE is developing a guideline on end of life care for adults in the last year of life.

RR8. What is the clinical and cost effectiveness of limiting emergency department opening hours, and what effect does this have on local healthcare provision and outcomes for people with medical emergencies?

RR9. What is the clinical and cost effectiveness of having GPs within or adjoining emergency departments?

RR10. Is a minor injury unit, urgent care or walk-in centre clinically and cost effective i) as a stand-alone unit and ii) when located on the same site as an emergency department?

10. **For people admitted to hospital with a medical emergency, consider providing the following accompanied by local evaluation which takes into account current staffing models, case mix and severity of illness:**
    - **consultant assessment within 14 hours of admission to determine the person's care pathway**
    - **daily consultant review, including weekends and bank holidays**
    - **more frequent (for example, twice daily) consultant review based on clinical need.**

RR11. What is the clinical and cost effectiveness of providing 'physician extenders' such as advanced nurse practitioners, 'physician associates' and advanced clinical practitioners in secondary care?

11. **Use validated risk stratification tools to inform clinical decisions about hospital admission for people with medical emergencies.**

RR12. What is the optimal configuration in terms of clinical and cost effectiveness of hospital diagnostic radiology services to support 7-day care of people presenting with medical emergencies?

12. **Provide access to liaison psychiatry services for people with medical emergencies who have mental health problems.**

13. **Assess and treat people needing hospital admission with undifferentiated medical emergencies in an acute medical unit.**

RR13. What is the most clinically and cost effective way to configure services to assess frail older people who present to hospital with a medical emergency?

14. **Consider providing access to critical care outreach teams (CCOTs) for people in hospital who have, or are at risk of, acute deterioration, accompanied by local evaluation of the CCOT service.**

15. **Use standardised and structured approaches to ward rounds, for example with checklists or other clinical decision support tools.** [c]

16. **Provide coordinated multidisciplinary care for people admitted to hospital with a medical emergency.**[c]

17. **Include ward-based pharmacists in the multidisciplinary care of people admitted to hospital with a medical emergency.** [c]

18. **Provide access to physiotherapy and occupational therapy 7 days a week for people admitted to hospital with a medical emergency.**

19. **Use structured handovers during transitions of care and follow the recommendations on transferring patients in the NICE guideline on acutely ill patients in hospital.** [c]

RR14. What is the clinical and cost effectiveness of different methods for integrating patient information throughout the emergency medical care pathway?

20. **Use standardised systems of care (including checklists, staffing and equipment) when transferring critically ill patients within or between hospitals.**[c]

21. **Start discharge planning at the time of admission for a medical emergency.**

RR15. Are standardised criteria for hospital discharge clinically and cost effective in specific medical emergencies?

RR16. What is the clinical and cost effectiveness of post-discharge early follow up clinics for people who have had a medical emergency and are at risk of unscheduled hospital readmission?

22. **Health and social care systems should develop and evaluate integrated care pathways.**

23. **Healthcare providers should:**
    - **monitor total acute hospital bed occupancy, capacity, flow and outcomes in real time, taking account of changes in a 24-hour period and the occupancy levels and needs of specific wards and units**
    - **plan capacity to minimise the risks associated with occupancy rates exceeding 90%.**

RR17. Which components of a hospital escalation policy to deal with surges in demand are the most clinically and cost effective?

c NICE's guideline on medicines optimisation includes recommendations on medicines-related communication systems when patients move from one care setting to another, medicines reconciliation, clinical decision support, and medicines-related models of organisational and cross-sector working.

3 Development of the guideline

3.1 What is a NICE guideline?

NICE guidelines are recommendations for the care of individuals in specific clinical conditions or circumstances within the NHS – from prevention and self-care through primary and secondary care to more specialised services. These may also include elements of social care or public health measures. We base our guidelines on the best available research evidence, with the aim of improving the quality of healthcare. We use predetermined and systematic methods to identify and evaluate the evidence relating to specific review questions.

NICE guidelines can:

- provide recommendations for the treatment and care of people by health professionals
- be used to develop standards to assess the clinical practice of individual health professionals
- be used in the education and training of health professionals
- help patients to make informed decisions
- improve communication between patient and health professional.

While guidelines assist the practice of healthcare professionals, they do not replace their knowledge and skills.

We produce our guidelines using the following steps:

- A guideline topic is referred to NICE from NHS England.
- Stakeholders register an interest in the guideline and are consulted throughout the development process.
- The scope is prepared by the National Guideline Centre (NGC).
- The NGC establishes a Guideline Committee.
- A draft guideline is produced after the group assesses the available evidence and makes recommendations.
- There is a consultation on the draft guideline.
- The final guideline is produced.

The NGC and NICE produce a number of versions of this guideline:

- The 'full guideline' contains all the recommendations, plus details of the methods used and the underpinning evidence.
- The 'NICE guideline' lists the recommendations.
- 'Information for the public' is written using suitable language for people without specialist medical knowledge.
- NICE Pathways brings together all connected NICE guidance.

This version is the full version. The other versions can be downloaded from NICE at www.nice.org.uk.

3.2 Remit

NICE received the remit for this guideline from NHS England. NICE commissioned the NGC to produce the guideline.

The remit for this guideline is:

- Urgent and emergency care

- Out of hours care
- 7 day working
- Consultant review within 12 hours of admission
- Acute medical admissions within the first 48 hours
- Discharge planning to reduce readmissions

3.3 Who developed this guideline?

A multidisciplinary Guideline Committee (GC) comprising health professionals and researchers as well as lay members developed this guideline (see the list of Guideline Committee members and the acknowledgements).

The National Institute for Health and Care Excellence (NICE) funds the National Guideline Centre (NGC) and thus supported the development of this guideline. The committee was convened by the NGC and chaired by Professor Julian Bion in accordance with guidance from NICE.

The group met approximately every 5 weeks during the development of the guideline. At the start of the guideline development process all the committee members declared interests including consultancies, fee-paid work, shareholdings, fellowships and support from the healthcare industry. At all subsequent guideline committee meetings, members declared arising conflicts of interest.

Members were either required to withdraw completely or for part of the discussion if their declared interest made it appropriate. The details of declared interests and the actions taken are shown in Chapter 42, Appendix B.

Staff from the NGC provided methodological support and guidance for the development process. The team working on the guideline included a project manager, systematic reviewers (research fellows), health economists and information scientists. They undertook systematic searches of the literature, appraised the evidence, conducted meta-analysis and cost-effectiveness analysis where appropriate and drafted the guideline in collaboration with the committee.

3.3.1 What this guideline covers

Groups that will be covered:

Adults (18 years and over) and young people (16-17 years) who seek, or are referred for, emergency NHS care for a suspected or confirmed acute medical emergency. Specific consideration will be given to:

- Frail elderly people and
- People with mental health comorbidity

Issues that will be covered:

- Timely access to services (including services available 24-hours a day, 7-days a week)
- Timely access to staff with a given competency or skill
- Capacity of services
- Location of services.
- Staffing, skills and competencies in pre-hospital and hospital settings
- Integration of services, including continuity of information, handover and discharge
- Alternatives to acute care in hospital
- Standardisation of services

- First point of contact with urgent care services, including initial triage.

For further details please refer to the scope in Chapter 42, Appendix A and the review questions in section 4.1.

3.3.2 What this guideline does not cover

Groups that will not be covered:

- Children
- People with acute obstetric emergencies
- People with acute mental health emergencies, once a diagnosis has been made
- People with acute surgical emergencies, once a diagnosis has been made
- People who have experienced major trauma, complex or non-complex fractures or spinal injury
- People in hospital who are not there for an acute medical emergency (i.e. elective admissions) and do not develop an acute medical emergency during their stay
- People already in hospital with acute deterioration
- People with chronic conditions who are being managed as outpatients but who require an elective admission for treatment from specialists who may be involved in the acute care pathway.

Issues that will not be covered:

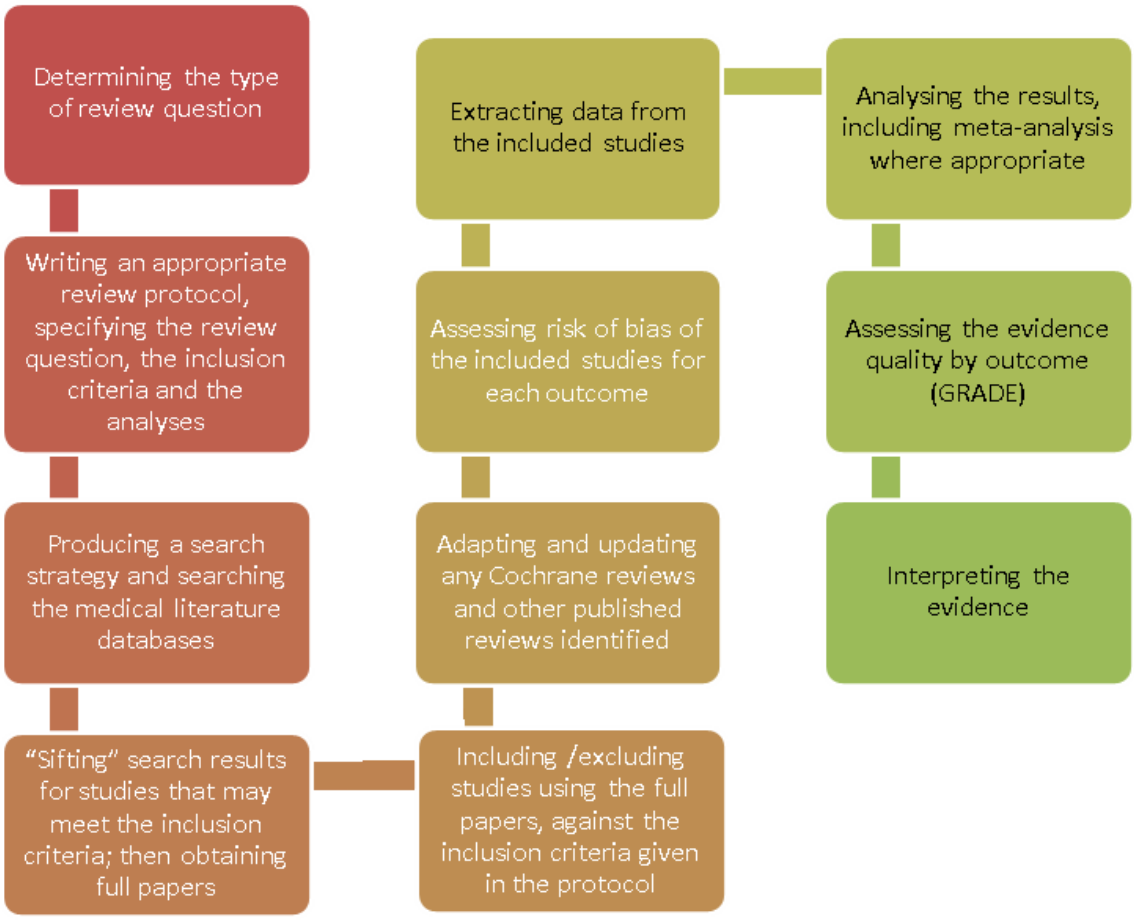
- Acute clinical management of specific medical conditions requiring urgent or emergency care
- Specific on-going management of a condition
- Non-emergency patient transport
- Resuscitation
- Nurse staffing in accident and emergency departments and on wards (which will be covered in other NICE guidance)
- Emergency planning and resilience
- Readmissions to intensive care units within 48 hours.

4 Methods

This section sets out in detail the methods used to review the evidence and to develop the recommendations that are presented in subsequent chapters of this guideline. This guidance was developed in accordance with the methods outlined in the NICE guidelines manual 2014.[19]

Sections 4.1 to 4.3 describe the process used to identify and review clinical evidence (summarised in Figure 2) and Section 4.4 outlines the process to review cost-effectiveness evidence. Section 4.5 describes the process used to develop recommendations.

Figure 2: Step-by-step process of review of evidence in the guideline



4.1 Developing the review questions and outcomes

Review questions were developed using a PICO framework (population, intervention, comparison and outcome) for intervention reviews. Review questions were developed within a framework of population, presence or absence of factors under investigation (for example prognostic factors) and outcomes for prognostic reviews.

The purpose of this was to guide the literature searching process, critical appraisal and synthesis of evidence, and to facilitate the development of recommendations by the committee. The review questions were drafted by the NGC technical team and refined and validated by the committee. The questions were based on the key clinical areas identified in the scope (Chapter 42, Appendix A).

A total of 43 review questions were identified. Full literature searches, critical appraisals and evidence reviews were completed for all the specified review questions.

Table 1: Review questions

Chapter	Review questions	Outcomes
04	Does the provision of immediate access by ambulance staff to clinical advice, using remote decision support reduce NHS resource usage and improve outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Number of patients seeking further contacts after initial assessment by paramedic • Conveyance rates • Avoidable adverse events Important outcomes: • Number of hospital admissions • Staff satisfaction
03	Does enhancing the competencies of paramedics reduce ED demand, hospital admissions and improve patient outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Number of patients seeking further contacts after initial assessment by paramedic • Conveyance rates • Adverse events Important outcomes: • Number of hospital admissions • Staff satisfaction
07	Does primary care access to laboratory investigations with same day results improve outcomes?	Critical outcomes: • Avoidable adverse events • Quality of life • Patient and/or carer satisfaction • ED attendance Important outcomes: • Antibiotic usage • Lab/Diagnostic turn around for result to GP
08	Does GP access to radiology with same day results improve outcomes?	Critical outcomes: • Mortality • Avoidable adverse events • Patient and/or carer satisfaction • Quality of life • ED attendance • Admissions Important outcomes: • Lab/diagnostic turn around for results to GP
06	Do primary care led home visits reduce unplanned hospital admissions?	Critical outcomes: • Mortality • Quality of life

Chapter	Review questions	Outcomes
		• Patient and/or carer satisfaction • Avoidable adverse events • ED attendance Important outcomes: • Attendance at other health services • Complaints and feedback
05	Is urgent and/or routine extended access to usual GPs (e.g., evenings, 7 day) associated with improved outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • ED attendance Important outcomes: • Attendance to other health services • Complaints and feedback
02	Does the addition of non-emergency telephone access to urgent or unscheduled care, to an emergency (e.g. 999/112) service, improve patient outcomes and reduce demand on health care services?	Critical outcomes: • Mortality • Quality life • Patient and/or carer satisfaction • Avoidable adverse events • Unplanned re-contact rates Important outcomes: • Time to first medical contact • ED demand • Rates of referral to 999
09	Is extended access to community nursing/district nursing more clinically and cost-effective than standard access?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Presentation to ED Important outcomes: • Length of stay • Unplanned hospital admission • Delayed discharge • Staff satisfaction
18	Is a minor injury unit, urgent care centre or walk-in centre clinically and cost effective: 1. as a standalone unit 2. when co-located on the same site as a full emergency department?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Waiting time in ED including 4 hour target breach

Chapter	Review questions	Outcomes
		Important outcomes: • ED avoidance
17	Does the presence of GPs within or on the same site as the ED reduce the demand on ED and/or improve outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Time to admission/discharge • Avoidable adverse events Important outcomes: • Diagnostic investigations • Readmission and re-presentation • Hospital admissions • ED demand • Staff satisfaction
16	Is 24-hour open access to ED more clinically and cost-effective compared with limited opening times to ED?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Impact on other services Important outcomes: • Ambulance transfer times • Number of ED presentations
02	Do non-clinical call handlers perform as effectively as clinical call handlers?	Critical outcomes: • Mortality • Adverse events • Quality of life • Patient and/or carer satisfaction • Ambulance dispatches • Presentation to ED, GP and walk in centres minor injury units Important outcomes: • Referrals to ED, GP and walk in centres, minor injury units
10	Do enhanced roles of pharmacists in the community have clinical and cost-effectiveness benefits for people at risk of an AME or have a suspected or confirmed AME?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Number of ED presentations • GP attendances Important outcomes:

Chapter	Review questions	Outcomes
		• Hospital admission
19	Is early consultant triage in the ED (RAT model) more clinically and cost effective than later consultant review? Is early consultant review in the AMU, ICU, HDU, CCU or Stroke Unit more clinically and cost effective than later consultant review?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay in ED Important outcomes: • Early diagnosis • Hospital admission • GP visits • Diagnostic test number • Readmission • Discharge • Referrals form admissions • Staff satisfaction • Trainee satisfaction
24	Does admission or assessment through an acute medical unit (AMU) increase hospital discharges, improve patient outcomes and hospital resource usage?	Critical outcomes: • Mortality • Avoidable adverse events • Quality of life • Patient and/or carer satisfaction • Length of stay Important outcomes: • Number of readmissions • Direct discharges or zero length of stay admissions • Number of discharges within 48-72 hours • Outlying/boarding • ED 4 hour emergency access target • Staff satisfaction
26	What is the most clinically and cost-effective frequency of review by a consultant in AMU, ICU, CCU, stroke units and general medical wards?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay in hospital Important outcomes: • Number of readmissions • Number of diagnostic tests • Family satisfaction
27	Does the provision of a critical care outreach team in secondary care improve outcomes?	Critical outcomes: • Mortality • Quality of life

Chapter	Review questions	Outcomes
		• Patient and/or carer satisfaction • Avoidable adverse events • Number of DNAR orders • In-hospital mortality due to cardiac arrest • Length of stay Important outcomes: • ICU avoidance • Readmission to ICU
30	Do ward-based pharmacists improve outcomes in patients admitted to hospital with a suspected or confirmed acute medical emergency?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay in hospital • Prescribing errors • Missed medications • Medicines reconciliation Important outcomes: • Readmissions • Future admissions to hospital • Discharges • Staff satisfaction
25	Does admission or assessment through an elderly care assessment unit (ECAU) improve patient outcomes and hospital resource usage?	Critical outcomes: • Mortality • Patient and/or carer satisfaction • Quality of life • Length of stay • Avoidable adverse events Important outcomes: • Readmissions • Delayed transfers of care • ED 4 hour emergency access target
31	Is enhanced access to physiotherapy and/or occupational therapy for hospital patients clinically and cost effective?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Discharge to normal place of residency • Readmission • Time to mobilisation • Delayed transfers of care

Chapter	Review questions	Outcomes
32	Do structured patient handovers between healthcare professionals improve outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and /or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Staff satisfaction
11	Is urgent and/or routine extended access to social care services (e.g., evenings, 7 day) more clinically and cost effective compared with standard access?	Critical outcomes: • Mortality • Quality of life • Patient and /or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Admission avoidance • Readmission
39	What is the appropriate level of bed occupancy in hospital to facilitate optimal patient flow?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay • 4 hour target • Outliers/boarders Important outcomes: • Readmission • Staff satisfaction
29	Do ward multidisciplinary team meetings (MDTs) improve processes and patient outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Readmission • Staff satisfaction
34	Do standardised systems of care for intra- and inter-hospital transfers of critically ill patients improve outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay

Chapter	Review questions	Outcomes
		Important outcomes: • Staff satisfaction
28	Do structured ward rounds improve processes and outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Missed or delayed investigations • Missed or delayed treatments • Staff satisfaction
35	Does discharge planning facilitate early hospital discharge?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Length of stay • Avoidable adverse events Important outcomes: • Readmission • Delayed transfers of care • Staff satisfaction
23	Do acute psychiatric services improve outcomes for patients with mental health disturbance presenting with an acute medical emergency?	Critical outcomes: • Mortality • Patient and/or carer satisfaction • Quality of life • Avoidable adverse events • Early hospital discharge Important outcomes: • Early diagnosis and treatment • Readmission • Staff satisfaction • Discharge to home
12	Does community-based intermediate care improve outcomes compared with hospital care? Alternatives to hospital including: • Hospital at home • Step up/step down • Rapid response schemes • Virtual wards	Critical outcomes: • Mortality • Avoidable adverse events • Quality of life • Patient and/or carer satisfaction • Number of admissions to hospital Important outcomes: • Length of hospital stay • Length of stay in programme

Chapter	Review questions	Outcomes
		• Number of presentation to ED • Number of GP presentations • Readmission
13	Does the provision of community-based rehabilitation services following acute medical illness improve patient outcomes?	Critical outcomes: • Mortality • Avoidable adverse events • Quality of life • Patient and/or carer satisfaction Important outcomes: • Length of hospital stay • Number of admissions • Number of presentation to ED • Number of GP presentations
14	Does community-based palliative care improve outcomes compared with hospital care?	Critical outcomes: • Place of death • Avoidable adverse events • Quality of life • Patient and/or carer satisfaction Important outcomes: • Length of hospital stay • Number of admissions • Number of presentation to ED • Number of GP presentations • Readmission
09	Does community matron or nurse-led care improve outcomes compared to usual care?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Number of admissions to hospital Important outcomes: • Length of hospital stay • Length of stay in programme • Number of presentation to ED • Number of GP presentations • Readmission
15	Does advance care planning improve outcomes compared with usual care?	Critical outcomes: • Place of death • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events

Chapter	Review questions	Outcomes
		Important outcomes: • Readmission • Number of presentations to ED • Number of admissions to hospital • Length of hospital stay • Length of stay in the programme
20	Do physician extenders (for example, physician assistants, and emergency nurse practitioners) improve outcomes in secondary care?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Readmission • Missed or delayed treatments • Staff satisfaction
40	What are the appropriate escalation measures to manage surges in demand to facilitate optimal patient flow?	Critical outcomes: • Mortality • Quality of life • Avoidable adverse events • 4 hour target Important outcomes: • Length of stay • Readmission • Outliers/boarders • Staff satisfaction • Referral to treat • Visits to hospital • Bed occupancy
36	Do standardised criteria for hospital discharge facilitate earlier discharge and/or reduce readmission rates?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Readmission
21	Do standardised criteria for hospital admission facilitate appropriate admission?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Admissions

Chapter	Review questions	Outcomes
		Important outcomes: • Length of stay • Discharge destination
33	Do integrated patient information systems throughout the AME pathway (primary and secondary care) improve patient outcomes?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events Important outcomes: • Length of stay • ED admissions • Unnecessary duplication of tests • Staff satisfaction
38	Do integrated care models improve outcomes for patients with a suspected or confirmed acute medical emergency or at high risk of an acute medical emergency?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • Length of stay Important outcomes: • Unplanned hospital admissions • Hospital readmission rates • ED demand • Family satisfaction
37	Do post discharge early follow up clinics optimise outcomes for patients with a suspected or confirmed acute medical emergency?	Critical outcomes: • Mortality • Quality of life • Patient and/or carer satisfaction • Avoidable adverse events • ED attendance • Return to work Important outcomes: • Readmission
22	Does the provision of 7 day diagnostic radiology in hospital improve patient outcomes?	Critical outcomes: • Mortality • Avoidable adverse events • Quality of life • Patient and/or carer satisfaction • Length of stay Important outcomes: • Time to definitive diagnosis • Diagnostic turn around for result to healthcare professional

Chapter	Review questions	Outcomes
		• Staff satisfaction • Re-attendance

4.2 Searching for evidence

4.2.1 Clinical literature search

Systematic literature searches were undertaken to identify all published clinical evidence relevant to the review questions. Searches were undertaken according to the parameters stipulated within the NICE guidelines manual 2014.[19] Databases were searched using relevant medical subject headings, free-text terms and study-type filters where appropriate. Where possible, searches were restricted to papers published in English. Studies published in languages other than English were not reviewed. All searches were conducted in Medline, Embase, and The Cochrane Library. Additional subject specific databases were used for some questions: CINAHL for acute medical units, community nursing, community palliative care, access to physiotherapy, discharge planning; PsycINFO for liaison psychiatry; HMIC for bed occupancy and escalation measures. All searches were updated on 1 and 2 December 2016. No papers published after this date were considered.

Search strategies were quality assured by cross-checking reference lists of highly relevant papers, analysing search strategies in other systematic reviews, and asking the committee members to highlight any additional studies. Searches were quality assured by a second information scientist before being run. The questions, the study types applied, the databases searched and the years covered can be found in Chapter 42, Appendix D.

The titles and abstracts of records retrieved by the searches were sifted for relevance, with potentially significant publications obtained in full text. These were assessed against the inclusion criteria.

During the scoping stage, a search was conducted for guidelines and reports on the websites listed below from organisations relevant to the topic.

- Guidelines International Network database (www.g-i-n.net)
- National Guideline Clearing House (www.guideline.gov)
- National Institute for Health and Care Excellence (NICE) (www.nice.org.uk)
- National Institutes of Health Consensus Development Program (consensus.nih.gov)
- NHS Evidence Search (www.evidence.nhs.uk)
- Department of Health (www.gov.uk)

All references sent by stakeholders were considered. Searching for unpublished literature was not undertaken.

4.2.2 Health economic literature search

Systematic literature searches were also undertaken to identify health economic evidence within published literature relevant to the review questions. The evidence was identified by conducting a search for economic evidence alongside each clinical search. Additional searches were run in specific areas to inform the economic model. All economic searches were conducted in the NHS Economic Evaluation Database (NHS EED) and the Health Technology Assessment database (HTA) and the Health Economic Evaluations Database (HEED) (NHS EED ceased to be updated after March 2015; HEED was used for searches up to December 2014 but subsequently ceased to be available). Additionally, searches were run on Medline and Embase using a health economic filter. Where

possible, searches were restricted to papers published in English. Studies published in languages other than English were not reviewed.

The health economic search strategies are included in Chapter 42, Appendix D. All searches were updated on 1 and 2 December 2016. No papers published after this date were considered.

4.2.2.1 Call for evidence

To inform the Guideline's modelling, a 'call for evidence' to find discrete event simulation models of acute medical health systems was conducted. The committee thought that there may be useful models that would not be identified by the standard searches. The NGC contacted all registered stakeholders and asked them to submit any relevant published or unpublished evidence.

4.3 Identifying and analysing evidence of effectiveness

Research fellows conducted the tasks listed below, which are described in further detail in the rest of this section:

- Identified potentially relevant studies for each review question from the relevant search results by reviewing titles and abstracts, and deciding which studies should be ordered as full papers. Full papers were then obtained.
- Reviewed full papers against prespecified inclusion and exclusion criteria to identify studies that addressed the review question in the appropriate population, and reported on outcomes of interest (review protocols are included in Appendix A of each chapter).
- Critically appraised relevant studies using the appropriate study design checklist as specified in the NICE guidelines manual.[19]
- Critically appraised relevant studies with a prognostic study design checklist produced by NGC.
- Extracted key information about interventional study methods and results using 'Evibase', NGC's purpose-built software. Evibase produces summary evidence tables, with critical appraisal ratings. Key information about non-interventional study methods and results was manually extracted onto standard evidence tables and critically appraised separately (evidence tables are included in Appendix D of each chapter).
- Generated summaries of the evidence by outcome. Outcome data were combined, analysed and reported according to study design:
    - Randomised data were meta-analysed where appropriate and reported in GRADE profile tables.
    - Observational data is presented as a range of values in GRADE profile tables or meta-analysed if appropriate.
    - Prognostic data were meta-analysed where appropriate and reported in GRADE profile tables.
- A sample of a minimum of 10% of the abstract lists of the first 3 sifts by new reviewers and those for complex review questions (for example, prognostic reviews) were double-sifted by a senior research fellow and any discrepancies were rectified. All of the evidence reviews were quality assured by a senior research fellow. This included checking:
    - papers were included or excluded appropriately
    - a sample of the data extractions
    - correct methods were used to synthesise data
    - a sample of the risk of bias assessments.

4.3.1 Inclusion and exclusion criteria

The inclusion and exclusion of studies was based on the criteria defined in the review protocols, which can be found in Appendix A of each chapter. Excluded studies by review question (with the reasons for their exclusion) are listed in Appendix G of each chapter. The committee was consulted about any uncertainty regarding inclusion or exclusion.

The key population inclusion criterion was:

- Adults (18 years and over) and young people (16-17 years) who seek, or are referred for, emergency NHS care for a suspected or confirmed acute medical emergency.

The key population exclusion criterion was:

- Children
- People with acute obstetric emergencies
- People with acute metal health emergencies, once a diagnosis has been made
- People with acute surgical emergencies, once a diagnosis has been made
- People who have experienced major trauma, complex or non-complex fractures or spinal injury
- People in hospital who are not there for an acute medical emergency (i.e. elective admissions) and do not develop an acute medical emergency during their stay
- People already in hospital with acute deterioration
- People with chronic conditions who are being managed as outpatients but who require an elective admission for treatment form specialists who may be involved in the acute pathway.

Conference abstracts were not automatically excluded from any review. No relevant conference abstracts were identified for this guideline. Literature reviews, posters, letters, editorials, comment articles, unpublished studies and studies not in English were excluded.

4.3.2 Type of studies

Randomised trials, non-randomised intervention studies, and other observational studies (including prognostic studies) were included in the evidence reviews as appropriate.

For most intervention reviews in this guideline, parallel randomised controlled trials (RCTs) were included because they are considered the most robust type of study design that can produce an unbiased estimate of the intervention effects. If non-randomised intervention studies were considered appropriate for inclusion (for example, where no randomised evidence of high quality was available), the committee identified a priori in the protocol the variables must be equivalent at baseline or else the analysis had to adjust for any baseline differences. If the study did not fulfil either criterion it was excluded. Please refer to the review protocols in Appendix A of each chapter for full details on the study design of studies selected for each review question.

For prognostic review questions, prospective and retrospective cohort studies were included. Case–control studies were not included.

Where data from non-randomised studies were included, the results for each outcome were presented separately for each study or meta-analysed if appropriate.

4.3.3 Methods of combining clinical studies

4.3.3.1 Data synthesis for intervention reviews

Where possible, meta-analyses were conducted using Cochrane Review Manager (RevMan5)[2] software to combine the data given in all studies for each of the outcomes of interest for the review question.

4.3.3.1.1 Analysis of different types of data

Dichotomous outcomes

Fixed-effects (Mantel-Haenszel) techniques (using an inverse variance method for pooling) were used to calculate risk ratios (relative risk, RR) for the binary outcomes, which included:

- mortality
- admission
- readmission
- adverse events.

The absolute risk difference was also calculated using GRADEpro[13] software, using the median event rate in the control arm of the pooled results.

For binary variables where there were zero events in either arm or a less than 1% event rate, Peto odds ratios, rather than risk ratios, were calculated. Peto odds ratios are more appropriate for data with a low number of events.

Where sufficient information was provided, hazard ratios were calculated in preference for outcomes such as mortality.

Continuous outcomes

Continuous outcomes were analysed using an inverse variance method for pooling weighted mean differences. These outcomes included:

- quality of life
- length of stay in hospital
- patient and/or carer satisfaction

Where the studies within a single meta-analysis had different scales of measurement, standardised mean differences were used (providing all studies reported either change from baseline or final values rather than a mixture of both); each different measure in each study was 'normalised' to the standard deviation value pooled between the intervention and comparator groups in that same study.

The means and standard deviations of continuous outcomes are required for meta-analysis. However, in cases where standard deviations were not reported, the standard error was calculated if the p values or 95% confidence intervals (95% CI) were reported, and meta-analysis was undertaken with the mean and standard error using the generic inverse variance method in Cochrane Review Manager (RevMan5[2] software. Where p values were reported as 'less than', a conservative approach was undertaken. For example, if a p value was reported as 'p≤0.001', the calculations for standard deviations were based on a p value of 0.001. If these statistical measures were not available then the methods described in Section 16.1.3 of the Cochrane Handbook (version 5.1.0, updated March 2011) were applied.

4.3.3.1.2 Generic inverse variance

If a study reported only the summary statistic and 95% CI the generic-inverse variance method was used to enter data into RevMan5.[2] If the control event rate was reported this was used to generate the absolute risk difference in GRADEpro.[13] If multivariate analysis was used to derive the summary statistic but no adjusted control event rate was reported no absolute risk difference was calculated.

4.3.3.1.3 Heterogeneity

Statistical heterogeneity was assessed for each meta-analysis estimate by considering the chi-squared test for significance at $p<0.1$ or an I-squared (I^2) inconsistency statistic (with an I-squared value of more than 50% indicating significant heterogeneity) as well as the distribution of effects. Where significant heterogeneity was present, predefined subgrouping of studies was carried out as per the review questions protocols.

If the subgroup analysis resolved heterogeneity within all of the derived subgroups, then each of the derived subgroups were adopted as separate outcomes (providing at least 1 study remained in each subgroup. Assessments of potential differences in effect between subgroups were based on the chi-squared tests for heterogeneity statistics between subgroups. Any subgroup differences were interpreted with caution as separating the groups breaks the study randomisation and as such is subject to uncontrolled confounding.

If all predefined strategies of subgrouping were unable to explain statistical heterogeneity within each derived subgroup, then a random effects (DerSimonian and Laird) model was employed to the entire group of studies in the meta-analysis. A random-effects model assumes a distribution of populations, rather than a single population. This leads to a widening of the confidence interval around the overall estimate, thus providing a more realistic interpretation of the true distribution of effects across more than 1 population. If, however, the committee considered the heterogeneity was so large that meta-analysis was inappropriate, then the results were described narratively.

4.3.3.2 Data synthesis for prognostic factor reviews

Odds ratios (ORs), risk ratios (RRs), or hazard ratios (HRs), with their 95% CIs, for the effect of the prespecified prognostic factors were extracted from the studies. Studies were only included if the confounders prespecified by the GC were either matched at baseline or were adjusted for in multivariate analysis. Where there was little or no evidence, studies which matched or adjusted for the majority of the prespecified key confounders were considered. These studies were downgraded for risk of bias.

Studies of lower risk of bias were preferred, taking into account the analysis and the study design. In particular, prospective cohort studies were preferred if they reported multivariable analyses that adjusted for key confounders identified by the committee at the protocol stage for that outcome.

Data were combined in meta-analyses for prognostic studies where possible. Heterogeneity was assessed in the same way as intervention reviews. Where evidence was not meta-analysed because studies differed in population, prognostic factor, multivariable analysis or outcome, no alternative pooling strategies were carried out on the basis that such pooling would have little meaning. Evidence was not meta-analysed where there was an overlap of study populations (for example studies using hospital episode statistics from overlapping dates) to avoid double counting. In these cases, results from single studies were presented.

4.3.4 Appraising the quality of evidence by outcomes

4.3.4.1 Intervention reviews

The evidence for outcomes from the included RCTs and observational studies were evaluated and presented using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group (http://www.gradeworkinggroup.org/). The software (GRADEpro[13]) developed by the GRADE working group was used to assess the quality of each outcome, taking into account individual study quality and the meta-analysis results.

Each outcome was first examined for each of the quality elements listed and defined in Table 2.

Table 2: Description of quality elements in GRADE for intervention studies

Quality element	Description
Risk of bias	Limitations in the study design and implementation may bias the estimates of the treatment effect. Major limitations in studies decrease the confidence in the estimate of the effect. Examples of such limitations are selection bias (often due to poor allocation concealment), performance and detection bias (often due to a lack of blinding of the patient, healthcare professional or assessor) and attrition bias (due to missing data causing systematic bias in the analysis).
Indirectness	Indirectness refers to differences in study population, intervention, comparator and outcomes between the available evidence and the review question.
Inconsistency	Inconsistency refers to an unexplained heterogeneity of effect estimates between studies in the same meta-analysis.
Imprecision	Results are imprecise when studies include relatively few patients and few events (or highly variable measures) and thus have wide confidence intervals around the estimate of the effect relative to clinically important thresholds. 95% confidence intervals denote the possible range of locations of the true population effect at a 95% probability, and so wide confidence intervals may denote a result that is consistent with conflicting interpretations (for example a result may be consistent with both clinical benefit AND clinical harm) and thus be imprecise.
Publication bias	Publication bias is a systematic underestimate or overestimate of the underlying beneficial or harmful effect due to the selective publication of studies. A closely related phenomenon is where some papers fail to report an outcome that is inconclusive, thus leading to an overestimate of the effectiveness of that outcome.
Other issues	Sometimes randomisation may not adequately lead to group equivalence of confounders, and if so this may lead to bias, which should be taken into account. Potential conflicts of interest, often caused by excessive pharmaceutical company involvement in the publication of a study, should also be noted.

Details of how the 4 main quality elements (risk of bias, indirectness, inconsistency and imprecision) were appraised for each outcome are given below. Publication or other bias was only taken into consideration in the quality assessment if it was apparent.

4.3.4.1.1 Risk of bias

The main domains of bias for RCTs are listed in Table 3. Each outcome had its risk of bias assessed within each study first. For each study, if there were no risks of bias in any domain, the risk of bias was given a rating of 0. If there was risk of bias in just 1 domain, the risk of bias was given a 'serious' rating of −1, but if there was risk of bias in 2 or more domains the risk of bias was given a 'very serious' rating of −2. A weighted average score was then calculated across all studies contributing to the outcome, by taking into account the weighting of studies according to study precision. For

example if the most precise studies tended to each have a score of −1 for that outcome, the overall score for that outcome would tend towards −1.

Table 3: Principle domains of bias in randomised controlled trials

Limitation	Explanation
Selection bias (sequence generation and allocation concealment)	If those enrolling patients are aware of the group to which the next enrolled patient will be allocated, either because of a non-random sequence that is predictable, or because a truly random sequence was not concealed from the researcher, this may translate into systematic selection bias. This may occur if the researcher chooses not to recruit a participant into that specific group because of: • knowledge of that participant's likely prognostic characteristics, and • a desire for one group to do better than the other.
Performance and detection bias (lack of blinding of patients and healthcare professionals)	Patients, caregivers, those adjudicating or recording outcomes, and data analysts should not be aware of the arm to which patients are allocated. Knowledge of the group can influence: • the experience of the placebo effect • performance in outcome measures • the level of care and attention received, and • the methods of measurement or analysis all of which can contribute to systematic bias.
Attrition bias	Attrition bias results from an unaccounted for loss of data beyond a certain level (a differential of 10% between groups). Loss of data can occur when participants are compulsorily withdrawn from a group by the researchers (for example, when a per-protocol approach is used) or when participants do not attend assessment sessions. If the missing data are likely to be different from the data of those remaining in the groups, and there is a differential rate of such missing data from groups, systematic attrition bias may result.
Selective outcome reporting	Reporting of some outcomes and not others on the basis of the results can also lead to bias, as this may distort the overall impression of efficacy.
Other limitations	For example: • Stopping early for benefit observed in randomised trials, in particular in the absence of adequate stopping rules. • Use of unvalidated patient-reported outcome measures. • Lack of washout periods to avoid carry-over effects in crossover trials. • Recruitment bias in cluster-randomised trials.

The assessment of risk of bias differs for non-randomised intervention studies, as they are inherently at high risk of selection bias. For this reason, GRADE requires that non-randomised evidence is initially downgraded on the basis of study design, starting with a rating of –2. This accounts for selection bias and so non randomised intervention studies are not downgraded any further on that domain. Non-randomised evidence was assessed against the remaining domains used for RCTs in Table 3, and downgraded further as appropriate.

4.3.4.1.2 Indirectness

Indirectness refers to the extent to which the populations, interventions, comparisons and outcome measures are dissimilar to those defined in the inclusion criteria for the reviews. Indirectness is important when these differences are expected to contribute to a difference in effect size, or may affect the balance of harms and benefits considered for an intervention. As for the risk of bias, each outcome had its indirectness assessed within each study first. For each study, if there were no sources of indirectness, indirectness was given a rating of 0. If there was indirectness in just 1 source (for example in terms of population), indirectness was given a 'serious' rating of −1, but if there was

indirectness in 2 or more sources (for example, in terms of population and treatment) the indirectness was given a 'very serious' rating of −2. A weighted average score was then calculated across all studies contributing to the outcome by taking into account study precision. For example, if the most precise studies tended to have an indirectness score of −1 each for that outcome, the overall score for that outcome would tend towards −1.

4.3.4.1.3 Inconsistency

Inconsistency refers to an unexplained heterogeneity of results for an outcome across different studies. When estimates of the treatment effect across studies differ widely, this suggests true differences in the underlying treatment effect, which may be due to differences in populations, settings or doses. When heterogeneity existed within an outcome (chi-squared $p<0.1$, or $I^2>50\%$), but no plausible explanation could be found, the quality of evidence for that outcome was downgraded. Inconsistency for that outcome was given a 'serious' score of −1 if the I^2 was 50–74%, and a 'very serious' score of −2 if the I^2 was 75% or more.

If inconsistency could be explained based on prespecified subgroup analysis (that is, each subgroup had an $I^2<50\%$), the committee took this into account and considered whether to make separate recommendations on new outcomes based on the subgroups defined by the assumed explanatory factors. In such a situation the quality of evidence was not downgraded for those emergent outcomes.

Since the inconsistency score was based on the meta-analysis results, the score represented the whole outcome and so weighted averaging across studies was not necessary.

4.3.4.1.4 Imprecision

The criteria applied for imprecision were based on the 95% CIs for the pooled estimate of effect, and the minimal important differences (MID) for the outcome. The MIDs are the threshold for appreciable benefits and harms, separated by a zone either side of the line of no effect where there is assumed to be no clinically important effect. If either end of the 95% CI of the overall estimate of effect crossed 1 of the MID lines, imprecision was regarded as serious and a 'serious' score of −1 was given. This was because the overall result, as represented by the span of the confidence interval, was consistent with 2 interpretations as defined by the MID (for example, both no clinically important effect and clinical benefit were possible interpretations). If both MID lines were crossed by either or both ends of the 95% CI then imprecision was regarded as very serious and a 'very serious' score of −2 was given. This was because the overall result was consistent with all 3 interpretations defined by the MID (no clinically important effect, clinical benefit and clinical harm). This is illustrated in Figure 3. As for inconsistency, since the imprecision score was based on the meta-analysis results, the score represented the whole outcome and so weighted averaging across studies was not necessary.

The position of the MID lines is ideally determined by values reported in the literature. 'Anchor-based' methods aim to establish clinically meaningful changes in a continuous outcome variable by relating or 'anchoring' them to patient-centred measures of clinical effectiveness that could be regarded as gold standards with a high level of face validity. For example, a MID for an outcome could be defined by the minimum amount of change in that outcome necessary to make patients feel their quality of life had 'significantly improved'. MIDs in the literature may also be based on expert clinician or consensus opinion concerning the minimum amount of change in a variable deemed to affect quality of life or health. For binary variables, any MIDs reported in the literature will inevitably be based on expert consensus, as such MIDs relate to all-or-nothing population effects rather than measurable effects on an individual, and so are not amenable to patient-centred 'anchor' methods.

In the absence of values identified in the literature, the alternative approach to deciding on MID levels is the 'default' method, as follows:

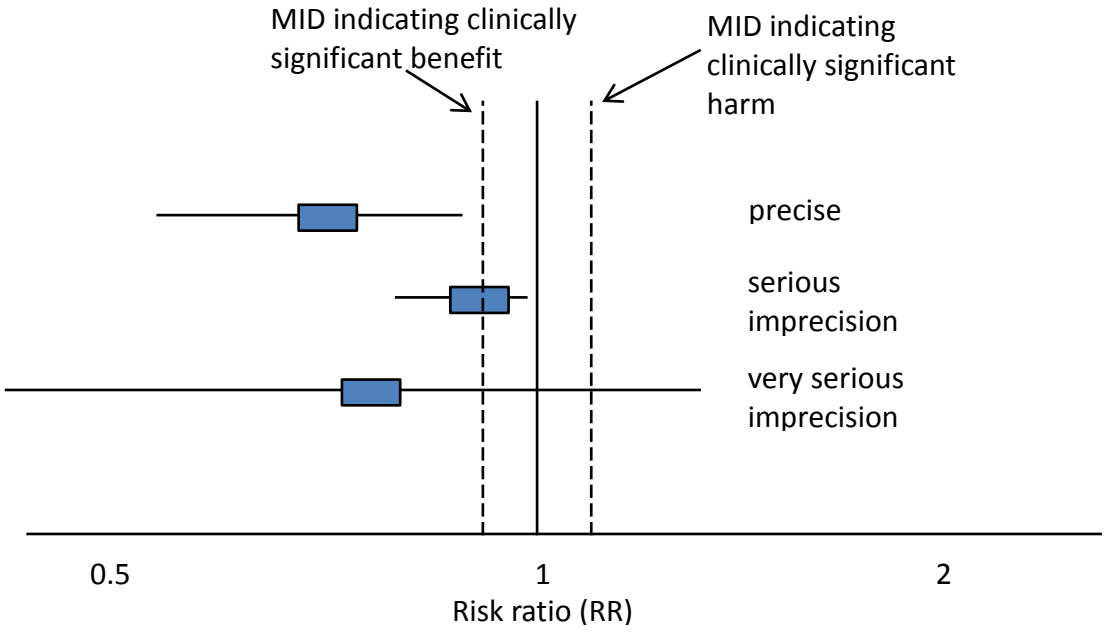
- For categorical outcomes the MIDs were taken to be RRs of 0.75 and 1.25. For 'positive' outcomes such as 'patient satisfaction', the RR of 0.75 is taken as the line denoting the boundary between no clinically important effect and a clinically significant harm, whilst the RR of 1.25 is taken as the line denoting the boundary between no clinically important effect and a clinically significant benefit. For 'negative' outcomes such as 'bleeding', the opposite occurs, so the RR of 0.75 is taken as the line denoting the boundary between no clinically important effect and a clinically significant benefit, whilst the RR of 1.25 is taken as the line denoting the boundary between no clinically important effect and a clinically significant harm.
- For continuous outcome variables the MID was taken as half the median baseline standard deviation of that variable, across all studies in the meta-analysis. Hence the MID denoting the minimum clinically significant benefit was positive for a 'positive' outcome (for example, a quality of life measure where a higher score denotes better health), and negative for a 'negative' outcome (for example, a visual analogue scale [VAS] pain score). Clinically significant harms will be the converse of these. If baseline values are unavailable, then half the median comparator group standard deviation of that variable will be taken as the MID.
- If standardised mean differences have been used, then the MID will be set at the absolute value of +0.5. This follows because standardised mean differences are mean differences normalised to the pooled standard deviation of the 2 groups, and are thus effectively expressed in units of 'numbers of standard deviations'. The 0.5 MID value in this context therefore indicates half a standard deviation, the same definition of MID as used for non-standardised mean differences.

The default MID value was subject to amendment after discussion with the committee. If the committee decided that the MID level should be altered, after consideration of absolute as well as relative effects, this was allowed, provided that any such decision was not influenced by any bias towards making stronger or weaker recommendations for specific outcomes.

For this guideline, no appropriate MIDs for continuous or dichotomous outcomes were found in the literature, and so the default method was adopted.

Resource use outcomes (such as re-admissions) are typically referred to as negative outcomes because they have an opportunity cost. Of course, this need not necessarily be a negative outcome from the patient/clinician's perspective, if that is the best place for someone with that condition to be treated. However, it is a process outcome and in the context of a whole set of outcomes, it would be double counting to include both health gain (survival and quality of life) and re-admission as positive outcomes. In this context, the re-admission should be seen as a necessary negative that has to be balanced against the positive health outcomes.

Figure 3: Illustration of precise and imprecise outcomes based on the 95% CI of dichotomous outcomes in a forest plot (Note that all 3 results would be pooled estimates, and would not, in practice, be placed on the same forest plot)



4.3.4.1.5 Overall grading of the quality of clinical evidence

Once an outcome had been appraised for the main quality elements, as above, an overall quality grade was calculated for that outcome. The scores (0, −1 or −2) from each of the main quality elements were summed to give a score that could be anything from 0 (the best possible) to −8 (the worst possible). However scores were capped at −3. This final score was then applied to the starting grade that had originally been applied to the outcome by default, based on study design. All RCTs started as High and the overall quality became Moderate, Low or Very Low if the overall score was −1, −2 or −3 points respectively. The significance of these overall ratings is explained in Table 4. The reasons for downgrading in each case were specified in the footnotes of the GRADE tables.

Observational studies started at Low, and so a score of −1 would be enough to take the grade to the lowest level of Very Low. Observational studies could, however, be upgraded if there was a large magnitude of effect or a dose-response gradient.

Table 4: Overall quality of outcome evidence in GRADE

Level	Description
High	Further research is very unlikely to change our confidence in the estimate of effect
Moderate	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Low	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
Very low	Any estimate of effect is very uncertain

4.3.4.2 Prognostic reviews

The quality of evidence for prognostic studies was evaluated according to the criteria given in Table 5. If data were meta-analysed, the quality for pooled studies was presented. If the data were not pooled, then a quality rating was presented for each study.

Table 5: Description of quality elements for prospective studies

Quality element	Description of cases where the quality measure would be downgraded
Study design	Case–control studies rather than prospective cohort studies
Patient recruitment	If potential for selection bias
Validity of risk factor measure(s)	If non-validated and no reasonable face validity
Validity of outcome measure	If non-validated and no reasonable face validity
Blinding	If assessors of outcome not blinded to risk factor measurement (or vice versa)
Adequate duration of follow-up (or retrospective duration)	If follow-up (or retrospective) period inadequate to allow events to occur, or retrospective period so short that causality is in doubt because the outcome may have preceded the risk factor
Confounder consideration	If there is a lack of consideration of all reasonable confounders in a multivariable analysis
Attrition	If attrition is too high and there is no attempt to adjust for this
Directness	If the population, risk factors or outcome differ from that in the review question

4.3.4.2.1 Inconsistency

Inconsistency was assessed as for intervention studies.

4.3.4.2.2 Imprecision

In meta-analysed outcomes, or for non-pooled outcomes, the position of the 95% CIs in relation to the null line determined the existence of imprecision. If the 95% CI did not cross the null line then no serious imprecision was recorded. If the 95% CI crossed the null line then serious imprecision was recorded.

4.3.4.2.3 Overall grading

Because prognostic reviews were not usually based on multiple outcomes per study, quality rating was assigned by study. However if there was more than 1 outcome involved in a study, then the quality rating of the evidence statements for each outcome was adjusted accordingly. For example, if one outcome was based on an invalidated measurement method, but another outcome in the same study was not, the second outcome would be graded 1 grade higher than the first outcome.

Quality rating started at High for prospective studies, and each major limitation brought the rating down by 1 increment to a minimum grade of Very Low, as explained for interventional reviews. For prognostic reviews prospective cohort studies with a multivariate analysis are regarded as the gold standard because RCTs are usually inappropriate for these types of review for ethical or pragmatic reasons. Furthermore, if the study is looking at more than 1 risk factor of interest then randomisation would be inappropriate as it can only be applied to 1 of the risk factors.

4.3.5 Assessing clinical importance

The committee assessed the evidence by outcome in order to determine if there was, or potentially was, a clinically important benefit, a clinically important harm or no clinically important difference between interventions. To facilitate this, binary outcomes were converted into absolute risk differences (ARDs) using GRADEpro[13] software: the median control group risk across studies was used to calculate the ARD and its 95% CI from the pooled risk ratio.

The assessment of clinical benefit, harm, or no benefit or harm was based on the point estimate of absolute effect for intervention studies taking into account the comparison event rate.

4.3.6 Clinical evidence statements

Clinical evidence statements are summary statements that are included in each review chapter, and which summarise the key features of the clinical effectiveness evidence presented. The wording of the evidence statements reflects the certainty or uncertainty in the estimate of effect. The evidence statements are presented by outcome and encompass the following key features of the evidence:

- The number of studies and the number of participants for a particular outcome.
- An indication of the direction of clinical importance (if one treatment is beneficial or harmful compared to the other, or whether there is no difference between the 2 tested treatments).
- A description of the overall quality of the evidence (GRADE overall quality).

4.4 Identifying and analysing evidence of cost-effectiveness

The committee is required to make decisions based on the best available evidence of both clinical effectiveness and cost-effectiveness. Guideline recommendations should be based on the expected costs of the different options in relation to their expected health benefits (that is, their 'cost-effectiveness'). They should not be based on the total implementation cost.[19] Thus, if the evidence suggests that a strategy provides significant health benefits at an acceptable cost per patient treated then it should be recommended, even if it would be expensive to implement across the whole population.

Health economic evidence was sought relating to the key clinical issues being addressed in the guideline. Health economists:

- Undertook a systematic review of the published economic literature.
- Undertook new cost-effectiveness analysis in priority areas.

4.4.1 Literature review

The health economists:

- Identified potentially relevant studies for each review question from the health economic search results by reviewing titles and abstracts. Full papers were then obtained.
- Reviewed full papers against pre-specified inclusion and exclusion criteria to identify relevant studies (see below for details).
- Critically appraised relevant studies using economic evaluations checklists as specified in the NICE guidelines manual.[19]
- Extracted key information about the studies' methods and results into health economic evidence tables (included in Appendix E of each chapter).
- Generated summaries of the evidence in NICE health economic evidence profile tables (included in the relevant chapter for each review question) – see below for details.

4.4.1.1 Inclusion and exclusion criteria

Full economic evaluations (studies comparing costs and health consequences of alternative courses of action: cost-utility, cost-effectiveness, cost-benefit and cost-consequences analyses) and comparative costing studies that addressed the review question in the relevant population were considered potentially includable as health economic evidence.

Studies that only reported cost per hospital (not per patient), or only reported average cost-effectiveness without disaggregated costs and effects were excluded. Literature reviews, abstracts, posters, letters, editorials, comment articles, unpublished studies and studies not in English were excluded. Studies published before 2005 and studies from non-OECD countries or the USA were also excluded, on the basis that the applicability of such studies to the present UK NHS context is likely to be too low for them to be helpful for decision-making.

Remaining health economic studies were prioritised for inclusion based on their relative applicability to the development of this guideline and the study limitations. For example, if a high quality, directly applicable UK analysis was available, then other less relevant studies may not have been included. Where exclusions occurred on this basis, this is noted in the relevant section.

For more details about the assessment of applicability and methodological quality see Table 6 below and the economic evaluation checklist (Appendix H of the 2014 Developing NICE guidelines: the manual[19]) and the health economics review protocol in Appendix A of the Health Economic modelling report.

When no relevant health economic studies were found from the economic literature review, relevant UK NHS unit costs related to the compared interventions were presented to the committee to inform the possible economic implications of the recommendations.

4.4.1.2 NICE health economic evidence profiles

NICE health economic evidence profile tables were used to summarise cost and cost-effectiveness estimates for the included health economic studies in each review chapter. The health economic evidence profile shows an assessment of applicability and methodological quality for each economic study, with footnotes indicating the reasons for the assessment. These assessments were made by the health economist using the economic evaluation checklist from the NICE guidelines manual. [19] It also shows the incremental costs, incremental effects (for example, quality-adjusted life years [QALYs]) and incremental cost-effectiveness ratio (ICER) for the base case analysis in the study, as well as information about the assessment of uncertainty in the analysis - see Table 6 for more details.

When a non-UK study was included in the profile, the results were converted into pounds sterling using the appropriate purchasing power parity.[27]

Table 6: Content of NICE health economic evidence profile

Item	Description
Study	Surname of first author, date of study publication and country perspective with a reference to full information on the study.
Applicability	An assessment of applicability of the study to this guideline, the current NHS situation and NICE decision-making:[(a)] • Directly applicable – the study meets all applicability criteria, or fails to meet 1 or more applicability criteria but this is unlikely to change the conclusions about cost-effectiveness. • Partially applicable – the study fails to meet 1 or more applicability criteria, and this could change the conclusions about cost-effectiveness. • Not applicable – the study fails to meet 1 or more of the applicability criteria, and this is likely to change the conclusions about cost-effectiveness. Such studies

Item	Description
	would usually be excluded from the review.
Limitations	An assessment of methodological quality of the study:[(a)] • Minor limitations – the study meets all quality criteria, or fails to meet 1 or more quality criteria, but this is unlikely to change the conclusions about cost-effectiveness. • Potentially serious limitations – the study fails to meet 1 or more quality criteria, and this could change the conclusions about cost-effectiveness. • Very serious limitations – the study fails to meet 1 or more quality criteria, and this is highly likely to change the conclusions about cost-effectiveness. Such studies would usually be excluded from the review.
Other comments	Information about the design of the study and particular issues that should be considered when interpreting it.
Incremental cost	The mean cost associated with one strategy minus the mean cost of a comparator strategy.
Incremental effects	The mean QALYs (or other selected measure of health outcome) associated with one strategy minus the mean QALYs of a comparator strategy.
Cost-effectiveness	Incremental cost-effectiveness ratio (ICER): the incremental cost divided by the incremental effects (usually in £ per QALY gained).
Uncertainty	A summary of the extent of uncertainty about the ICER reflecting the results of deterministic or probabilistic sensitivity analyses, or stochastic analyses of trial data, as appropriate.

(a) Applicability and limitations were assessed using the economic evaluation checklist in Appendix H of the 2014 NICE guidelines manual.[19]

4.4.2 Undertaking new health economic analysis

As well as reviewing the published health economic literature for each review question, as described above, new health economic analysis was undertaken by the health economists in selected areas. Priority areas for new analysis were agreed by the committee after formation of the review questions and consideration of the existing health economic evidence.

The committee identified the following as the highest priority areas for original health economic modelling:

- Early consultant review (Rapid Assessment and Treatment in the emergency department)
- Frequency of consultant review on medical wards
- Extended consultant hours in the Acute Medicine Unit
- Extended access to physiotherapy and occupational therapy (on medical wards and in the emergency department).

These were areas where there was not existing evidence of cost effectiveness but where there was sufficient evidence of effectiveness to undertake modelling. Simpler costing analyses were deemed sufficient / feasible for the following questions:

- Multidisciplinary teams
- Standardised methods of transfer.

The following general principles were adhered to in developing the cost-effectiveness analysis:

- Methods were consistent with the NICE reference case for interventions with health outcomes in NHS settings.[19,21]
- The committee was involved in the design of the model, selection of inputs and interpretation of the results.

- Model inputs were based on the systematic review of the clinical literature supplemented with other published data sources where possible.
- When published data were not available, committee expert opinion was used to populate the model.
- Model inputs and assumptions were reported fully and transparently.
- The results were subject to sensitivity analysis and limitations were discussed.
- The model was subjected to peer-review by another health economist.

Full methods for the cost-effectiveness analysis for are described in the Health Economics modelling chapter (chapter 41).

4.4.3 Inputs for health economic models

The evidence from the guideline's systematic review was not sufficient to populate the health economic models. The following sources were used:

- An elicitation exercise was conducted among the Health Economics Subgroup members to obtain treatment effects. These effect sizes were invariably conservative compared with those observed in the literature.
- Systematic literature reviews were undertaken for:
  - The consequences of being a medical outlier
  - The impact of being admitted at the weekend compared with being admitted in the week.
- Systematic searches with informal reviews were conducted for:
  - Survival after an acute medical emergency
  - Utility after an acute medical emergencies
  - Utility and frailty
  - Health care cost and frailty
  - National Early Warning Score (NEWS)
  - Discrete event simulations of services for acute medicine
- Bespoke data analysis was requested including:
  - Detailed analysis of a large district general hospital were conducted, covering pathways of care, discharge destination, length of stay and mortality
  - Descriptive statistics of patients admitted for AME from hospital episode statistics (HES)
  - Descriptive statistics of patients admitted for AME from the audit of the Society for Acute Medicine.
- Standardised mortality ratios were estimated for AMEs using HES linked to ONS data.
- Standard sources were used for unit costs.

Full details are described in the Health Economics modelling chapter (chapter 41).

4.4.4 Cost-effectiveness criteria

NICE's report 'Social value judgements: principles for the development of NICE guidance' sets out the principles that committees should consider when judging whether an intervention offers good value for money.[20] In general, an intervention was considered to be cost-effective (given that the estimate was considered plausible) if either of the following criteria applied:

- the intervention dominated other relevant strategies (that is, it was both less costly in terms of resource use and more clinically effective compared with all the other relevant alternative strategies), or

- the intervention cost less than £20,000 per QALY gained compared with the next best strategy.

If the committee recommended an intervention that was estimated to cost more than £20,000 per QALY gained, or did not recommend one that was estimated to cost less than £20,000 per QALY gained, then the reasons for this decision are discussed explicitly in the 'Recommendations and link to evidence' section of the relevant chapter. In this circumstance, reference would be made to issues regarding the plausibility of the estimate or to the factors set out in 'Social value judgements: principles for the development of NICE guidance'.[20]

When QALYs are not used in the analysis, results are difficult to interpret unless one strategy dominates the others with respect to every relevant health outcome and cost.

A simulation model was a key part of the economic modelling. This allowed the following patient flow outcomes to be evaluated for a large district general hospital:

- Number of medical outliers
- Queueing time in the ED
- 4 hour breeches in the ED

The benefits of better flow are generally captured in the cost per QALY ratio since we costed bed utilisation. Reduced medical outliers was captured in terms of the cost per QALY ratio, since there was a modest reduction in length of stay and mortality but the benefits of reduced time in ED were not explicitly modelled but considered by the committee to be an additional benefit beyond the QALY gain and cost savings.

4.4.5 In the absence of health economic evidence

When no relevant published health economic studies were found, and a new analysis was not prioritised, the committee made a qualitative judgement about cost-effectiveness by considering expected differences in resource use between options and relevant UK NHS unit costs, alongside the results of the review of clinical effectiveness evidence.

The UK NHS costs reported in the guideline are those that were presented to the committee and were correct at the time recommendations were drafted. They may have changed subsequently before the time of publication. However, we have no reason to believe they have changed substantially.

4.5 Developing recommendations

Over the course of the guideline development process, the committee was presented with:

- Evidence tables of the clinical and health economic evidence reviewed from the literature.
- Summaries of clinical and health economic evidence and quality.
- Forest plots.
- A description of the methods and results of the cost-effectiveness analyses undertaken for the guideline.

Recommendations were drafted on the basis of the committee's interpretation of the available evidence, taking into account the balance of benefits, harms and costs between different courses of action. This was either done formally in an economic model, or informally. Firstly, the net clinical benefit over harm (clinical effectiveness) was considered, focusing on the critical outcomes. When this was done informally, the committee took into account the clinical benefits and harms when one intervention was compared with another. The assessment of net clinical benefit was moderated by the importance placed on the outcomes (the committee's values and preferences), and the confidence the committee had in the evidence (evidence quality). Secondly, the committee assessed

whether the net clinical benefit justified any differences in costs between the alternative interventions.

When clinical and health economic evidence was of poor quality, conflicting or absent, the committee drafted recommendations based on its expert opinion. The considerations for making consensus-based recommendations include the balance between potential harms and benefits, the economic costs compared to the economic benefits, current practices, recommendations made in other relevant guidelines, patient preferences and equality issues. The consensus recommendations were agreed through discussions in the committee meetings. The committee also considered whether the uncertainty was sufficient to justify delaying making a recommendation to await further research, taking into account the potential harm of failing to make a clear recommendation (see Section 4.5.1 below).

The committee considered the appropriate 'strength' of each recommendation. This takes into account the quality of the evidence but is conceptually different. Some recommendations are 'strong' in that the committee believes that the vast majority of healthcare and other professionals and patients would choose a particular intervention if they considered the evidence in the same way that the committee has. This is generally the case if the benefits clearly outweigh the harms for most people and the intervention is likely to be cost-effective. However, there is often a closer balance between benefits and harms, and some patients would not choose an intervention whereas others would. This may happen, for example, if some patients are particularly averse to some side effect and others are not. In these circumstances the recommendation is generally weaker, although it may be possible to make stronger recommendations about specific groups of patients.

The committee focused on the following factors in agreeing the wording of the recommendations:

- The actions health professionals need to take.
- The information readers need to know.
- The strength of the recommendation (for example the word 'offer' was used for strong recommendations and 'consider' for weaker recommendations).
- The involvement of patients (and their carers if needed) in decisions on treatment and care.
- Consistency with NICE's standard advice on recommendations about drugs, waiting times and ineffective interventions (see Section 9.2 in the 2014 NICE guidelines manual[19]).

The main considerations specific to each recommendation are outlined in the 'Recommendations and link to evidence' sections within each chapter.

4.5.1 Research recommendations

When areas were identified for which good evidence was lacking, the committee considered making recommendations for future research. Decisions about the inclusion of a research recommendation were based on factors such as:

- the importance to patients, including patient safety or the population
- national priorities
- potential impact on the NHS and future NICE guidance
- ethical and technical feasibility.

4.5.2 Validation process

This guidance is subject to a 6-week public consultation and feedback as part of the quality assurance and peer review of the document. All comments received from registered stakeholders are responded to in turn and posted on the NICE website.

4.5.3 Updating the guideline

Following publication, and in accordance with the NICE guidelines manual, NICE will undertake a review of whether the evidence base has progressed significantly to alter the guideline recommendations and warrant an update.

4.5.4 Disclaimer

Healthcare providers need to use clinical judgement, knowledge and expertise when deciding whether it is appropriate to apply guidelines. The recommendations cited here are a guide and may not be appropriate for use in all situations. The decision to adopt any of the recommendations cited here must be made by practitioners in light of individual patient circumstances, the wishes of the patient, clinical expertise and resources.

The National Guideline Centre disclaims any responsibility for damages arising out of the use or non-use of this guideline and the literature used in support of this guideline.

4.5.5 Funding

The National Guideline Centre was commissioned by the National Institute for Health and Care Excellence to undertake the work on this guideline.

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6 Acronyms and abbreviations

Acronym	Definition
AAU	Acute assessment unit
ACP	Advanced care planning
A&E	Accident and emergency
AME	Acute medical emergency
AMU	Acute medical unit
AMAU	Acute medical admissions unit
CCOT	Critical care outreach teams
CT (scan)	Computerised Tomography
ECAU	Elderly Care Assessment Unit
ED	Emergency Department
GP	General Practitioner
ITU/ICU	Intensive care units
MAU	Medical admissions unit
MDT	Multidisciplinary team
MET	Medical Emergency Team
MIU	Minor Injuries Units
MRI	Magnetic resonance imaging
NGC	National Guideline Centre
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
RCT	Randomised control trial
RRT	Rapid Response Team
SR	Systematic review
UCC	Urgent Care Centres
WHO	World Health Organisation
WiC	Walk-in centres

7 Glossary

The NICE Glossary can be found at www.nice.org.uk/glossary.

7.1 Clinical

Term	Definition
Acute medical emergency (AME)	Life-threatening emergencies, acute exacerbation of chronic illnesses and routine health problems that need prompt action. A medical emergency can arise in anyone, for example in people: • without a previously diagnosed medical condition, • with an acute exacerbation of underlying chronic illness, • after surgery, • after trauma.
Acute medical unit (AMU)	The first point of entry for patients referred to hospital as an acute medical emergency. Also known as an acute assessment unit (AAU), a medical admissions unit (MAU) and an acute medical admissions unit (AMAU).
Advance care planning	A voluntary process of discussion about future care between an individual and their care providers, irrespective of discipline. If the individual wishes, their family and friends may be included. An ACP discussion might include: • the individual's concerns and wishes • their important values or personal goals for care • their understanding about their illness and prognosis • their preferences and wishes for types of care or treatment that may be beneficial in the future and the availability of these. (www.endoflifecareforadults.nhs.uk)
Anxiety	Feeling or emotion of dread, apprehension, and impending disaster but not disabling as with anxiety disorders.
Comorbidities	The presence of co-existing or additional diseases with reference to an initial diagnosis or with reference to the index condition that is the subject of study. Comorbidity may affect the ability of affected individuals to function and also their survival; it may be used as a prognostic indicator for length of hospital stay, cost factors, and outcome or survival.
Creatinine	Breakdown product of creatine phosphate in muscle, and is usually produced at a fairly constant rate by the body.
Delirium	A disorder characterised by confusion; inattentiveness; disorientation; illusions; hallucinations; agitation; and in some instances autonomic nervous system over activity. It may result from toxic or metabolic conditions or structural brain lesions. (From Adams et al., Principles of Neurology, 6th ed, pp411-2)
Dementia	An acquired organic mental disorder with loss of intellectual abilities of sufficient severity to interfere with social or occupational functioning. The dysfunction is multifaceted and involves memory, behaviour, personality, judgment, attention, spatial relations, language, abstract thought, and other executive functions. The intellectual decline is usually progressive, and initially spares the level of consciousness.
Emergency Department	A medical facility specialising in emergency medicine and the acute care of patients who present without a prior appointment. Also known as an accident and emergency department (A&E)
General Practitioner	A doctor based in the community who treats patients with minor or chronic illnesses.

Term	Definition
Hospice	Facilities or services which are especially devoted to providing palliative and supportive care to the patient with a terminal illness and to the patient's family.
Hospital	An institution providing medical and surgical treatment and nursing care for sick or injured people.
Individualised care plan	A record of any discussions and decision made for clinical care in the last days of life (not an advance care plan).
Multidisciplinary team	All members of the healthcare and social care team that provide care, including clinical staff and social care staff in hospital, community and nursing home or residential settings.
Paramedic	A person trained to give emergency medical care to people who are seriously ill with the aim of stabilising them before they are taken to hospital.
Pain	Highly unpleasant physical sensation caused by illness or injury.
Palliative care	Care alleviating symptoms without curing the underlying disease.
Pharmacist	A person who is professionally qualified to prepare and dispense medicinal drugs.
Polypharmacy	The use of 4 or more medications.
Psychiatry	The study and treatment of mental illness.
Recovery	Recuperation. A return to a normal state of health, mind, or strength.
Rehabilitation	The action of restoring someone to health or normal life through training and therapy after an illness.
Therapy	Treatment intended to relieve or the treatment of psychological disorders.
Ward	A separate room in a hospital, typically allocated to a particular type of patient.

7.2 Methodological

Term	Definition
Abstract	Summary of a study, which may be published alone or as an introduction to a full scientific paper.
Algorithm (in guidelines)	A flow chart of the clinical decision pathway described in the guideline, where decision points are represented with boxes, linked with arrows.
Allocation concealment	The process used to prevent advance knowledge of group assignment in an RCT. The allocation process should be impervious to any influence by the individual making the allocation, by being administered by someone who is not responsible for recruiting participants.
Applicability	How well the results of a study or NICE evidence review can answer a clinical question or be applied to the population being considered.
Arm (of a clinical study)	Subsection of individuals within a study who receive 1 particular intervention, for example placebo arm.
Association	Statistical relationship between 2 or more events, characteristics or other variables. The relationship may or may not be causal.
Baseline	The initial set of measurements at the beginning of a study (after run-in period where applicable), with which subsequent results are compared.
Bayesian analysis	A method of statistics, where a statistic is estimated by combining established information or belief (the 'prior') with new evidence (the 'likelihood') to give a revised estimate (the 'posterior').
Before-and-after study	A study that investigates the effects of an intervention by measuring particular characteristics of a population both before and after taking the

Term	Definition
	intervention, and assessing any change that occurs.
Bias	Influences on a study that can make the results look better or worse than they really are. (Bias can even make it look as if a treatment works when it does not.) Bias can occur by chance, deliberately or as a result of systematic errors in the design and execution of a study. It can also occur at different stages in the research process, for example, during the collection, analysis, interpretation, publication or review of research data. For examples see selection bias, performance bias, information bias, confounding factor, and publication bias.
Blinding	A way to prevent researchers, doctors and patients in a clinical trial from knowing which study group each patient is in so they cannot influence the results. The best way to do this is by sorting people into study groups randomly. The purpose of 'blinding' or 'masking' is to protect against bias. A single-blinded study is one in which people do not know which study group they are in (for example whether they are taking the experimental drug or a placebo). A double-blinded study is one in which neither patients nor the researchers and doctors know which study group the patients are in. A triple blind study is one in which neither the patients, clinicians or the people carrying out the statistical analysis know which treatment people received.
Carer (caregiver)	Someone who looks after family, partners or friends in need of help because they are ill, frail or have a disability.
Case–control study	A study to find out the cause(s) of a disease or condition. This is done by comparing a group of people who have the disease or condition (cases) with a group of people who do not have it (controls) but who are otherwise as similar as possible (in characteristics thought to be unrelated to the causes of the disease or condition). This means the researcher can look for aspects of their lives that differ to see if they may cause the condition. For example, a group of people with lung cancer might be compared with a group of people the same age that do not have lung cancer. The researcher could compare how long both groups had been exposed to tobacco smoke. Such studies are retrospective because they look back in time from the outcome to the possible causes of a disease or condition.
Case series	Report of a number of cases of a given disease, usually covering the course of the disease and the response to treatment. There is no comparison (control) group of people.
Clinical efficacy	The extent to which an intervention is active when studied under controlled research conditions.
Clinical effectiveness	How well a specific test or treatment works when used in the 'real world' (for example, when used by a doctor with a person at home), rather than in a carefully controlled clinical trial. Trials that assess clinical effectiveness are sometimes called management trials. Clinical effectiveness is not the same as efficacy.
Clinician	A healthcare professional who provides patient care. For example, a doctor, nurse or physiotherapist.
Cochrane Review	The Cochrane Library consists of a regularly updated collection of evidence-based medicine databases including the Cochrane Database of Systematic Reviews (reviews of randomised controlled trials prepared by the Cochrane Collaboration).
Cohort study	A study with 2 or more groups of people – cohorts – with similar characteristics. One group receives a treatment, is exposed to a risk factor or has a particular symptom and the other group does not. The study follows their progress over time and records what happens. See also

Term	Definition
	observational study.
Comorbidity	A disease or condition that someone has in addition to the health problem being studied or treated.
Comparability	Similarity of the groups in characteristics likely to affect the study results (such as health status or age).
Concordance	This is a recent term whose meaning has changed. It was initially applied to the consultation process in which doctor and patient agree therapeutic decisions that incorporate their respective views, but now includes patient support in medicine taking as well as prescribing communication. Concordance reflects social values but does not address medicine-taking and may not lead to improved adherence.
Confidence interval (CI)	There is always some uncertainty in research. This is because a small group of people are studied to predict the effects of a treatment on the wider population. The confidence interval is a way of expressing how certain we are about the findings from a study, using statistics. It gives a range of results that is likely to include the 'true' value for the population. The CI is usually stated as '95% CI', which means that the range of values has a 95 in a 100 chance of including the 'true' value. For example, a study may state that 'based on our sample findings, we are 95% certain that the 'true' population blood pressure is not higher than 150 and not lower than 110'. In such a case the 95% CI would be 110 to 150. A wide confidence interval indicates a lack of certainty about the true effect of the test or treatment – often because a small group of patients has been studied. A narrow confidence interval indicates a more precise estimate (for example, if a large number of patients have been studied).
Confounding factor	Something that influences a study and can result in misleading findings if it is not understood or appropriately dealt with. For example, a study of heart disease may look at a group of people that exercises regularly and a group that does not exercise. If the ages of the people in the 2 groups are different, then any difference in heart disease rates between the 2 groups could be because of age rather than exercise. Therefore age is a confounding factor.
Consensus methods	Techniques used to reach agreement on a particular issue. Consensus methods may be used to develop NICE guidance if there is not enough good quality research evidence to give a clear answer to a question. Formal consensus methods include Delphi and nominal group techniques.
Control group	A group of people in a study who do not receive the treatment or test being studied. Instead, they may receive the standard treatment (sometimes called 'usual care') or a dummy treatment (placebo). The results for the control group are compared with those for a group receiving the treatment being tested. The aim is to check for any differences. Ideally, the people in the control group should be as similar as possible to those in the treatment group, to make it as easy as possible to detect any effects due to the treatment.
Cost-effectiveness analysis (CEA)	Cost-effectiveness analysis is one of the tools used to carry out an economic evaluation. The benefits are expressed in non-monetary terms related to health, such as symptom-free days, heart attacks avoided, deaths avoided or life years gained (that is, the number of years by which life is extended as a result of the intervention).
Cost–utility analysis (CUA)	Cost–utility analysis is one of the tools used to carry out an economic evaluation. The benefits are assessed in terms of both quality and duration of life, and expressed as quality-adjusted life years (QALYs). See also utility.
Credible interval (CrI)	The Bayesian equivalent of a confidence interval.

Term	Definition
Deterministic analysis	In economic evaluation, this is an analysis that uses a point estimate for each input. In contrast, see Probabilistic analysis
Diagnostic odds ratio	The diagnostic odds ratio is a measure of the effectiveness of a diagnostic test. It is defined as the ratio of the odds of the test being positive if the subject has a disease relative to the odds of the test being positive if the subject does not have the disease.
Disutility	The loss of quality of life associated with having a disease or condition. See Utility
Dominance	A health economics term. When comparing tests or treatments, an option that is both less effective and costs more is said to be 'dominated' by the alternative.
Drop-out	A participant who withdraws from a trial before the end.
Economic evaluation	An economic evaluation is used to assess the cost effectiveness of healthcare interventions (that is, to compare the costs and benefits of a healthcare intervention to assess whether it is worth doing). The aim of an economic evaluation is to maximise the level of benefits – health effects – relative to the resources available. It should be used to inform and support the decision-making process; it is not supposed to replace the judgement of healthcare professionals. There are several types of economic evaluation: cost–benefit analysis, cost–consequences analysis, cost-effectiveness analysis, cost–minimisation analysis and cost–utility analysis. They use similar methods to define and evaluate costs, but differ in the way they estimate the benefits of a particular drug, programme or intervention.
Effect (as in effect measure, treatment effect, estimate of effect, effect size)	A measure that shows the magnitude of the outcome in 1 group compared with that in a control group. For example, if the absolute risk reduction is shown to be 5% and it is the outcome of interest, the effect size is 5%. The effect size is usually tested, using statistics, to find out how likely it is that the effect is a result of the treatment and has not just happened by chance (that is, to see if it is statistically significant).
Effectiveness	How beneficial a test or treatment is under usual or everyday conditions, compared with doing nothing or opting for another type of care.
Efficacy	How beneficial a test, treatment or public health intervention is under ideal conditions (for example, in a laboratory), compared with doing nothing or opting for another type of care.
EQ-5D (EuroQol 5 dimensions)	A standardised instrument used to measure health-related quality of life. It provides a single index value for health status.
Evidence	Information on which a decision or guidance is based. Evidence is obtained from a range of sources including randomised controlled trials, observational studies, expert opinion (of clinical professionals or patients).
Exclusion criteria (literature review)	Explicit standards used to decide which studies should be excluded from consideration as potential sources of evidence.
Exclusion criteria (clinical study)	Criteria that define who is not eligible to participate in a clinical study.
Extrapolation	An assumption that the results of studies of a specific population will also hold true for another population with similar characteristics.
Follow-up	Observation over a period of time of an individual, group or initially defined population whose appropriate characteristics have been assessed in order to observe changes in health status or health-related variables.
Generalisability	The extent to which the results of a study hold true for groups that did not

Term	Definition
	participate in the research. See also external validity.
Gold standard	A method, procedure or measurement that is widely accepted as being the best available to test for or treat a disease.
GRADE, GRADE profile	A system developed by the GRADE Working Group to address the shortcomings of present grading systems in healthcare. The GRADE system uses a common, sensible and transparent approach to grading the quality of evidence. The results of applying the GRADE system to clinical trial data are displayed in a table known as a GRADE profile.
Harms	Adverse effects of an intervention.
Health economics	Study or analysis of the cost of using and distributing healthcare resources.
Health-related quality of life (HRQoL)	A measure of the effects of an illness to see how it affects someone's day-to-day life.
Heterogeneity or Lack of homogeneity	The term is used in meta-analyses and systematic reviews to describe when the results of a test or treatment (or estimates of its effect) differ significantly in different studies. Such differences may occur as a result of differences in the populations studied, the outcome measures used or because of different definitions of the variables involved. It is the opposite of homogeneity.
Imprecision	Results are imprecise when studies include relatively few people and few events and thus have wide confidence intervals around the estimate of effect.
Inclusion criteria (literature review)	Explicit criteria used to decide which studies should be considered as potential sources of evidence.
Incremental analysis	The analysis of additional costs and additional clinical outcomes with different interventions.
Incremental cost	The extra cost linked to using 1 test or treatment rather than another. Or the additional cost of doing a test or providing a treatment more frequently.
Incremental cost-effectiveness ratio (ICER)	The difference in the mean costs in the population of interest divided by the differences in the mean outcomes in the population of interest for 1 treatment compared with another.
Indirectness	The available evidence is different from the review question being addressed, in terms of PICO (population, intervention, comparison and outcome).
Intention-to-treat analysis (ITT)	An assessment of the people taking part in a clinical trial, based on the group they were initially (and randomly) allocated to. This is regardless of whether or not they dropped out, fully complied with the treatment or switched to an alternative treatment. Intention-to-treat analyses are often used to assess clinical effectiveness because they mirror actual practice: that is, not everyone complies with treatment and the treatment people receive may be changed according to how they respond to it.
Intervention	In medical terms this could be a drug treatment, surgical procedure, diagnostic or psychological therapy. Examples of public health interventions could include action to help someone to be physically active or to eat a more healthy diet.
Kappa statistic	A statistical measure of inter-rater agreement that takes into account the agreement occurring by chance.
Lasting power of attorney	A lasting power of attorney (LPA) is a legal document that lets individuals (the 'donor') appoint one or more people (known as 'attorneys') to help them make decisions or to make decisions on their behalf. This gives more control over what happens to them if, for example, they have an accident or an illness and can't make decisions at the time they need to be made

Term	Definition
	(they 'lack mental capacity'). There are 2 types: 'health and welfare' and 'property and financial affairs'. 'Health and welfare' is of relevance in the context of this guideline document.
Length of stay	The total number of days a participant stays in hospital.
Licence	See 'Product licence'.
Life years gained	Mean average years of life gained per person as a result of the intervention compared with an alternative intervention.
Likelihood ratio	The likelihood ratio combines information about the sensitivity and specificity. It tells you how much a positive or negative result changes the likelihood that a person would have the disease. The likelihood ratio of a positive test result (LR+) is sensitivity divided by (1 minus specificity).
Long-term care	Residential care in a home that may include skilled nursing care and help with everyday activities. This includes nursing homes and residential homes.
Logistic regression or Logit model	In statistics, logistic regression is a type of analysis used for predicting the outcome of a binary dependent variable based on 1 or more predictor variables. It can be used to estimate the log of the odds (known as the 'logit').
Loss to follow-up	A person, or the proportion of people, actively participating in a clinical trial at the beginning, but whom the researchers were unable to trace or contact by the point of follow-up in the trial
Meta-analysis	A method often used in systematic reviews. Results from several studies of the same test or treatment are combined to estimate the overall effect of the treatment.
Multivariate model	A statistical model for analysis of the relationship between 2 or more predictor (independent) variables and the outcome (dependent) variable.
Number needed to treat (NNT)	The average number of people who need to be treated to get a positive outcome. For example, if the NNT is 4, then 4 people would have to be treated to ensure 1 of them gets better. The closer the NNT is to 1, the better the treatment. For example, if you give a stroke prevention drug to 20 people before 1 stroke is prevented, the number needed to treat is 20. See also number needed to harm, absolute risk reduction.
Observational study	Individuals or groups are observed or certain factors are measured. No attempt is made to affect the outcome. For example, an observational study of a disease or treatment would allow 'nature' or usual medical care to take its course. Changes or differences in 1 characteristic (for example, whether or not people received a specific treatment or intervention) are studied without intervening. There is a greater risk of selection bias than in experimental studies.
Odds ratio	Odds are a way to represent how likely it is that something will happen (the probability). An odds ratio compares the probability of something in 1 group with the probability of the same thing in another. An odds ratio of 1 between 2 groups would show that the probability of the event (for example a person developing a disease, or a treatment working) is the same for both. An odds ratio greater than 1 means the event is more likely in the first group. An odds ratio less than 1 means that the event is less likely in the first group. Sometimes probability can be compared across more than 2 groups – in this case, 1 of the groups is chosen as the 'reference category', and the odds ratio is calculated for each group compared with the reference category. For example, to compare the risk of dying from lung cancer for

Term	Definition
	non-smokers, occasional smokers and regular smokers, non-smokers could be used as the reference category. Odds ratios would be worked out for occasional smokers compared with non-smokers and for regular smokers compared with non-smokers. See also confidence interval, relative risk, risk ratio.
Opportunity cost	The loss of other healthcare programmes displaced by investment in or introduction of another intervention. This may be best measured by the health benefits that could have been achieved had the money been spent on the next best alternative healthcare intervention.
Outcome	The impact that a test, treatment, policy, programme or other intervention has on a person, group or population. Outcomes from interventions to improve the public's health could include changes in knowledge and behaviour related to health, societal changes (for example, a reduction in crime rates) and a change in people's health and wellbeing or health status. In clinical terms, outcomes could include the number of people who fully recover from an illness or the number of hospital admissions, and an improvement or deterioration in someone's health, functional ability, symptoms or situation. Researchers should decide what outcomes to measure before a study begins.
P value	The p value is a statistical measure that indicates whether or not an effect is statistically significant. For example, if a study comparing 2 treatments found that 1 seems more effective than the other, the p value is the probability of obtaining these results by chance. By convention, if the p value is below 0.05 (that is, there is less than a 5% probability that the results occurred by chance) it is considered that there probably is a real difference between treatments. If the p value is 0.001 or less (less than a 1% probability that the results occurred by chance), the result is seen as highly significant. If the p value shows that there is likely to be a difference between treatments, the confidence interval describes how big the difference in effect might be.
Placebo	A fake (or dummy) treatment given to participants in the control group of a clinical trial. It is indistinguishable from the actual treatment (which is given to participants in the experimental group). The aim is to determine what effect the experimental treatment has had – over and above any placebo effect caused because someone has received (or thinks they have received) care or attention.
Polypharmacy	The use or prescription of multiple medications.
Posterior distribution	In Bayesian statistics this is the probability distribution for a statistic based after combining established information or belief (the prior) with new evidence (the likelihood).
Power (statistical)	The ability to demonstrate an association when one exists. Power is related to sample size; the larger the sample size, the greater the power and the lower the risk that a possible association could be missed.
Pre-test probability	In diagnostic tests: The proportion of people with the target disorder in the population at risk at a specific time point or time interval. Prevalence may depend on how a disorder is diagnosed.
Prevalence	See Pre-test probability.
Prior distribution	In Bayesian statistics this is the probability distribution for a statistic based on previous evidence or belief.
Primary care	Healthcare delivered outside hospitals. It includes a range of services provided by GPs, nurses, health visitors, midwives and other healthcare professionals and allied health professionals such as dentists, pharmacists

Term	Definition
	and opticians.
Primary outcome	The outcome of greatest importance, usually the 1 in a study that the power calculation is based on.
Product licence	An authorisation from the MHRA to market a medicinal product.
Prognosis	A probable course or outcome of a disease. Prognostic factors are person or disease characteristics that influence the course. Good prognosis is associated with low rate of undesirable outcomes; poor prognosis is associated with a high rate of undesirable outcomes.
Prospective study	A research study in which the health or other characteristic of participants is monitored (or 'followed up') for a period of time, with events recorded as they happen. This contrasts with retrospective studies.
Publication bias	Publication bias occurs when researchers publish the results of studies showing that a treatment works well and don't publish those showing it did not have any effect. If this happens, analysis of the published results will not give an accurate idea of how well the treatment works. This type of bias can be assessed by a funnel plot.
Quality of life	See 'Health-related quality of life'.
Quality-adjusted life year (QALY)	A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health. QALYS are calculated by estimating the years of life remaining for a person following a particular treatment or intervention and weighting each year with a quality of life score (on a scale of 0 to 1). It is often measured in terms of the person's ability to perform the activities of daily life, freedom from pain and mental disturbance.
Randomisation	Assigning participants in a research study to different groups without taking any similarities or differences between them into account. For example, it could involve using a random numbers table or a computer-generated random sequence. It means that each individual (or each group in the case of cluster randomisation) has the same chance of receiving each intervention.
Randomised controlled trial (RCT)	A study in which a number of similar people are randomly assigned to 2 (or more) groups to test a specific drug or treatment. One group (the experimental group) receives the treatment being tested; the other (the comparison or control group) receives an alternative treatment, a dummy treatment (placebo) or no treatment at all. The groups are followed up to see how effective the experimental treatment was. Outcomes are measured at specific times and any difference in response between the groups is assessed statistically. This method is also used to reduce bias.
RCT	See 'Randomised controlled trial'.
Receiver operated characteristic (ROC) curve	A graphical method of assessing the accuracy of a diagnostic test. Sensitivity is plotted against 1 minus specificity. A perfect test will have a positive, vertical linear slope starting at the origin. A good test will be somewhere close to this ideal.
Reference standard	The test that is considered to be the best available method to establish the presence or absence of the outcome – this may not be the 1 that is routinely used in practice.
Relative risk (RR)	The ratio of the risk of disease or death among those exposed to certain conditions compared with the risk for those who are not exposed to the same conditions (for example, the risk of people who smoke getting lung cancer compared with the risk for people who do not smoke). If both groups face the same level of risk, the relative risk is 1. If the first

Term	Definition
	group had a relative risk of 2, subjects in that group would be twice as likely to have the event happen. A relative risk of less than 1 means the outcome is less likely in the first group. Relative risk is sometimes referred to as risk ratio.
Reporting bias	See 'Publication bias'.
Resource implication	The likely impact in terms of finance, workforce or other NHS resources.
Retrospective study	A research study that focuses on the past and present. The study examines past exposure to suspected risk factors for the disease or condition. Unlike prospective studies, it does not cover events that occur after the study group is selected.
Review question	In guideline development, this term refers to the questions about treatment and care that are formulated to guide the development of evidence-based recommendations.
Secondary outcome	An outcome used to evaluate additional effects of the intervention deemed a priori as being less important than the primary outcomes.
Selection bias	Selection bias occurs if: a) The characteristics of the people selected for a study differ from the wider population from which they have been drawn, or b) There are differences between groups of participants in a study in terms of how likely they are to get better.
Sensitivity	How well a test detects the thing it is testing for. If a diagnostic test for a disease has high sensitivity, it is likely to pick up all cases of the disease in people who have it (that is, give a 'true positive' result). But if a test is too sensitive it will sometimes also give a positive result in people who don't have the disease (that is, give a 'false positive'). For example, if a test were developed to detect if a woman is 6 months pregnant, a very sensitive test would detect everyone who was 6 months pregnant, but would probably also include those who are 5 and 7 months pregnant. If the same test were more specific (sometimes referred to as having higher specificity), it would detect only those who are 6 months pregnant, and someone who was 5 months pregnant would get a negative result (a 'true negative'). But it would probably also miss some people who were 6 months pregnant (that is, give a 'false negative'). Breast screening is a 'real-life' example. The number of women who are recalled for a second breast screening test is relatively high because the test is very sensitive. If it were made more specific, people who don't have the disease would be less likely to be called back for a second test but more women who have the disease would be missed.
Significance (statistical)	A result is deemed statistically significant if the probability of the result occurring by chance is less than 1 in 20 ($p<0.05$).
Specificity	The proportion of true negatives that are correctly identified as such. For example in diagnostic testing the specificity is the proportion of non-cases correctly diagnosed as non-cases. See related term 'Sensitivity'. In terms of literature searching a highly specific search is generally narrow and aimed at picking up the key papers in a field and avoiding a wide range of papers.
Stakeholder	An organisation with an interest in a topic that NICE is developing a clinical guideline or piece of public health guidance on. Organisations that register as stakeholders can comment on the draft scope and the draft guidance. Stakeholders may be:

Term	Definition
	• manufacturers of drugs or equipment • national patient and carer organisations • NHS organisations • organisations representing healthcare professionals.
Systematic review	A review in which evidence from scientific studies has been identified, appraised and synthesised in a methodical way according to predetermined criteria. It may include a meta-analysis.
Treatment allocation	Assigning a participant to a particular arm of a trial.
Univariate	Analysis which separately explores each variable in a data set.
Utility	In health economics, a 'utility' is the measure of the preference or value that an individual or society places upon a particular health state. It is generally a number between 0 (representing death) and 1 (perfect health). The most widely used measure of benefit in cost–utility analysis is the quality-adjusted life year, but other measures include disability-adjusted life years (DALYs) and healthy year equivalents (HYEs).