Department of Health

Health Building Note 15-01: Accident & emergency departments

Planning and design guidance

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UCL

Cambridge University Hospitals NHS Foundation Trust

The College of Emergency Medicine

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Executive summary

This guidance is aimed at the multidisciplinary team including clinicians, design teams, estates planners and managers involved in the strategic and operational planning of an accident & emergency (A&E) service and built space.

It sets out the strategic background, uncertainties and evidence-base for key decisions that need to be made in the design and planning of a new or refurbished A&E department.

Type 1 A&E is defined as “a consultant-led 24-hour service with full resuscitation facilities and designated accommodation for the reception of accident and emergency patients”.

The four key components crucial to the success of a new build or refurbishment are:

a. design;

b. processes;

c. communication and

d. the ability to change.

Strategic design

Differentiating levels in decision-making can be a helpful way of handling the expectations of different stakeholders – in what is discussed and when – during capital projects.

The A&E department is part of a whole system approach to emergency care. It requires specific design features, focused on flow, but needs to operate as part of an integrated health system.

This should be delivered within an individual trust’s strategy for emergency care, which should reflect the importance of acute medicine, surgery and the wider networks of care.

Increasing attendance at A&E departments needs to be addressed. It is important to understand why people attend A&E departments as the number and type of patients attending the department will influence the design required.

Delivery of services within the A&E department is dependent on both flows of patients into the department and flows out (that is, those patients who are referred on or discharged).

Most A&E attendances can be predicted within a range, allowing the department to deliver a planned service to some extent. Matching demand to staff availability and skills for patient mix is very important.

The methodology by which the multidisciplinary stakeholder groups will address the longer term (the 5–20 year timeframe) and wider service vision through multidisciplinary group work should be agreed, enabling consideration of spatial and infrastructural limitations.

The Big Front Door concept should be used to appraise the strengths, weaknesses, constraints and opportunities of local networks and community care providers to help manage future attendance at the A&E department.

It is essential to identify the range of stakeholders required for decision-making as well as the role or roles each plays in the process of service design.

It is important to involve stakeholders at the correct levels (strategic, operational and spatial), to ensure appropriate decisions are made on matters relevant to the time and detail outlined in the business plan, design, construction and fit-out stages.

Consideration should be given to the timescales for making decisions and receiving feedback from wide-ranging stakeholder groups in developing and measuring the performance of the design before and after the project.

The design team needs to resolve any contradictions that may occur between mandatory/statutory regulation and guidance documents. All key decisions should be documented: why derogations may have to be submitted to the relevant agency; when they have been made; the date of decision and for what reason, linked to an evaluation of risk.

Risk can be considered to have two components: likelihood (or probability) and impact (severity).

a. Consider likelihood, consequence and cost of each alternative.

b. Consider the risk of a do-nothing option.

c. Ensure evaluation is undertaken by people who are sufficiently skilled and expert in each area.

A performance framework should be developed, which involves the whole design team in order to meet conflicting stakeholder demands, achieve best value for money and deliver significant improvements in performance, incorporating targets, directives and guidance within the A&E service provision.

In order to identify good practice and service improvement, as well as a clearer understanding of existing and possible risks, it is important to establish a baseline or benchmark for measurement.

However, one measure may be in conflict with another; therefore, performance measures should be agreed through wider engagement so that potential conflicts are resolved.

The design team will need to agree a strategy incorporating qualitative and quantitative measures to establish key performance indicators.

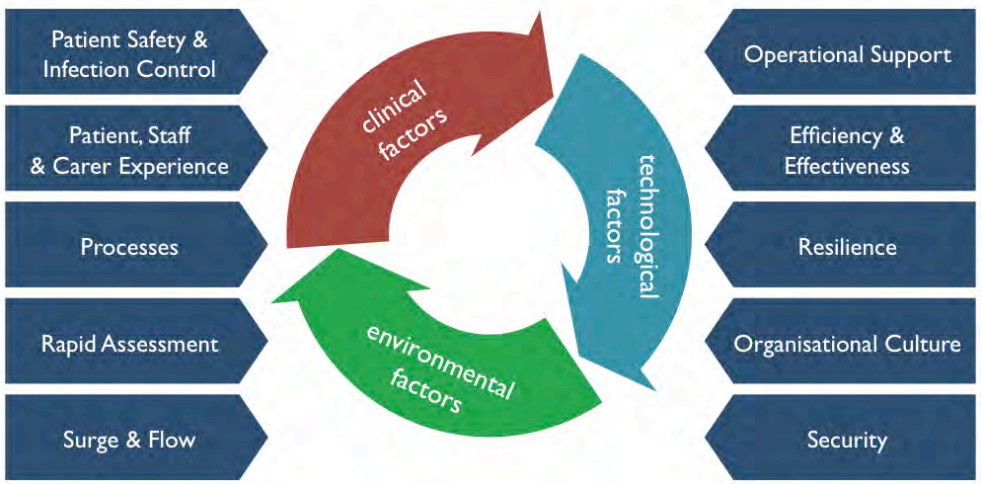
The spatial needs of support services should be considered in parallel with the wider A&E department service model. Liaison should take place between psychiatry, the homeless healthcare team and other medical, primary care, mental health or non-medical support located within A&E and included in design discussions.

An emergent system for the A&E department is to stream patients into acute (hot), ambulatory (warm) and minors (cold) zones – placing patients into the correct stream, supported by step-up and step-down services.

Rapid diagnosis and assessment should be completed as quickly as possible. The proximity of diagnostic equipment and agreed processes for rapid access to diagnostics is of key importance.

The resilience of an A&E department is critical in order to provide a continued service, especially in a major incident. The ability for the A&E department to flex with day-to-day ebb and flow should expand in order to meet the sudden rapid increase in numbers of patients arriving when a major incident occurs.

Major incident and resilience planning will need to be tied into design for decontamination and infection control.



Ten themes for operational effectiveness (checklists in Chapter 8)

Operational design

Each of the above themes is considered in terms of three factors: clinical, technological and environmental, with the aim of prompting dialogue between the multidisciplinary team.

It is essential to consider the needs and activities of all users – patients, staff and others – and prioritise them according to clinical risk and outcome.

Key design considerations to be discussed by the multidisciplinary team in the A&E department are:

- standardisation of room-handing;
- stepping-up/stepping-down of acuity;
- single patient rooms with en-suites;

- chair-centric area;
- interruption-free zones;
- lighting levels;
- communication.

Acuity flows begin to define three key types of space:

a. Fixed acuity – determined by the activities and equipment within it, and the adjacencies of other services.

b. Acuity-adaptable – generic single patient treatment rooms, created as identical similarly fitted treatment rooms, removing the need to move patients as their acuity changes.

c. Chair-centric – provide clinical space for patients who need short periods of treatment or observation, but do not need to be on a trolley.

It is essential to establish a hierarchy for the importance of operational elements early on in the design process. This allows decisions to be made on critical pathways when conflict arises during the implementation stage, without the loss of key operational principles.

Compatibility of information and communications technology (ICT) systems within A&E and the rest of the hospital is essential, and should be supported across the care network. The multidisciplinary design team should consider the likely changes in technologies, and how spaces need to respond to new requirements.

Building design

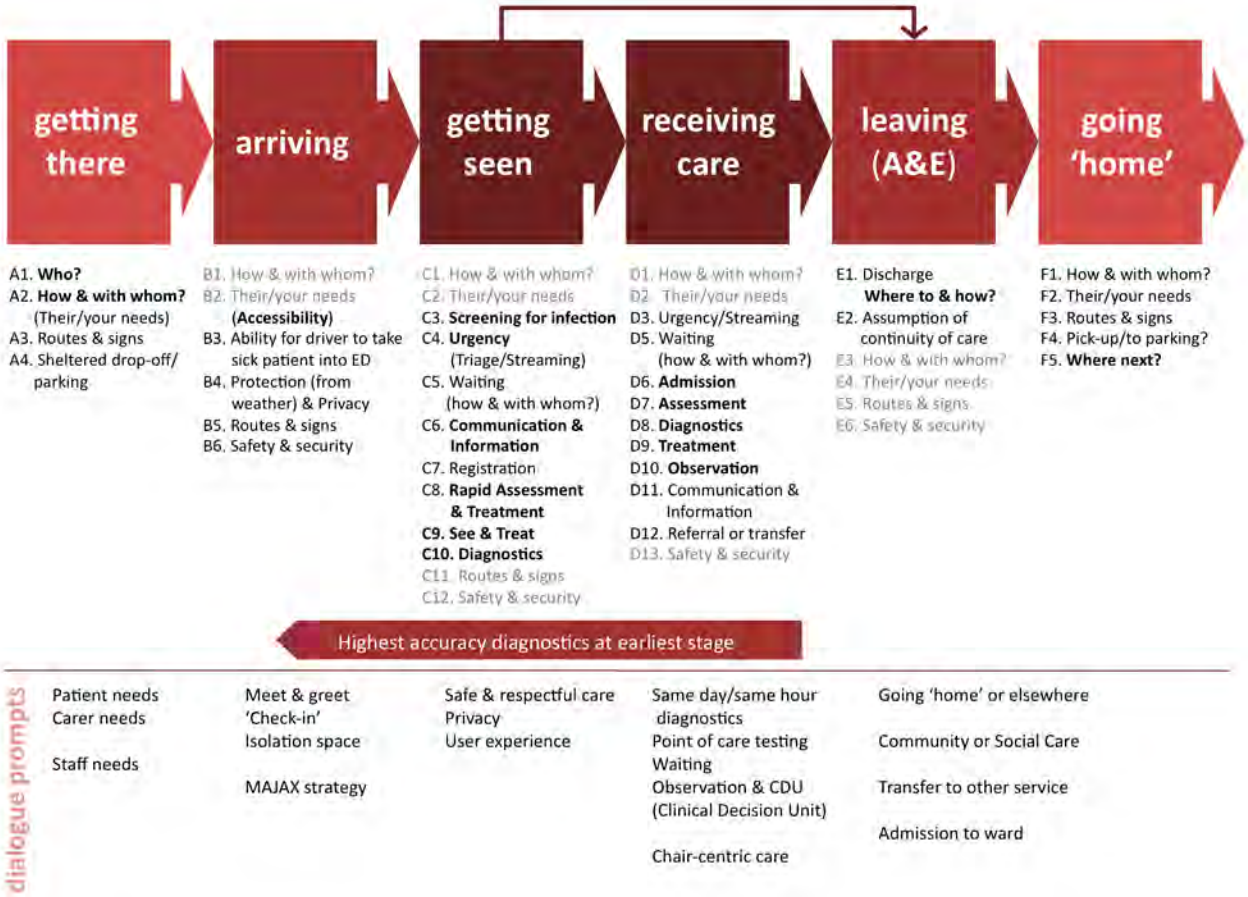
The planning strategy developed in the strategic design and operational design phases should be drawn into an output specification document and translated into the building requirements to reflect the operational practice of the individual trust's A&E.

Spatial requirements should be focused around the patient, derived from activity and equipment, incorporating ergonomic data as well as the adjacencies of sequential activities to develop a dynamic task envelope.

Activity should be defined around patient and staffing needs.

Patients are active participants in their care, not passive recipients. As such, they should be involved in the design process.

This diagram on the following page indicates the wide range of factors that need to be considered by the design team across a patient journey through the A&E department. Careful thought should be given to each pathway from the perspective of different stakeholders.


getting there
arriving
getting seen
receiving care
leaving (A&E)
going 'home'
A1. Who?
A2. How & with whom? (Their/your needs)
A3. Routes & signs
A4. Sheltered drop-off/ parking
B1. How & with whom?
B2. Their/your needs
(Accessibility)
B3. Ability for driver to take sick patient into ED
B4. Protection (from weather) & Privacy
B5. Routes & signs
B6. Safety & security
C1. How & with whom?
C2. Their/your needs
C3. Screening for infection
C4. Urgency (Triage/Streaming)
C5. Waiting (how & with whom?)
C6. Communication & Information
C7. Registration
C8. Rapid Assessment & Treatment
C9. See & Treat
C10. Diagnostics
C11. Routes & signs
C12. Safety & security
D1. How & with whom?
D2. Their/your needs
D3. Urgency/Streaming
D5. Waiting (how & with whom?)
D6. Admission
D7. Assessment
D8. Diagnostics
D9. Treatment
D10. Observation
D11. Communication & Information
D12. Referral or transfer
D13. Safety & security
E1. Discharge Where to & how?
E2. Assumption of continuity of care
E3. How & with whom?
E4. Their/your needs
E5. Routes & signs
E6. Safety & security
F1. How & with whom?
F2. Their/your needs
F3. Routes & signs
F4. Pick-up/to parking?
F5. Where next?
Highest accuracy diagnostics at earliest stage
dialogue prompts
Patient needs
Carer needs
Staff needs
Meet & greet
'Check-in'
Isolation space
MAJAX strategy
Safe & respectful care
Privacy
User experience
Same day/same hour diagnostics
Point of care testing
Waiting
Observation & CDU (Clinical Decision Unit)
Chair-centric care
Going 'home' or elsewhere
Community or Social Care
Transfer to other service
Admission to ward

Acknowledgements

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Project team

Susan Robinson (representing the College of Emergency Medicine) Cambridge University Hospitals NHS Foundation Trust

Rachel Northfield Cambridge University Hospitals NHS Foundation Trust

Philip Astley The Bartlett, University College London

Richard Hind The Bartlett, University College London

Thanks also to:

Darren Makepeace, Rob Young and Peter Harding, Gateshead Health NHS Foundation Trust

Photography

Nicholas Cartwright Salford Royal NHS Foundation Trust

Marte Lauvsnes SINTEF, Norway

James Lennon Lennon Associates

Gary Spring Southampton University Hospitals NHS Foundation Trust

Peer review and research steering

Toby Banfield E C Harris

Richard Barton Avanti Architects

Suraj Bassi BDO

Derek Bell Imperial College

Ian Boswell Taunton and Somerset NHS Foundation Trust

Keith Dowell Southampton University Hospitals NHS Foundation Trust

Vanya Gant University College London Hospital NHS Foundation Trust

Alastair Gourlay Guys and St Thomas' NHS Foundation Trust

Dries Hagen Circle Partnership

Robert Heavisides Milton Keynes NHS Foundation Trust

Simon Henley Henley Halebrown Rorrison Architects

Stephen Kendall Ball State University, Indiana

Patricia Keeling Surrey and Borders Partnership NHS Foundation Trust

Nigel Klein Great Ormond Street Children's Hospital

Marte Lauvsnes SINTEF

James Lennon Lennon Associates

Kieran McDaid University College London Hospitals NHS Foundation Trust

Jacqui McDonald Papworth Hospital

Lindsay McCluskie Salford Royal NHS Foundation Trust

Saud Muhsinovic Fulcrum First

Phil Nedin ARUP

Simon Nevllie Salford Royal NHS Foundation Trust

James Nicholls BDO

Mark Page University College London

Duane Passman Brighton Hospitals

Heidi Shah Allies and Morrison

Martin Smith Salford Royal NHS Foundation Trust

Gary Spring Southampton University Hospitals NHS Foundation Trust

Anne Symons Balfour Beatty Construction Services UK

Sinclair Webster HKS Architects

Christopher Shaw MAAP Architects

Will Wilmshurst Rogers Stirk Harbour Architects

Statement from the College of Emergency Medicine

An opportunity to build a new department or refurbish an existing one happens rarely but when it does, it provides the opportunity to design a modern department that inspires and intuitively supports effective, efficient and safe patient care, with the flexibility to meet future developments in healthcare, technology and patient volumes.

This is possible only if senior clinicians engage with the planning process to ensure the design team appreciate how design can support the delivery of modern emergency medicine while both promoting the well-being of those patients attending and enhancing the experience of staff working within it.

This updated guidance provides information on how to approach a new build or redesign, specifically aimed at senior emergency clinicians and designers so key to making a new build successful.

It aims to facilitate purposeful dialogue between those responsible for service delivery and those responsible for design response, and is therefore essential reading for all those involved in planning and designing their department.

Policy statement

Accident & emergency (A&E) is unique in that patients of all ages are guaranteed access to emergency care 24 hours a day, 7 days a week. Almost 20 million new patients attend A&E in England each year. This number is rising by between 5 and 7% per annum in line with an increase in the acuity of the patient case mix. This is a challenge for all involved in providing emergency care, but the importance of emergency medicine to the public is paramount and so the challenge of ensuring the public receive a standard of emergency care that they both expect and deserve must be met. One of the key factors to enabling the delivery of modern, safe emergency care while enhancing the experience of patients and staff is the environment in which that care is provided. This guidance, authored by a team of specialists in emergency medicine and design, describes the expectations for the optimal design of A&E departments using the best available evidence. The guidance applies to both new build and refurbishment projects, but excludes minor injury units, walk-in centres or primary care facilities unless they are integral to the A&E department.
The guidance, which supersedes Health Building Note 22 (2003), is aimed at all those involved in the commissioning and design of A&E departments. It is essential reading for the clinicians, managers, designers and commissioners involved in the delivery of emergency care in England. It may also be of interest to the public.

Equality Act 2010

The Equality Act 2010 sets out the different ways in which it is unlawful to treat someone, such as direct and indirect discrimination, harassment, victimisation and failing to make a reasonable adjustment for a disabled person. The act prohibits unfair reatment in the workplace when providing goods, facilities and services, when exercising public functions, and in the disposal and management of premises.

Section 149 (1) of the Equality Act 2010 sets out a general Equality Duty with three main aims:

a. eliminate unlawful discrimination, harassment and victimisation;

b. advance equality of opportunity between people who share a protected characteristic and those who do not;

c. promote good relations between people who share a protected characteristic and those who do not.

As part of developing a design strategy for urgent and emergency care, providers of NHS-funded healthcare must show that they have considered their duty under section 149 (1) and that they can demonstrate evidence to support compliance.

Note on terminology

The name “Emergency Department”, rather than A&E, is the term recognised internationally by the specialty of emergency medicine. However A&E remains the official term in use within the Department of Health (DH) and as such is used in this document.

Contents

PART 3: BUILDING DESIGN

Part 1: Strategic design

1 Design guidance

What is it?

1.1 This guidance is written as a route map, setting out the strategic background, uncertainties and evidence base for key decisions that need to be made in the design and planning of a new or refurbished type-1 accident & emergency (A&E) department.

1.2 Type 1 A&E department in this context is defined as “a consultant-led 24-hour service with full resuscitation facilities and designated accommodation for the reception of accident and emergency patients”.

Who is it for?

1.3 This guidance is aimed at the multidisciplinary team including clinicians, design teams, estates planners, and managers involved in the strategic and operational planning of an A&E service and built space. It should specifically address the views of patients.

Why is it useful?

1.4 Good strategic estate decision-making is essential to the functioning of the health system and to that of an A&E department operating within the economic constraints of core-service delivery.

1.5 This guidance offers key questions to prompt dialogue between the design team and clinicians so that critical discussions as well as decisions can be made in a timely manner.

1.6 Included within this are prompts such as:

- What does the design team need?
- Who uses A&E?
- Who are the stakeholders?
- Where to look for answers?

Space requirements

1.7 This guidance focuses on the patient-led clinically driven activities and processes that determine spatial requirements and adjacencies.

1.8 Advances in clinical procedures, changes in clinical processes, the potential inclusion of family space within operational areas, single-bed rooms and other service arrangements need to be established at the outset, and the design should enable future adaptability. This does not necessarily mean more complex design requirements, as once activity has been untied from built space, clinical care can often be carried out in a number of generic adaptable spaces.

1.9 It should also be noted that while the number of people requiring bariatric equipment is increasing (see the Health and Social Care Information Centre's (2011) 'Health Survey for England – 2010, Trend tables' and data from the National Obesity Observatory, some diagnostic equipment is getting smaller and more mobile; both will impact on space requirements.

1.10 The role of the multidisciplinary team at the project inception stage will be to align the design of the space required to the project scope. A broad-brush approach may suffice: that is, defining the acuity streams and, from attendance analysis, the range of activities.

1.11 It is important not to involve the user groups or designers too early in the pre-planning stage, which can be protracted and involve costly detailed layout planning. They may be better used to define and test the scope of the A&E, the potential for change and innovation.

1.12 Zones and spaces will be determined by effective process flows and phasing, which will determine the costs outlined in the strategic business case.

2 Introduction

2.1 Delivering a new department is not just about design; there are three other key components crucial to the success of a new build or refurbishment: processes, communication and the ability to change.

2.2 All processes used within the A&E department need to be effective and efficient in delivering the service so that the new design will support their use. A new design will not improve the delivery of emergency care or be viewed as successful if the processes in use are outdated or inefficient.

2.3 While this document will address the evidence for design, equal attention should be paid to process and communication routes.

2.4 There are strong tensions between, on the one hand, the constant change of practices, activities, equipment, regulations and standards and, on the other, the idea of fixed stable, innovative environments and established budgets.

2.5 This is immediately apparent in the A&E department and the delivery of the acute service that faces challenging resource and management pressures.

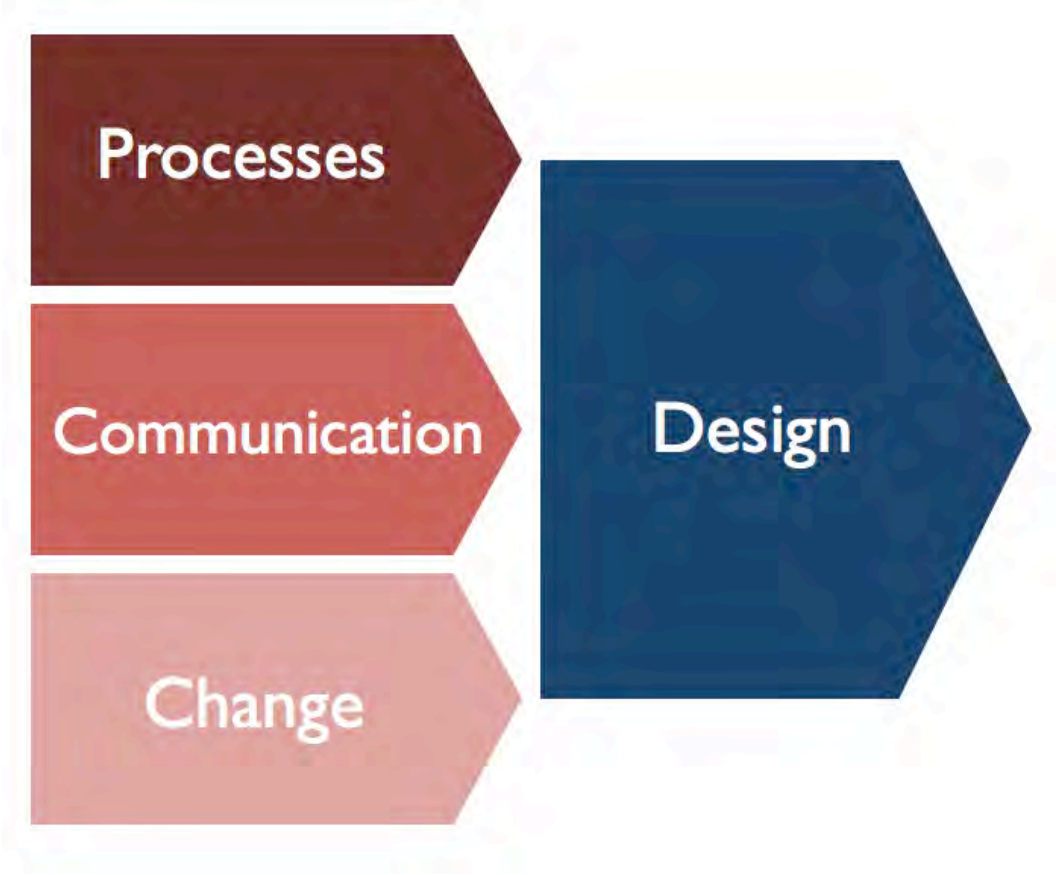


Figure 1 Four key components of success

2.6 This guidance addresses a shifting pattern of patient-centred requirements and clinical priorities by focusing primarily on strategic relationships for clinical effectiveness rather than functional arrangement. These requirements and priorities include:

- continual service change through regional and commissioning networks;

- innovative use of technologies to improve access to services;
- techniques for project delivery aligned to service and spatial strategies.

2.7 The aim of this design guidance at the inception of a project and in its development is to signpost a route through best practices, tools and techniques that can be used and adapted by the wider design team. It offers insights into activity analysis, decision-making and project programming.

2.8 Good emergency care:

- is patient-focused;
- delivers excellent clinical outcomes (including survival, recovery, lack of adverse events or complications);
- delivers a good patient experience (easy to access, convenient and cared for in an appropriate environment);
- is timely and consistent;
- is right first time;
- is available 24 hours, 7 days per week, 365 days a year.

2.9 Design considerations should ensure that the needs of patients, staff and carers/family members are carefully assessed at the planning stage. These groups should be involved in the planning of a new A&E department to ensure that individual user needs are catered for in terms of, for example, safety, privacy, security and wayfinding.

Decision-making levels

2.10 Differentiating levels in decision-making can be a helpful way of handling the expectations of different stakeholders – in what is discussed and when – during capital projects.

2.11 Strategic decisions can run in parallel to operational development and at the appropriate level of detail. The project management plan should ensure this is an iterative and informed process as planning proceeds.

Level 1: strategic relationships

2.12 Level 1 takes the whole systems approach, partnering across commissioning and provider boundaries, developing innovative solutions or radical solutions within the context of service reorganisation for patient-centred integrated care.

2.13 The coordination of ambulatory urgent patients requires local strategies for filtering non-ambulance attendance at the A&E department. Analysis of the distinct flows of patients – the urgent from the less urgent – may help reduce A&E waits and enable faster assessment, referral and discharge. This should be

Figure 2 Levels in decision-making

delivered within an individual trust's acute strategy for emergency care, which should reflect the importance of acute medicine, surgery and the wider networks of care.

Level 2: site relationships

2.14 The A&E department is redefining the interface between the hospital and the wider network, including primary, secondary and other acute practitioners, and its capacity to handle demand. Existing buildings may provide a significant constraint or opportunity in reconfiguring a hospital site, and a clear estates planning strategy will appraise existing buildings for fitness of purpose.

2.15 Trusts are reconfiguring the location, management and provision of front-door diagnostics at one end and the clinical decision unit (CDU) at the other.

Level 3: operational relationships

2.16 There is potential for extending job roles from other specialist areas into the A&E department and out through the community networks, physically and virtually.

2.17 Rather than starting with the functions of rooms, the processes used need to be considered: the movement and needs of patients flowing through the A&E department, and the activities of clinicians, paramedics, nurses, porters etc.

2.18 How communication occurs between the people and processes involved in delivering (and receiving) the A&E service and how these can change, need to be central to the design.

Hierarchies of importance

2.19 It is essential to establish a hierarchy for the importance of operational elements early on in the design process, which should be led primarily by the clinical and estates teams.

2.20 This allows decisions to be made on critical pathways when conflict arises during the implementation stage, without the loss of key operational principles due to time constraints that limit wider engagement once a project is under way. For example, opposite-handed (or mirrored) rooms usually share mechanical and electrical services and therefore may be considered to be less expensive to construct than same-handed rooms. However, the initial extra costs of constructing same-handed rooms may be offset by long-term savings resulting from patient safety, patient satisfaction and staff efficiencies.

2.21 Clearly then, some of these decisions may be an economic choice; however, the decision to omit or downgrade a key clinical operational principle should be informed by clinical and operational strategy, related to risk and outcome, and should be recorded.

3 Whole system design

Defining what is needed

Who is this service for?
(Define a range of user needs – there is no average A&E patient or staff member.)

What is the organisational vision for the delivery and future of this service?

Are we using the best current and available clinical processes?

What are the current requirements for delivering this service?
(Consider legislation, regulations, policy and economic constraints, social and cultural issues, demographics, needs and expectations.)

How might these change?
(How do we incorporate our patients' views of the service?)

3.1 The emergency care service provides a range of healthcare services to people who need medical advice, diagnosis and/or treatment quickly and unexpectedly. It provides treatment for acute injury or illness 24-hours, 365 days a year.

3.2 A type 1 A&E department is defined as "a consultant-led 24-hour service with full resuscitation facilities and designated accommodation for the reception of accident and emergency patients". Additionally, trusts may be part of a networked A&E service (that is, delivering part of an emergency service together with other local providers). It is important to recognise that the A&E department is part of a whole system approach to emergency care. It requires specific design features focused on flow, but needs to operate as part of an integrated health system.

3.3 Built assets need to be supported and invested in – replaced or possibly disposed of – in an informed way according to short-, medium- and long-term goals. The A&E department and the service it delivers should consider establishing a full and comprehensive collection of data for performance evaluation.

3.4 Benchmarking and key performance indicators (KPIs) should be agreed for efficient and effective service delivery, safety and space performance as well as patient, staff and visitor satisfaction (see Chapter 17 on core facilities).

3.5 Organisational decision-making is key at the start of any design project, and with such a complex system as emergency care, a whole system approach with interdisciplinary briefing is strongly recommended.

Change

3.6 Change is inevitable in both service requirements and clinical delivery. This means that decisions should be made in the context of reliable data, improvement and an understanding of change and uncertainty, as well as the implications of these on the built environment that is required to deliver the urgent and emergency care service.

3.7 With multidisciplinary groups, developing the longer term and wider service vision will be important – enabling consideration of spatial and infrastructural limitations as well as opportunities for change.

3.8 To successfully manage change and resource intelligence within the health estate and contribute to its wider environmental sustainability, trusts should understand and map uncertainties, challenges and opportunities presenting themselves to the design team in a scenario-based approach to long-term resilience (a considered and thorough "what if?" list).

3.9 Any decisions made should be framed around:

- policy change (for example, commissioning and service reconfiguration driven by government and the wider heath economy);
- service change (for example, inclusion of a major trauma or stroke centre, or changing demographics in population);
- clinical change (for example, developing whole-system clinical best practice including advances in diagnostics and innovations in procedure and treatment).

Attendance

3.10 Increasing attendance at A&E departments, nationally around 4% growth year on year (based on 2011 figures), will need to be addressed by new and existing clinical space.

Attendance rates for 2008–2010 reported by Hospital Episode Statistics (HES) and Quarterly Monitoring of Accident & Emergency (QMAE) data indicate more than 58% of people attending acute services were either discharged with no follow-up or referred to a GP.

3.11 It is important to understand why people attend A&E departments (see Chapter 5).

3.12 Many self-referred patients may require information or services that are provided by primary care or other providers at different times.

3.13 The number and type of patients attending the department will influence the design required. To establish likely future attendance, the following needs to be considered:

- local population growth and changes to road and rail infrastructure that will impact on attendance;
- planned developments in service (for example, major trauma centre or out-of-hours service provision);
- the possibility of specific, rare, but major, incidents such as a train crash, chemical incident or a terrorist attack;
- planned or potential reconfiguration of local acute services;
- potential increase in attendance as a result of new-build A&E department (reported to be 20% in the first three months of opening).

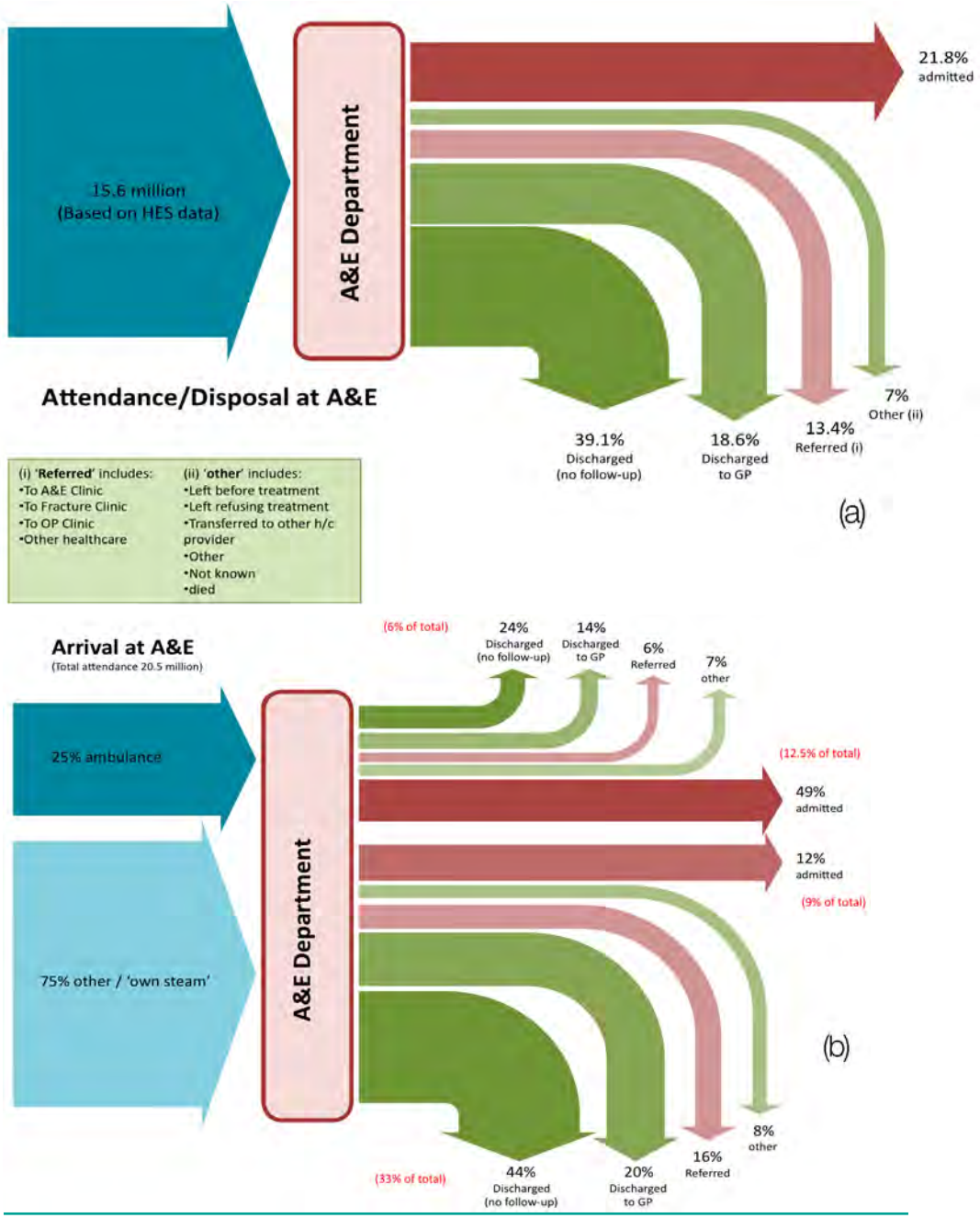


Figure 3(a) and (b) Attendance statistics (based on Hospital Episode Statistics (HES) 2010-2011 and Quarterly Monitoring of Accident & Emergency (QMAE) 2008-2010). Source: UCL/Hind 2011

The Big Front Door

3.14 It is essential to understand that the delivery of services within the A&E department is dependent on both flows of patients into the department and flows out (those that are referred on or discharged). Inadequate discharge procedures or any failure of the organisation to respond to the variety of reasons for accessing the A&E department will mean that improved practices in A&E can have only a limited effect.

3.15 The concept of the "Big Front Door" stems from this integrated way to access hospital services and wider local health service provision. It relies on a whole system approach being taken in order to create an effective and efficient delivery vehicle, from preventative medicine to social support frameworks. An integrated "front door", as well as bed space management, may help to avoid admissions, reduce length of stay and improve recovery time.

3.16 The Big Front Door model should be examined for each A&E department and will be specific to the individual service. Its use for debate and discussion at a strategic service level can ensure that departmental change is linked to wider innovations.

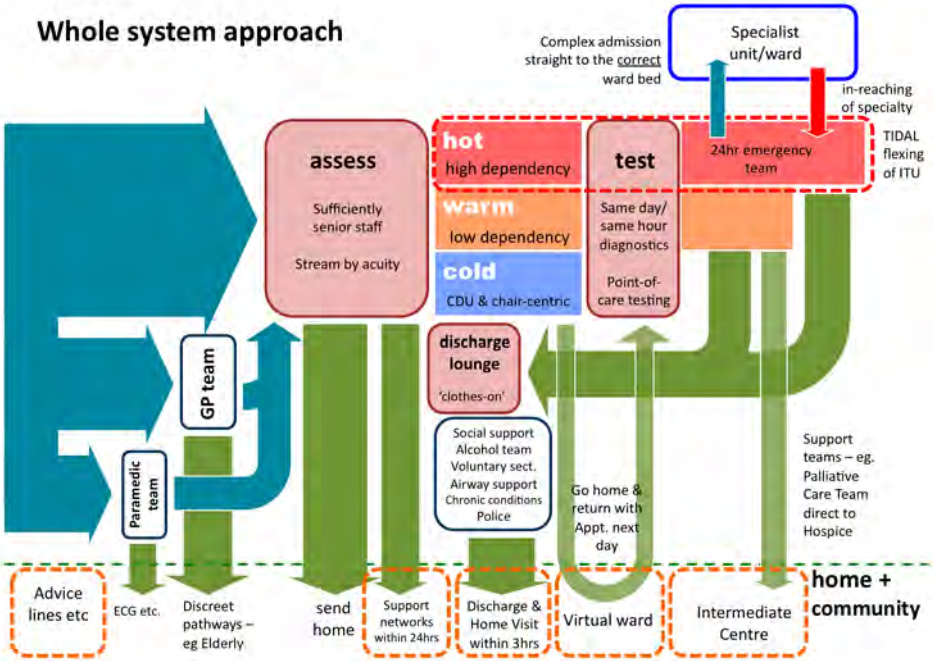


Figure 4 The Big Front Door model - showing whole system thinking to A&E attendance
Source: UCL/Hind 2011

Planned service

3.17 Some needs may be predicted, and most A&E attendances can be predicted within a range, allowing the department to deliver a planned service to some extent, making sure the right people are in the right place at the right time. Matching demand to staff availability and skills for patient mix is very important. The A&E department can be considered as the front line of the hospital, and the functions and effectiveness of an A&E department will impact on services required within the hospital.

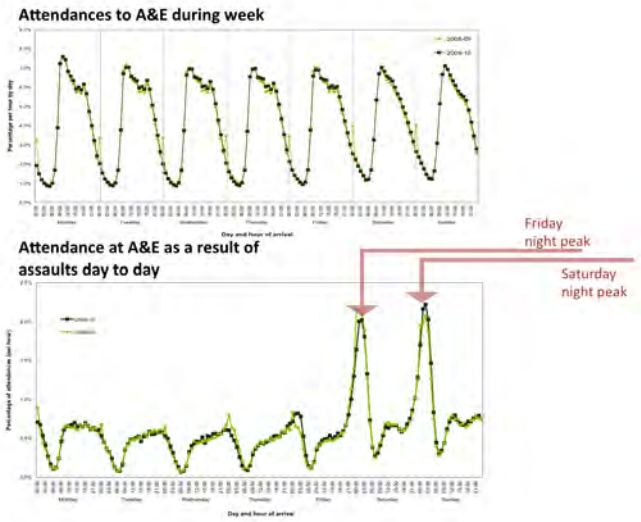


Figure 5 Attendances at A&E
Source: Hospital Episode Statistics (HES) 2010-2011 and Quarterly Monitoring of Accident & Emergency (QMAE) 2008-2010

3.18 More appropriate and effective control of the front door and bed management systems may enable patient throughput time to be as short as possible and consequently referral or discharge.

3.19 The scope of work and activity of the A&E department will depend on the development of specialised functions such as regional trauma or stroke networks.

3.20 Managing whole pathways may offer the potential to create an integrated organisational structure and the ability to manage the network across a number of locations, in order to reduce emergency attendance.

3.21 The potential for specially commissioned services targeted at specific groups or discrete populations (for instance the provision of care in the home for older people) may impact on A&E attendances.

Acuity streaming

3.22 Patient streaming methods, including the Big Front Door, allow more clearly considered care pathways within the department or redirection to other areas.

3.23 An emergent system for the A&E department is to stream patients into acute (hot), ambulatory (warm) and minors (cold) zones – placing patients into the correct stream, supported by step-up and step-down services.

3.24 There is evidence that A&E waiting times could be reduced through fast-tracking systems, point-of-care testing and more effective deployment of senior staff. Fast, accurate assessment and same-day/same-hour diagnosis at the point of need are seen as potential ways to both reduce front-end costs and create efficiencies further down the chain (Cooke et al. 2004).

Tidal flow

3.25 The need for adaptable space accommodating the tidal nature or ebb and flow of normal A&E attendance throughout a 24-hour period as well as weekly and seasonal cycles has to be considered in parallel with potential changes in service, the greater mobility of imaging equipment and staffing levels.

3.26 In addition to the predictable requirements, the A&E team should be able to ensure they can rapidly develop and incorporate new pathways as the need arises. Building flexibility and space that will enable changes in levels of acuity or function will ensure future efficiency and usability of space. The absolute requirement to maintain continuous flow through the department and to minimise delays and waiting times should be considered when discussing all pathways and processes.

3.27 Patient flow should also be considered in the development of strategic and integrated business cases. Clinical networks (for example trauma) impact on clinical scale and should be considered as part of built-environment planning.

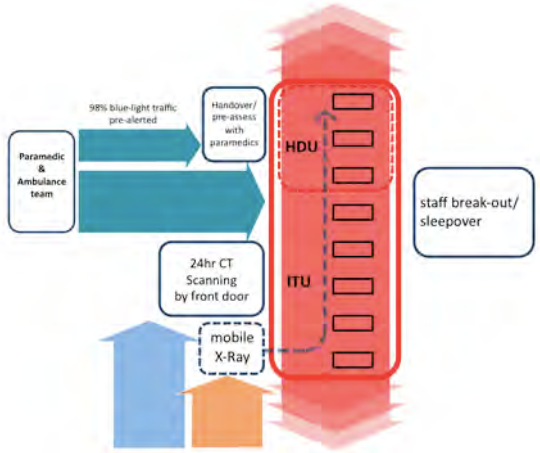


Figure 6 The flexing of need within ITUs
Source: UCL/Hind 2011
ITU = Intensive treatment unit (also Intensive Therapy Unit or ICU, Intensive Care Unit)
HDU = High dependency unit

Innovation and technology

3.28 Clinical innovation should drive operational change, which may require a reconfiguration of processes.

3.29 Rapid diagnosis and assessment should be completed as quickly as possible. The proximity of diagnostic equipment and agreed processes for rapid access to diagnostics is of key importance – this can potentially reduce the need for admission, multiple handovers between admission and discharge, and the risk of exposure to infection.

3.30 Layouts may be constrained by the necessary proximity or availability of staff.

3.31 New and improving information technologies are creating areas of change such as telemedicine and mobile imaging. Strategic bed management systems will allow staff to coordinate and manage capacity as well as pre-alert the A&E department from ambulance/paramedic networks using electronic noticeboards for early assessment of patients.

3.32 Information and communications technology (ICT) has the potential for transformational change in space utilisation, supporting effective and flexible patient-centred processes.

3.33 Virtual wards may allow patients to avoid admission through the use of telecommunication management.

3.34 Additionally, ICT systems can support process flow at the front end, communicating waiting times to patients and enabling self check-in.

3.35 Compatibility of the ICT systems within the A&E department and the rest of the hospital is essential, allowing A&E clinicians unrestricted access to radiology and patient test data in order to reduce admission/discharge decision times.

3.36 Systems should be supported across the care network. Access to information held on GP electronic patient records should also be unrestricted for those in A&E. The multidisciplinary design team should consider the likely changes in technologies and how spaces need to respond to new requirements.

4 Summary: a dialogue approach

4.1 Discussion needs to focus on core issues in order to reach decisions on the integration and testing of innovative new approaches to patient care including clinical capacity, technology, access to, and utilisation of, the built infrastructure. Sufficient time should be dedicated to the development of the approach and for engagement.

4.2 The core aims in project discussions are:

a. The methodology by which the multidisciplinary stakeholder groups will address the longer term (the 5–20 year timeframe) and wider service vision through multidisciplinary group work should be agreed, enabling consideration of spatial and infrastructural limitations.

b. Clinical teams may focus on the short-term change and innovations occurring in the one-to-five year period or be involved in fast-tracking a refurbishment scheme – but they should not be limited by the need to overcome obstacles in the immediate future.

c. Literature and evidence from industry support the argument that A&E services cannot be considered in isolation as an island of special patients. The Big Front Door concept should be used to appraise the strengths, weaknesses, constraints and opportunities of local networks and community care providers to help manage future attendance at the A&E department.

d. The conceptual development of the Big Front Door model should be used for debate and discussion with clinical teams regarding the possibility of reconfiguring services around acuity.

e. Flow should be considered at all levels, not only within the department, but also into and out of the department – for instance: the approach used to filter the flow of non-ambulance attendance at A&E; the need to restrict or limit access; allowing better ambulance access; and widening the “front door” to enable faster diagnostic assessment and discharge rates.

f. The organisational understanding of the clinical decision unit (CDU) should be developed and designed to deliver these requirements.

Part 2: Operational design

Design teams should ask:
"How can the design facilitate and support clinical processes?"

5 Who uses the A&E?

5.1 To design appropriate healthcare spaces, it is essential to consider the needs and activities of all users – patients, staff and others (see next page) – and prioritise them according to clinical risk and outcome.

5.2 In an A&E department, this can be a complex process as each patient and user has his/her own requirements. Some need to interact or communicate; some will be separated or dealt with in specific and individual ways.

5.3 The best method to understand patients' and users' needs is often to ask them through wide-ranging stakeholder engagement (see Chapter 10).

5.4 The needs of some users, including those with complex needs (for example older patients from ethnic minorities and those with mental health problems or the frail), may require particular spatial consideration (see the 'Older people, mental health' section in Bibliography of themes).

5.5 Accommodation for staff training (such as seminar rooms, meeting rooms and areas for study) should be considered within or near to the A&E department.

5.6 Patients arriving at the A&E department may be driven to hospital by family members or friends, who will need to support their relative in entering the department. In an emergency, the distance between the parking zone and the entrance can be critical. Covered drop-off areas should be considered, especially if the driver is expected to help the patient into the A&E department and to be present when their relative is registered. On occasions, emergency patients may arrive via emergency helicopter. If the helipad is to be co-located with the A&E department, it will have its own specific design requirements.

5.7 The needs of staff working in the A&E department should be fully explored. For example, close to the A&E department should be sufficient space for staff to change into their uniforms plus adequate secure storage for their clothes and possessions.

Note: This list is not exhaustive

Patients with a wide range of diverse needs, such as:

- Confused older woman with suspected broken hip
- Older man with dementia who has a blocked catheter
- Agitated patient with schizophrenia, escorted by police
- Injured young man following a fight, with intoxicated friends
- Young couple accompanying their small child who has a rash
- Obese man with breathing difficulties
- Teenage boy concerned he has a sexually transmitted disease
- Visitor from overseas with fever
- Young woman with headache for two hours
- Critically injured motorcyclist brought in by emergency helicopter

Staff:

- A&E department and primary care, hospital medical staff, nursing, specialist
- Imaging, radiology etc
- Thrombosis team
- Mental health teams
- Phlebotomy, point-of-care testing etc
- Older people's care team
- Infection prevention and control teams
- Homeless team (specialist GP and nurse)
- Physiotherapy
- Transfer teams (medical and nursing)
- Administration staff
- Estates and Facilities
- Management staff
- Pharmacists
- Medical supplies support
- Paramedics and ambulance staff

Other:

- Family member(s) or friend(s) who brought the patient to A&E
- Carers, drivers
- Social services
- Volunteers
- Police
- Members of the public requesting information

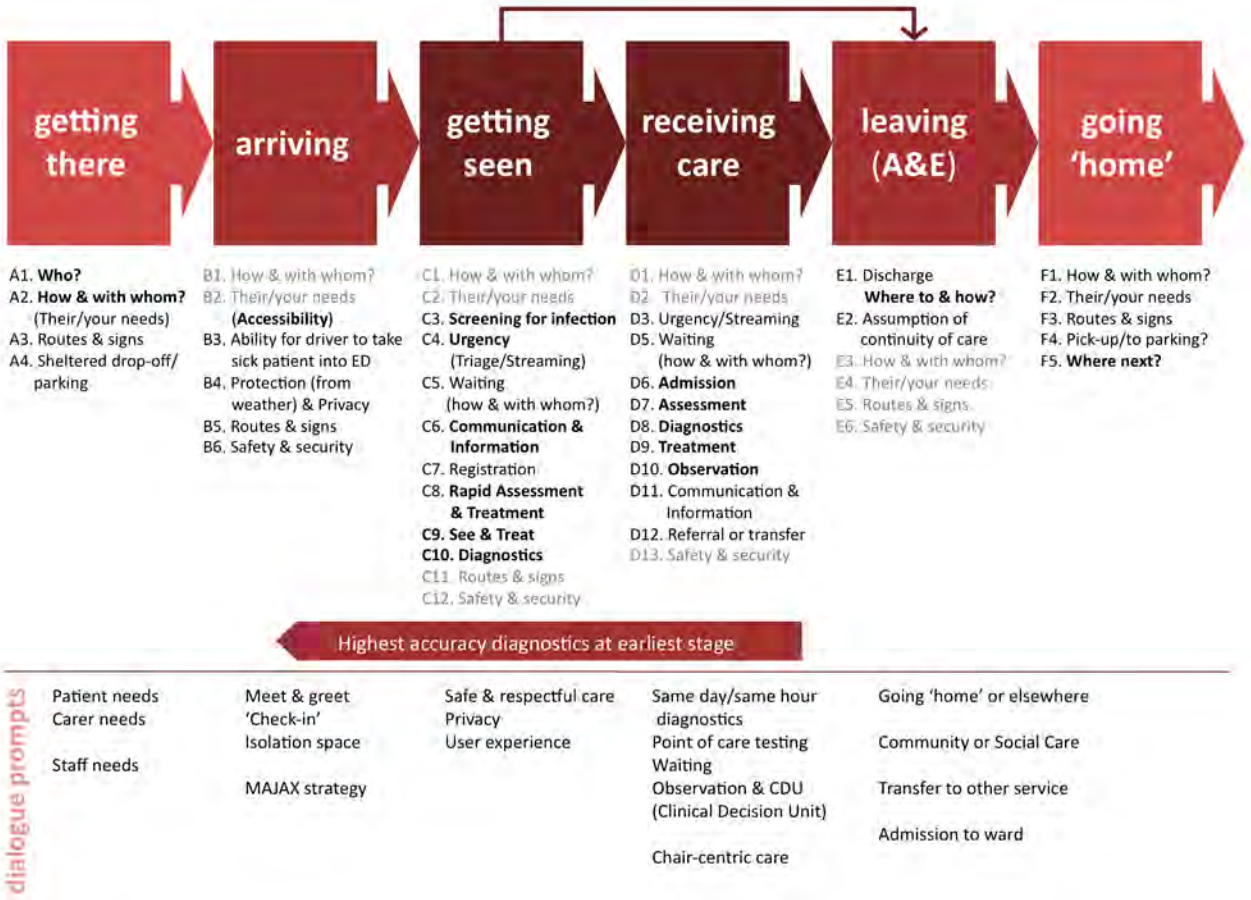


Figure 7 This diagram indicates the wide range of factors that need to be considered by the design team across a patient journey through the A&E department. Careful thought should be given to each pathway from the perspective of different stakeholders

6 Pathway diagrams

6.1 The diagrams on the following pages examine the pathways in more detail, to illustrate to the design team the processes and general needs of the spaces where these activities take place, as well as the flow into, through and out of the A&E department. It should be noted that these are the detailed pathways in an example A&E department: individual trusts' flows may look different.

6.2 They should serve as the basis for discussion between clinicians, healthcare planners and the wider team in order to critically assess and agree the specific needs of the individual A&E department at any point.

6.3 Design teams should ask: How can the design facilitate and support clinical processes?

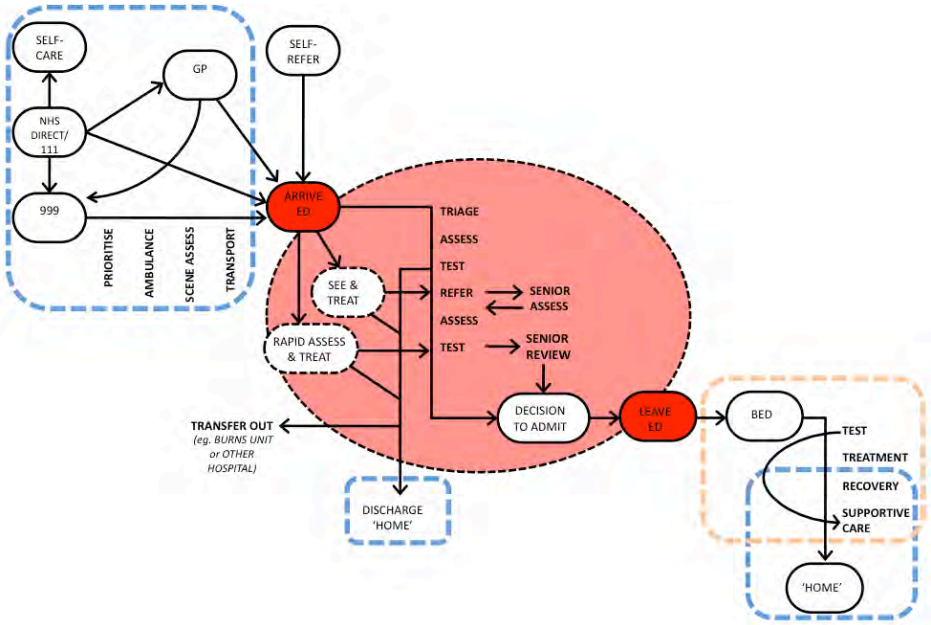


Figure 8 This diagram shows the typical flow of patients through the emergency systems (Adapted from Cooke et al (2004))

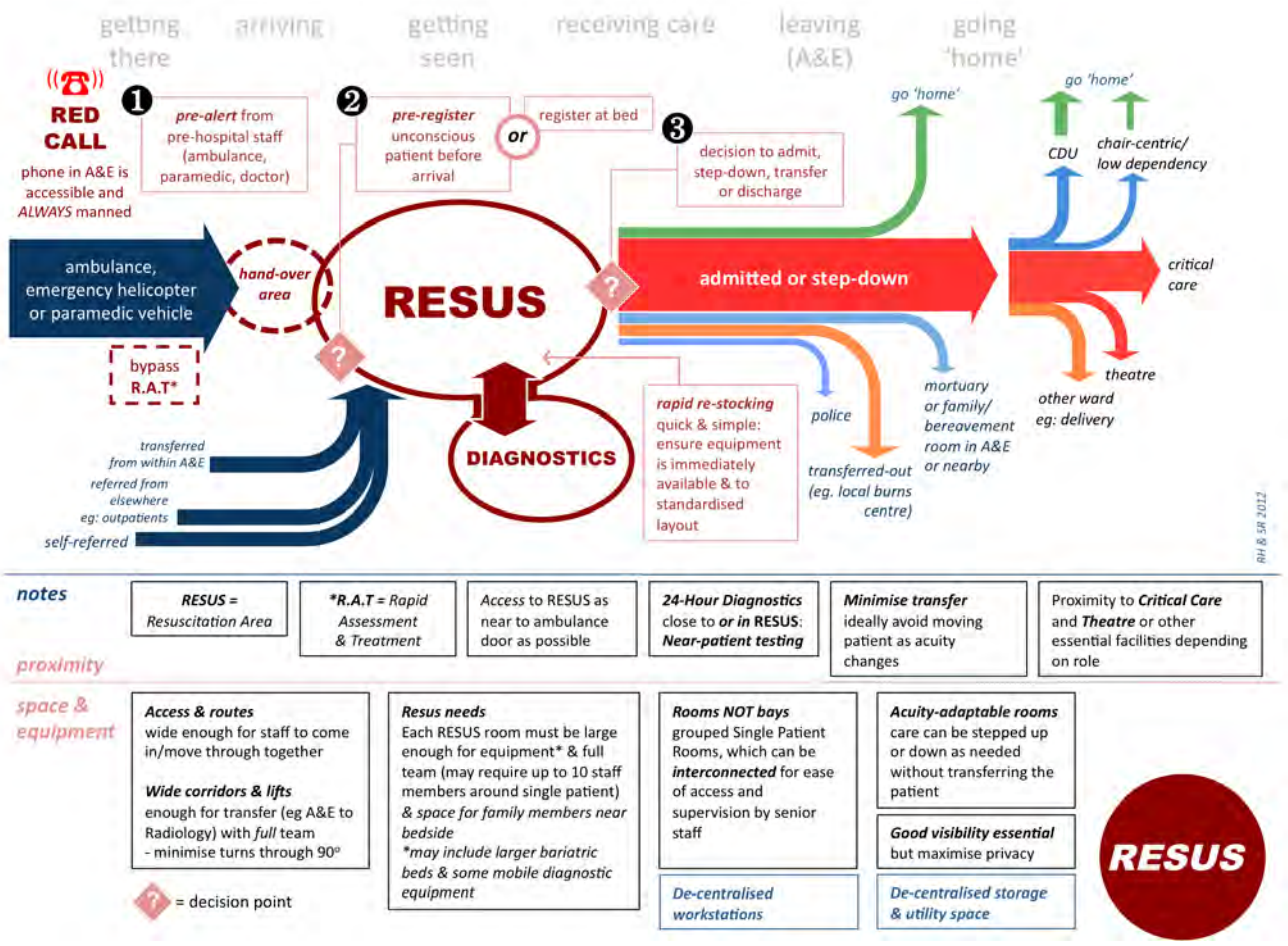


Figure 9 Resuscitation pathway (this is an example of the detailed pathway in one A&E; those of individual trusts may look different)

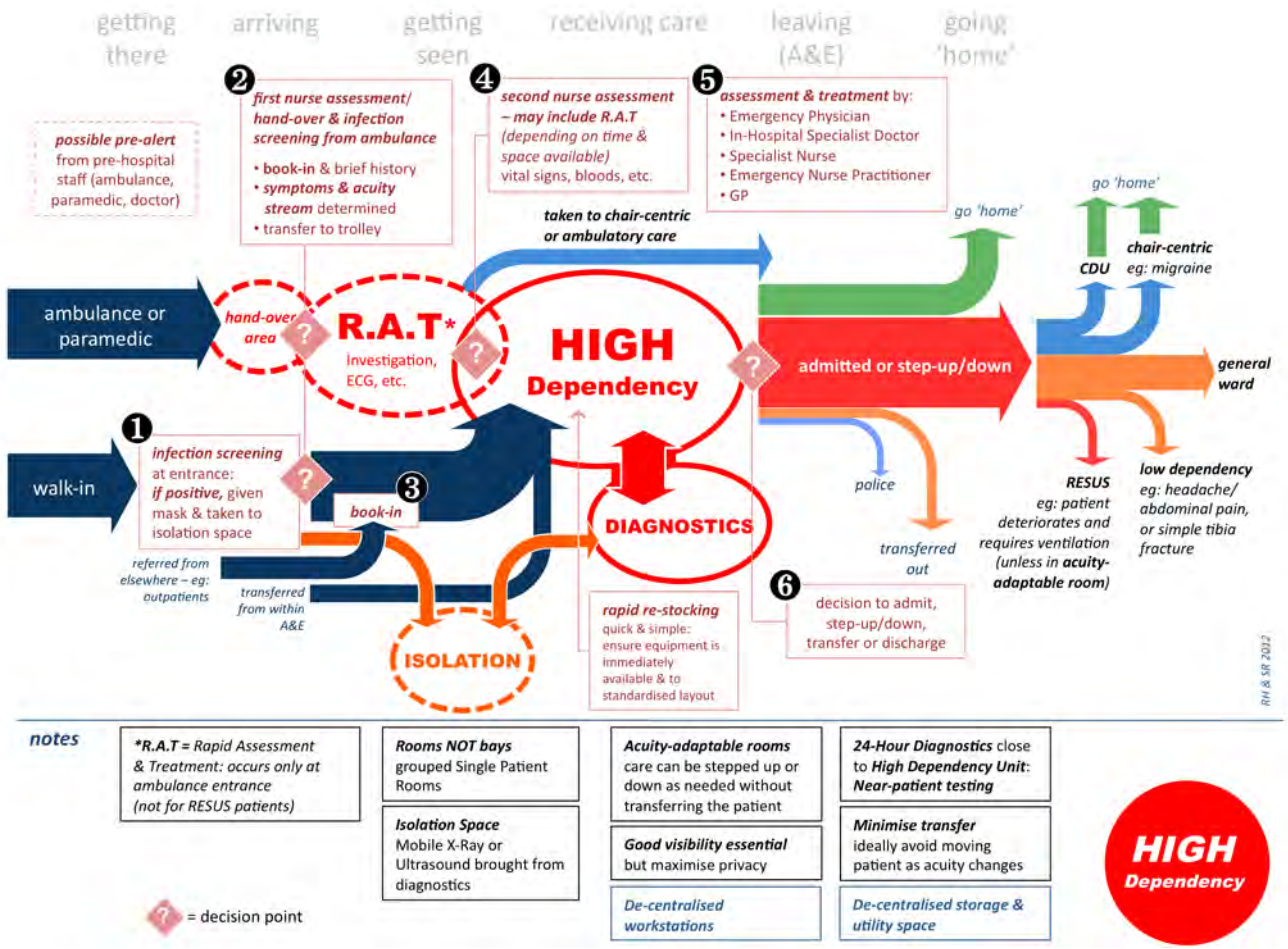


Figure 10 High dependency pathway (this is an example of the detailed pathway in one A&E; those of individual trusts may look different)

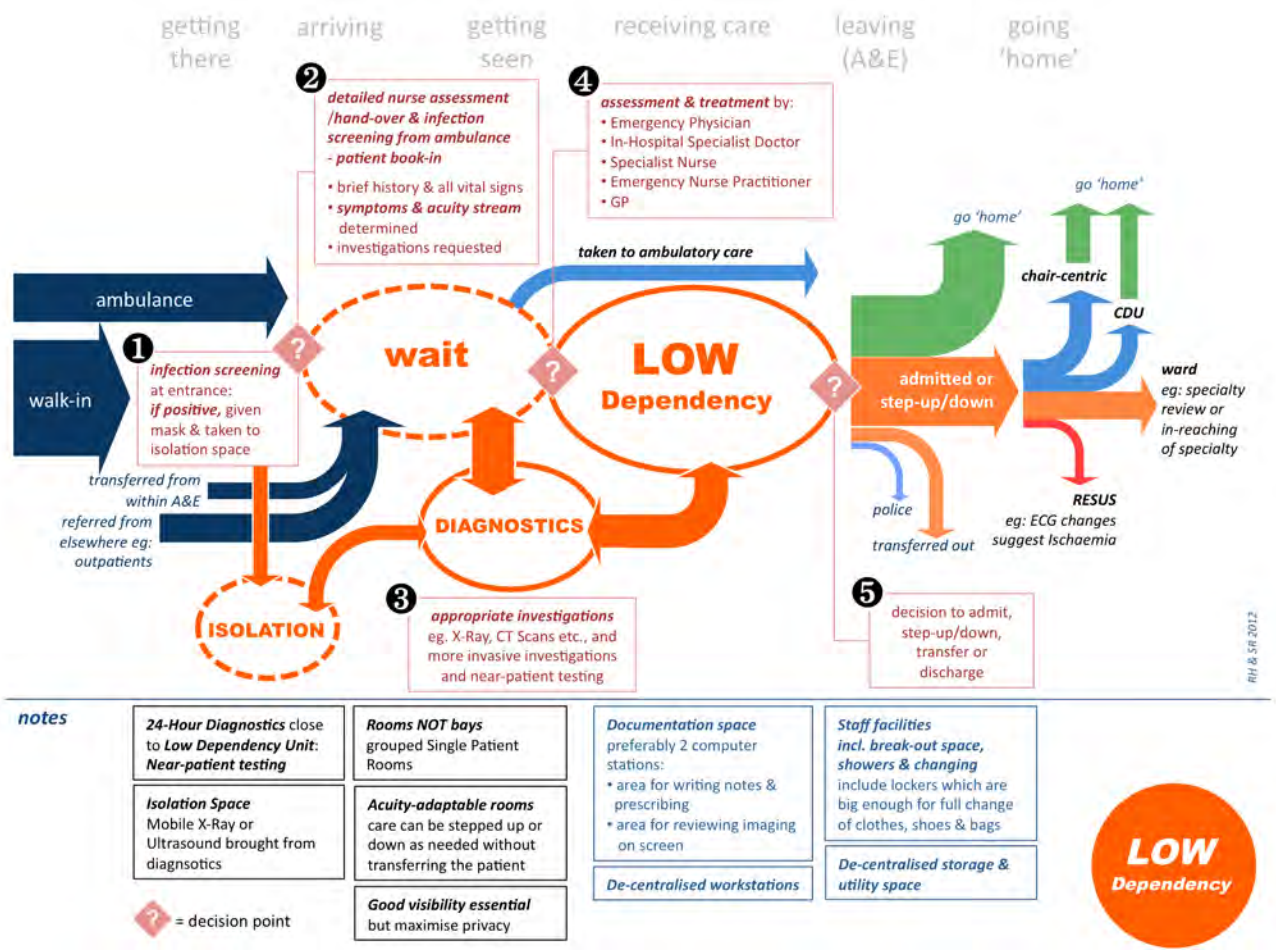


Figure 11 Low dependency pathway (this is an example of the detailed pathway in one A&E; those of individual trusts may look different)

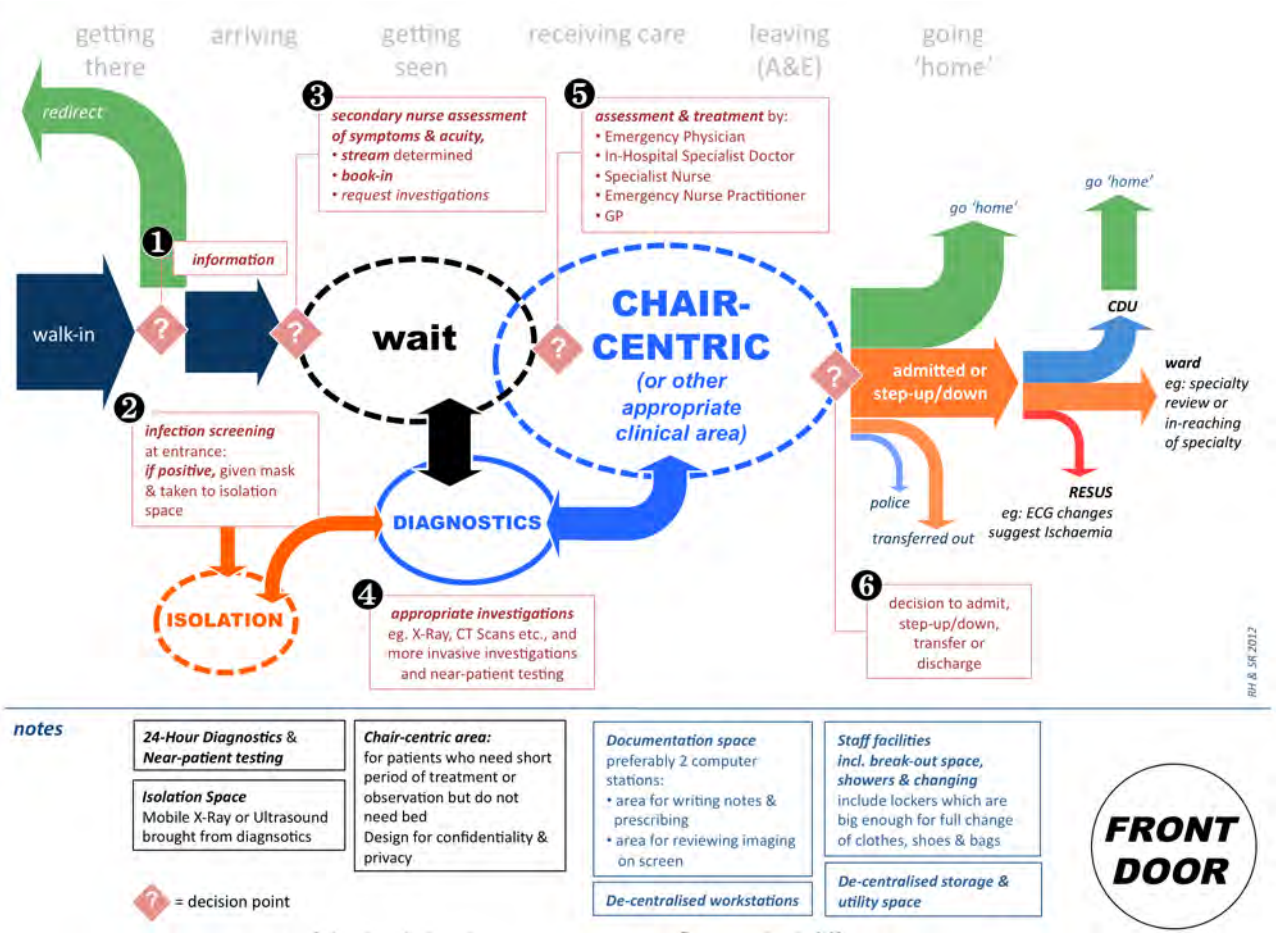


Figure 12 Front door pathway (this is an example of the detailed pathway in one A&E; those of individual trusts may look different)

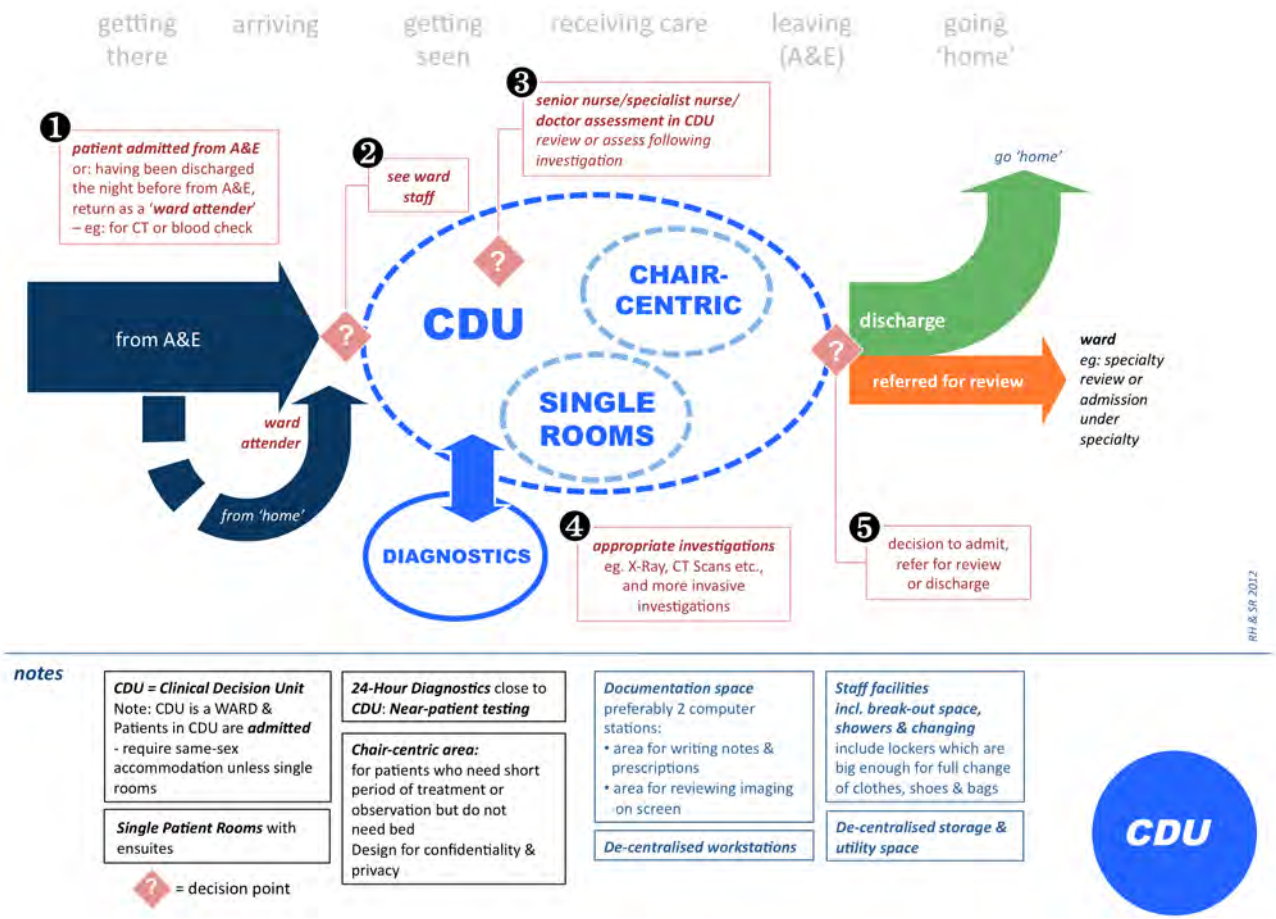


Figure 13 CDU pathway (this is an example of the detailed pathway in one A&E; those of individual trusts may look diFferent)

7 Insights into operational design

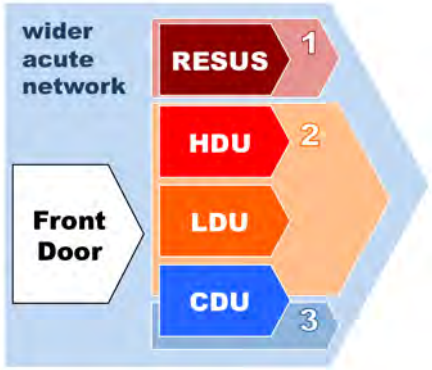


Figure 14 Diagram of the key process flows through A&E

Redefining space

7.1 Three types of space can be defined by relating acuity flows through the A&E department to the spatial requirements of the main operational areas:

a. Fixed acuity – can be located anyway within the department. The specific needs of this type is determined both in terms of the activities and equipment within it and in terms of the adjacencies of other services such as diagnostics and immediate access from ambulance and paramedic traffic.

b. Acuity-adaptable – defined as generic single patient treatment rooms, created as identical similarly fitted treatment rooms that can meet the needs of any patient from low dependency to resuscitation. The presence of these rooms removes the need to move patients as their acuity changes.

c. Chair-centric – usually located within the A&E department, but can also be appropriate for CDUs, these areas provide clinical space for patients who need short periods of treatment or observation, but who do not need to be on a trolley.

7.2 The translation of the flow diagrams (drawn once the multidisciplinary team have reviewed and agreed the processes within the department) outlined in this chapter into operational relationships requires the A&E planning team to agree their priorities when planning a new unit.

7.3 What at first may appear to be a constraint in the redevelopment of existing buildings may provide an opportunity to rethink, at a strategic level, whole-hospital processes, particularly the future role (and location) of A&E support services (for example radiology, diagnostics and pathology).

Spacial requirements

7.4 The challenge for healthcare planners and the clinical team will be to provide the most appropriately designed space for assessing and treating a range of patients with varying acuity needs within an effective staffing ratio. This will be driven by a need to optimise patient safety and clinical outcomes, which will be informed by current evidence-based best clinical practice.

7.5 Clinical space in the A&E department has to accommodate changing levels of acuity and be adaptable when demand dictates, but should aim to minimise the need to move patients from one bed to another when their individual needs change, in order to improve outcome.

7.6 Operational requirements should be driven by:

- the space needed for effective clinical care;
- existing and future equipment planning; and
- servicing requirements of the space in terms of comfort and safety, which will define air changes and ventilation requirements (such as negative pressure in isolation rooms) and mechanical & electrical services within the main A&E activity areas.

Space for family members to be beside the patient in clinical areas is good practice.

7.7 The ability to adapt will maximise the potential usefulness of the design in the future, and rooms should reflect activities expected to take place within the space. Designers should refer to current ergonomic data, but bear in mind the changes and possible future needs of the space. Failing to address future need, surge capacity and the increasing necessity for good patient and carer experience can limit future growth within a very short period of time.

7.8 A range of structural tolerances should be incorporated. The suitability of existing space will need to reflect existing and potential equipment, activity and loading to both floor slab and ceiling/stuctural soffit. A wide range of pendant equipment, as well as ceiling-mounted vertical pendants and equipment, need to be catered for.

Department layout

7.9 Effective delivery of the processes within the A&E department should go in parallel with a clear understanding of patient needs.

7.10 The patient experience of A&E – in terms of waiting, space for carers (which may include extended families), the impact of other users' behaviour, and the stress-related factors which can exacerbate their situation, to ensure that they receive, effective and respectful care with minimal delay – is very important. Likewise, the experience of staff working in A&E needs equal attention.

7.11 The Design Council's (2011) 'Reducing violence and aggression in A&E' offers a range of suggested innovations, including better communication of the clinical process to patients, and a web-based toolkit for the design team.

7.12 The proximity, or adjacency, of services and spaces that reflect best clinical practice should be agreed by the team, with reference to time taken between spaces and activities. Vertical movement through the building by lift may be an appropriate and quick way of delivering proximity within a limited footprint.

7.13 Similarly, doors and corridors need to be wide enough to enable bariatric equipment and accompanying teams to travel between clinical spaces with ease.

Standardisation of room-handing

7.14 Using a standard room-handing and layout throughout the A&E department has been shown to reduce medical errors. This means that all doors should be located in the same place in each room – handed and opening in the same direction. Additionally, equipment should be located in the same place in each room, as should communication points and mechanical and electrical switches and services etc, which should be designed and positioned to be in the most convenient and appropriate place for safe and effective clinical care.

7.15 Increased standardisation of supporting services (medical gases etc) within the design increases flexible use of rooms for a wider range of acuities.

7.16 Increased performance specification by the use of solid partitions between rooms/bays and corridor entrances increases patient privacy and the potential for a controlling the environmental performance in terms of operational resilience.

7.17 Room size should be determined by analysis of the flow of activity to inform different clinical requirements and the capacities of room type, which should, in turn, be informed by the operational use of technology and mobile equipment. In addition to clinical requirements, size will also be affected by the level of patient experience and the degrees of flexibility the organisation requires from the build.

Same-handing of rooms may feel counter-intuitive when designing shared service zones, but a simple analogy is to imagine getting into a car in an emergency and finding that the steering wheel is on the wrong side.

Stepping-up/stepping-down of acuity

7.18 Minimising the movement of patients as their needs increase or decrease within the A&E department has been seen to improve patient safety.

7.19 The use of acuity-adaptable rooms removes the need for dedicated high- and low-dependency areas and a resuscitation area.

7.20 The impact of acuity-adaptable rooms may require review of the conventional processes used within the department and may redetermine staffing and skill profile across the wider department. In order to manage high- or low-dependency patients at any time, staff will need to move between patients as their needs escalate or diminish. Staff movement between patients can be facilitated by incorporating separate staff corridors.

Single en-suite patient rooms

7.21 Single en-suite patient rooms can help to resolve a number of issues including infection control risks, partial lock-down, patient privacy and safety. Evidence suggests that the increased cost of providing single en-suite patient rooms can be significantly offset when compared with a whole department shutdown and improved patient safety.

7.22 There is increasing evidence that falls in hospital, particularly among older people, can drastically extend lengths of stay. Careful design, including accessibility, fall prevention and material choice can impact directly on patient stays.

Chair-centric area

7.23 The provision of clinical space for patients who need short periods of treatment or observation, but who do not need to be in a bed, can offset the impact on limited space within an A&E footprint of providing single patient rooms.

7.24 This concept demonstrates the need to move away from treatment room planning by default, since spatial need should be informed by knowledge of the patient's condition and need as well as the definition of an appropriate patient environment.

Interruption-free zones

7.25 The increased risk of errors by staff due to interruptions in activity has been well-documented.

7.26 Reducing the number of interruptions, minimising the amount of irrelevant or unnecessary information exchange and improving communication between healthcare staff can improve patient safety.

7.27 Staff in A&E have to deal with high levels of communication as part of their daily work, and providing specific interruption-free zones for activities such as prescribing or writing notes may have a measurable positive impact on patient safety.

7.28 Decentralised workstations may, in part, reduce the number of interruptions. Additionally, decentralised workstations are necessary if single patient rooms are to be effective.

Lighting levels

7.29 The quality of natural light and its intensity have been seen to improve health outcomes. Recent studies have also shown significant reductions in medical errors with improved lighting levels.

7.30 Increasing daylight to A&E departments and designing to accommodate available natural light can also impact on energy consumption. It is also likely to improve staff well-being. See also CIBSE's (2008) Lighting Guide LG2 – 'Hospitals and health care buildings'.

Communication

7.31 Along with better communication to patients, explaining where they are in the system, how long they might have to wait and why (see the Design Council's (2011) 'Reducing violence and aggression in A&E'), self check-in systems can allow more efficient low acuity streaming and are used internationally.

7.32 Tracking patients electronically through the system is an effective method of communication and for assessing waiting times etc.

7.33 Observation, both in terms of monitoring patient health and ward security, can be supplemented by discreet and non-invasive surveillance technology.

8 Operational relationships

8.1 The following ten planning themes, expanded upon in the following checklists, require discussion by both the design team and clinical teams from the A&E department in order to ensure the design offers the opportunity for innovation in the delivery of service.

8.2 Each is considered in terms of three factors: clinical, technological and environmental, with the aim of prompting dialogue between the multidisciplinary team.

Figure 15 Ten themes for operational effectiveness

1. Processes	Performance insights – effective flows through design of acuity-adaptable rooms.
Clinical	Check-in kiosk at Front Door, “straight to room” operational philosophy into appropriate acuity stream
	Minimise transfer times in flow, adjacent access to radiology and interventional facilities
	Same level access to theatres
	Enable same-handed room layout for rooms (particularly resuscitation and HDU) for operational navigation
Technological	Increased use of near-patient imaging and diagnostic screening; use of mobile computer cart: order/return results
	Access to mobile computer cart bays when not in use, recharge points
	Front Door potential for self-registration console, touch-screen
	Automatic passive tracking system for patients, staff movement, room availability and equipment
Environmental	Acuity-adaptable rooms, step-up/step-down operational analysis in every part of the A&E department
	All acuity-adaptable rooms same-handed
	Same-handed decentralised workstations (if not on the mobile computer cart)
	Same-handed storage and management of supplies in acuity-adaptable rooms
	Minimal changes of direction en route to theatres. Space for clinical team to accompany trolley (including bariatric trolleys)
	Ensure clear floor space in rooms by use of ceiling pendants and ceiling stems
	Use of standardised vertical/horizontal trunking systems for medical gases etc
	All doors to rooms slide/swing as standard, same-handed

2. Rapid assessment	**Performance insights** – rapid identification of key clinical conditions (e.g. acute myocardial infarction, neutropaenic sepsis). Enables infection control measures to be in place at entrances.
Clinical	Patients assessed at Front Door for conditions (e.g. asthma, pneumonia, chronic obstructive pulmonary disease (COPD)) with rapid access to diagnostic and interventional facilities and treatment in rooms
	Rapid pre-registration moves to the patient using mobile computer carts; space for carts
	Walk-in patients also assessed at the Front Door kiosk (e.g. which patients require treatment, which patients require information only)
	Dedicated information desk with privacy near ambulance entrance
Technological	A&E in-house radiology suite to include CT and ultrasound
	Increase mobile point-of-care testing throughout; near-patient screening and non-invasive screening (e.g. full-body low-dose image intensifier for rapid 2D pictures)
	Consider if angioplasty suite in A&E required if a heart attack centre
Environmental	Clinical rapid assessment and treatment rooms at ambulance entrance; storage bay and recharging point
	Radiology suite may require waiting space

3. Surge and flow	Performance insights – use of acuity adaptable rooms allows flexing as activity changes.
Clinical	Activity analysis will demonstrate capacity of HDU/LDU rooms to ebb and flow between acuity
	The potential is to (a) consider resuscitation less as a protected/separated stream of activity, but through process/acuity-adaptable design (b) see resuscitation as a suite of (ready) rooms that could also be used by HDU patients
	Same room layout, handing and size within and between resuscitation–HDU and HDU–LDU.
Technological	Increased collection of activity data for a number of key measures, including flexing between rooms at peak hours
Environmental	Consider two-sided ingress into patient room: one side patient access; other side from clinical staff. This will support planning/concept of a separate clinical corridor
	Consider resuscitation/HDU rooms' capability to expand to two-person-sized rooms if surge capacity required
	Corridors could be equipped with the capability to access services in order to improve responsiveness to major incidents

4. Operational support	Performance insights – acuity-adaptable rooms and decentralised working will require robust communications coordination and reviewed operational management with facilities management (FM) policies.
Clinical	Decentralisation of supplies to patient rooms requires consideration of dedicated storage space plus management of supplies in and/or near patient rooms. Consider the use of FM/ supplies staff and passive tracking of equipment
	Vending supplies bays with charging points required to local areas
	Determine patient-to-nurse ratios to ensure safe care, which will impact on layout and arrangement of step-up and step-down adjacencies
Technological	Staff mobile handsets and passive patient tracking/sensor communications system for rapid contact (public address system should not be used in order to reduce noise)
	Tracking of patients and equipment to enable rapid location of equipment and staff
	Mobile computer carts and consoles with appropriate technology for real-time transmission of discharge letter with pre-defined advice to primary care to ensure timely communications and follow-up appointments
Environmental	Acuity-adaptable rooms require clear floor space for mobile equipment
	Where space allows, provide seating space for 2 carers
	Bedhead services and power installed on off-set angled pillars for ease of access by staff around patient bed and working around patient's head
	Vertical ceiling-mounted medical gases and hanging drip-stands allow alternative room arrangements for working around bedhead
	In chair-centric rooms, allow for different chair configurations and space for working around feet and head. The recliner chair will be in sit-up mode all the way to horizontal mode. Space for staff to sit next to patient – need to consider how they maintain privacy (e.g. rooms/ flexible partitions over curtains).

5. Efficiency and effectiveness	Performance insights – use of acuity adaptable rooms, increased use of mobile diagnostics in rooms, expanded access to radiology in A&E, electronic prescribing and dispensing will require changes to current operational routines and FM performance measures.
Clinical	Tele-tracking/monitoring of equipment; room usage programme to inform FM colleagues of patterns of use
	Dedicated quiet space to protect dispensing activity; preparation space for medication supported by use of automated dispensing system
	Compact chair-centric rooms for the management of low acuity ambulatory activity
Technological	Tele-tracking linked to management of transport porters and housekeeping
	Electronic prescribing and dispensing with prescriptive coding with performance measurements to save clinician time and improve safety
	Automatic paging systems combined with electronic bed/ trolley tracking system to inform staff when room is free
	Benefits of body scanners vs CT. Radiologists/radiographers to advise on reporting turnaround times and how this may impact on flow and process
	Patient monitors should be linked to a central monitoring system to support remote observation
Environmental	Bays for mobile computer carts and recharging areas are used only as supporting spaces to rooms
	Dedicated staff workstations to ensure quiet cognitive working space
	Worktops for some nursing staff could be at standing height
	Decentralise supplies management (with closed storage) in room
	High acuity-adaptable rooms require careful coordination of openness/privacy to central base/decentralised workstation

6. Resilience	Performance insights – an "all risks ready" strategy designed to absorb surge capacity. To demonstrate how the A&E zones can be contained if there is an infection outbreak. Allows for disaster decontamination and isolation room strategy at the front entrance.
Clinical	Surge capacity testing for an "all risks ready" A&E. Consider how to accommodate a significant increase in patient volume
	Isolation rooms (negative pressure) adjacent to the front door entrance. Allows for contained routes of access and second access point in the event of contamination with gowning areas
	In case of outbreak, managed shut-down while rest of the A&E department in operation
	External staging area with hot water supplies. Could be used to decontaminate 40 or 50 people per hour
Technological	Isolation room resuscitation and radiology capability. Containment ability – ensure zone is able to be isolated from rest of the A&E department to allow continual support
	Identical placement of equipment/technology room (e.g. bedhead services). Same-handed layout for familiar operations
	Sensing/scanning equipment set within the walls and ceiling at front entrance for the identification of contaminated or infected individuals
Environmental	Inclusion of en-suite facilities in all isolation and single-bed rooms
	Hand-washing facility at all entrances, external and internal
	The number, location & height of wash-hand basins should be agreed
	Separate gowning areas for isolation rooms. Lockers and room for staff change. Separate lockers and changing for A&E staff
	Separate air-conditioning control and isolation
	Televisions in all areas of the A&E department. Incident management, separation of supply, secure and remote observation
	Designing (some) rooms so that they could take two patients if required; increase capacity during incident management
	Corridor walls fitted with essential medical gases: allows an A&E to increase capacity fourfold in conjunction with in room facilities

7. Patient safety and infection control	Performance insights – design and management strategies to prevent infectious patients entering A&E and to enhance patient safety and staff operational environment.
Clinical	100% single patient rooms supported by use of mobile computer carts or fixed decentralised workstations; promotes patient privacy, infection control, patient/staff experience.
	Interruption-free zones for cognitive working: ensures quiet areas to work (e.g. separate medication areas/room, quiet rooms for doctors/ nurses to make referrals)
	Front Door rapid assessment and ambulatory assessment kiosk processes before patients enter A&E
	Daylight levels – ensure maximum levels of daylight for staff and patient rooms; performance for working supported by locally adjustable ambient light levels.
Technological	Digital ECG recording. Ensure technology equipment/specification includes the ability to provide all digital recording capacities
	Non-touch technologies on doors to reduce cross-infection
	Automated dispensing capacity to improve near-patient prescribing in order reduce pharmacy waiting
Environmental	Separate staff corridor from patient side with access into patient rooms. Promotes semi-sterile environment, improves privacy and reduces noise on clinical side
	Wash-hand basins in each room and before entrance to patient room provides main enhancement of infection control precautions

8. Patient, staff and carer experience	Performance insights – patient and staff satisfaction is linked to a range of performance objectives such as improved safety and retention of staff, which aim to promote a healthy working environment.
Clinical	Design of Front Door spaces, routes and adjacencies to patient rooms is a whole-system A&E management strategy directly linked to patient satisfaction measures (i.e. the time it takes to see a clinician)
Technological	Reduce noise attenuation. Noise should be minimised for staff working and patient experience; need to incorporate as a theme in all strands of design. Enabled by use of mobile communication systems, rooms with solid/sliding door entrances, flooring type
	Interaction between patient and staff base linked to information resource.
(*Continued in next column*)	

Environmental	Internet access and televisions in rooms. These are shown to decrease patient complaints.
	Use of communication systems that allow users to find the right person without delay but maintain low level of noise.
	Space for carers; ensure mobile equipment does not impede carers' space. Rooms need to accommodate two chairs
	Separate clinical routes from public routes (e.g. access routes to radiology and theatres that are unimpeded by complex 90-degree turns)
	Doors to corridors and lifts wide enough to take a patient (including those requiring bariatric facilities) and the accompanying team around the trolley/bed; these doors need to be automatic or kick-plate activated ahead of the door
	Carefully orchestrated wayfinding. Clear signage strategies; coordinated colours will greatly reduce confusion and stress for patients and carers
	Daylight levels supported by adjustable ambient lighting will promote sustainable energy use and soothing ambience when required to promote patient behaviour in a smart environment
	Environmental design (e.g. wayfinding, fittings, colour, lighting, security/privacy)
	Smart and cleanable play areas. Touchscreen painting and televisions – appropriate design features for children and young people
	Space for toilets if en-suite facilities not available
	Staff rest room and changing facilities
	Space for staff kitchen facilities
	Changing facilities for babies, feeding rooms
	Sufficient seminar and meeting rooms for staff

9. Organisational culture	Performance insights – acuity-adaptable working, flow processes and increased use of mobile communication technologies will require changes to current working routines and FM operations.
Clinical	Patients directed to rooms from Front Door will reduce central patient waiting areas and reconsideration of traditional (administration) reception desk to an information resource
Technological	Interruption-free zones for staff for safer working; fewer prescribing errors
	Acuity-adaptable rooms will change working routines
	Acuity-adaptable operational management: refer to guidelines on ratio of nurse to A&E patients
	Tacit staff communications in large A&E departments should be promoted by design layout (e.g. sight lines)
Environmental	Dedicated mobile phones with speed dial; improved communications with ear buds
	For increased data-logging and ICT, designate an information/data support worker(s) to A&E
	Support spaces laid out on grid system so that inter-room activities (e.g. access to supplies) can be undertaken efficiently and safely

10. Security and reduction of aggression	Performance insights – to obviate incidents of physical aggression, patients are assessed before entering A&E as to level of risk where there is concern (e.g. with alcohol or drugs).
Clinical	Front Door assessment becomes reception. Patients requiring information go to an information desk (see the Design Council's A&E toolkit). Consider privacy.
	Patients directed to rooms/acuity streams from Front Door will reduce the need for one central patient waiting area
	Safe "cooling down" rooms, with quiet counselling and secure mental health suite (with couch)
	Reception space is extended to include defined communications, security and control rooms alongside administration space
	Entrances to A&E are the Front Door: the resuscitation entrance is kept clear of ambulatory patients
	To facilitate transfer of deceased patients to mortuary without public/patient sight. Clinical circulation spaces not available to public/unaccompanied patients

(*Continued on next page*)

Technological	Plan for a control centre that has multiple telephone lines; ambulance aerial point for information gathering and communications coordination
	Separate room for bed management, telemedicine contact and major incident planning
	Patients seen in room. Pre-registration computer carts at patient's side in rooms obviates patient waiting and associated aggression
	CCTV is installed in strategic places linked to monitors situated in the security office. Removes need for physical security presence at entrance; covers whole A&E
	Mobile communication systems for staff. Allows more efficient staff, patient and public address modes
	Comprehensive communications systems centre, including computer radios for the event of telecommunications failure, telephones, call systems and alarms
Environmental	If additional security required (e.g. major incident), build in empty space at front entrance, security at entrance, not permanent
	Front Door reception: environment designed to reduce tension and security risks. Ensure new reception position and layout means patients not queuing outside front doors.
	Security of staff egress in case of violence. All rooms/spaces for assessment and treatment have dual doors, with one opening into a secure refuge space for staff

9 What does the design team need?

9.1 The design team requires detail from a variety of sources at successive stages in the design process.

9.2 Design briefing should be informed by a combination of quantitative and qualitative information and measures that identify the requirements for health accommodation, adjacencies, operational processes and spatial qualities. The information for this should be drawn from across the stakeholder spectrum.

9.3 It is therefore important to involve stakeholders at the correct levels (strategic, operational and spatial), to ensure appropriate decisions are made on matters relevant to the time and detail outlined in the business plan, design, construction and fit-out stages.

9.4 Consideration should also be given to the timescales for making decisions and receiving feedback from wide-ranging stakeholder groups in developing and measuring the performance of the design before and after the project.

Quantitative or qualitative data

9.5 Examples of data and considerations to agreed by the team:

Quantitative data	Qualitative data
– Energy performance	– Comfort
– Air quality/pollution	– Control of internal climate
– Temperature	– Views and outlook
– Noise	– Perceived noise and interruption
– Daylighting and illuminance	– Poor quality lighting/glare
– Space/volume requirements	– Sense of enclosure/cramped space
– Availability of space adjacent to A&E	– Location and access
– Waste and emissions	– Patient satisfaction
– Staff retention	– Job satisfaction
– Cost	– Value
– Waiting time	– Perceived undue waiting
– Medical errors	– Wellness
– Repeat attendance	– Aesthetics

10 Who are the stakeholders?

10.1 Those taking responsibility for developing the strategy and planning will also need to take responsibility for stakeholder engagement, and it is essential to identify the range of stakeholders required for decision-making as well as the roles each plays in the process of service design.

10.2 Key to engagement is ensuring that the right people are available to make the right level of decisions at the right time, based on their expertise, importance to the delivery of the service, level of influence and interest. A communications plan and appropriate methodology will need to be agreed, with clear messages including:

- capability of organisation to progress its business model;
- value and prioritisation in the proposed model;
- key performance indicators (KPIs) related to future performance of both the project and long-term deliverability of the business case;
- improved service through innovation within the new design.

Figure 16 Example grouping of stakeholders

11 The project team's perspective

11.1 The project team has the challenging job of helping to innovate service planning, managing the change and ensuring continuous design input is integrated into the procurement programme. The task of keeping the body of the hospital functioning, guaranteeing continuous service and providing support for the running of the A&E department during change and transformation should not be underestimated. It would carry similar responsibilities whether a new build or a refurbishment were to be undertaken.

11.2 The project team usually instruct consultants to carry out the initial front-end planning and design development work, and perform extensive searches to collect as much information as possible about the existing constraints and opportunities of the site. The team will develop a robust set of criteria for the future performance requirements of the built environment from the clinical and operational FM perspective, as well as equipment, technology and infrastructure.

11.3 The designer has to resolve any contradictory specifications in the design requirement between mandatory/statutory regulation and guidance documents. All key decisions should be documented: why derogations may have to be submitted to the relevant agency; when they have been made; the date of decision and for what reason, linked to an evaluation of risk.

Planning considerations

11.4 While the strategic direction for the new department is being considered, the project team could also undertake considerations of operational planning at the fit-out level.

1. Front-end planning for the feasibility study

At an early stage in the design, there is very limited value in requiring (or unnecessarily providing) a high level of detail. Not only might this increase initial design costs, it will undoubtedly change. However, to inform the service business case and the commissioners and to establish the overarching capacity of a site, building or part of a building, to provide an A&E department will require:

a. An approximate floor area and ceiling height (for services and equipment). This will be based on:

(i) an agreed service model and informed assumption of the number of users;

(ii) comparative areas of similar service models and populations, which should be informed by a predictive model of future need.

It is also important to consider, in outline, the following:

b. Structural engineering:

(i) structural loading range (floor and ceiling);

(ii) infrastructural support, fixed points etc.

c. Mechanical and electrical services (M&E):

(i) capacity and location check (where and how big);

(ii) maximising daylight and natural ventilation should be prioritised over artificial light and mechanical ventilation, bearing in mind the performance requirements dictated by specific clinical space;

(iii) appropriate lighting;

(iv) medical gas requirements, power and other utilities.

d. Other matters such as:

(i) outline environmental requirements based on current best practice (referenced and recorded from visits or literature);

(ii) consideration of continued service delivery, both clinical and non-clinical support;

(iii) decisions based on location and context, such as wider sustainability issues (for example local transport);

(iv) space/volume requirements should include the ability to adapt and upgrade;

(v) influence of technology.

2. Design for the fit-out

Planning acuity-adaptable rooms requires activity analysis that will inform the space design and accommodation database: room areas/volumes based on a detailed service model defining spaces informed by activity analysis and process flows.

Room sizes should be informed by ergonomic and equipment planners at the earliest stage with strategies in place to enable future change through the analysis of clinical trends. A smart and successful planning strategy will have considered contingency for change likely within the project life and service life post-implementation. The aim is to ensure minimal impact on cost; it is important that the fit-out has few fixed points as possible to the building structure. Key considerations for the space would include:

- space and technical specifications required for staff working around the patient related to the range of acuity expected in that room;
- a small range of uniform and identically equipped same-handed spaces, single patient rooms (with en-suite WCs where appropriate), ceiling heights and loads for services, equipment and fixings etc. Consider both structural soffits and suspended ceilings;
- layout detail integrating space and the service model to ensure proximity and adjacencies of staff, equipment and activities are carefully considered;
- testing floor area and layout including measures on the potential for expansion/contraction within the usual ebb and flow, surge planning, resilience planning and future service requirements;
- essential adjacencies of spaces to other departments, staff and equipment, and accessibility requirements including any need for (or existing) level changes;
- support services included in A&E (for example psychiatry, the homeless healthcare team and other medical, primary care, mental health or non-medical support located within A&E and included in design discussions).

Patient requirements (and their attendant family/carers)

Special attention should be given to wayfinding and environmental comfort both outside and inside the A&E department, reflecting the need for universally and easily understood communication. This should

be accessible to the widest range of visitors and patients (for example entrance lobbies with weather-protected drop-off zone, temperature control, security, infection control gateways).

Patients with dementia and their carers

Particular consideration for patients with dementia and their carers will contribute to their feelings of safety in an alien setting. Direct access to a single patient room should be considered. Consultation with patient liaison groups and reference to environments for those with dementia should be identified early in the design. Key questions related to performance measures include: Is the assessment reception large enough? Is there a staffed information desk? Does waiting have immediate access to food and liquids as well as accessible toilets? Is there access to outside space or views onto day-lit space?

Staff requirements

It is particularly important to consider the facilities for staff and the benefits this may have on staff recruitment . This might include providing a wide range of activities such as rest and changing facilities, education facilities, secretarial, meeting rooms, workstation locations (overlooking patient areas and interruption-free zones), distributed storage areas, separation of staff routes.

Facility management and equipment planning

The facilities management (FM) and equipment planning team will include staffing, supplies and administration, cleaning, waste and disposal, and other staff. It is essential that they are involved in the earliest stages of strategic planning through to detailed design. In order to incorporate decisions made into long-term FM and asset planning, the FM team are likely report daily on their effectiveness in managing the space with responsibility for staff in the continual maintenance of the department. They will be the first to implement and coordinate replacement of technology and services. It is essential for the project team to consider and test new operational working; built-in equipment now will in the near future move to mobile equipment as procedures change over time.

Aspects the FM team will wish to consider will include:

- Accessibility: door openings for wheelchairs and trolleys (including bariatric needs), corridor widths (minimising 90-degree turns) sufficient for passing and movement of trolleys with full team and equipment, as well as comprehensive design for physical, visual and aural impairments.
- Mechanical and electrical brief, giving performance levels for services requirements (air quality, comfort, heating, daylight/ lighting levels, acoustics, medical gas and utilities etc), as well as energy use and sustainability, following best practice.
- Structural engineering brief to ascertain necessary long-term structural loadings of equipment and activity (floor and ceiling).
- Security and safety will include ICT, passive security and active surveillance, as well as infection control.
- Furnishings, fittings and equipment (which includes furniture and materials) should consider durability, functionality and maintenance, including deep-clean procedures and infection control, as well as accommodating the needs of the users (including young and older people).
- Designing a healthy environment: lighting, ventilation, materials, landscape and planting, should be developed along best practice. BREEAM Healthcare includes a comprehensive performance checklist.

12 Performance

12.1 Understanding performance and the need to develop a performance framework involves the whole design team, to meet conflicting stakeholder demands, achieve best value for money and deliver significant improvements in performance, incorporating targets, directives and guidance within the A&E service provision.

12.2 They will need to consider:

- a long-term view (five years, ten years and beyond);
- physical asset performance and service measures that reflect legislative, regulatory compliance and stakeholders' requirements;
- the potential impact of high risk failures, ensuring business-critical assets are identified and treated accordingly;
- the approach to maintenance and continued operation;
- how performance data will be collected and stored;
- how activities will be planned and delivered including responsibilities and competencies to deliver services.
- identifying the management responsibility for monitoring, review and improvement.

Why measure performance?

12.3 Evidence-based design depends on the accurate measurement and recording of a wide range of factors, many of which are included within the A&E clinical quality indicators.

12.4 In order to identify good practice and service improvement, as well as a clearer understanding of existing and possible risks, it is important to establish a baseline or benchmark for measurement.

12.5 However, one measure may be in conflict with another; therefore, performance measures should be agreed through wider engagement so that potential conflicts are resolved.

Benchmarking and KPIs

12.6 The design team will need to agree a strategy incorporating qualitative and quantitative measures to establish key performance indicators, to include:

- learning from mistakes: incorporating feedback loops into processes;
- learning from others: best practice from the UK and overseas;
- continual improvement.

12.7 Existing performance measures, which are detailed in A&E clinical quality indicators, should be considered with the wider acute care network and commissioners in order to meet targets across multi-agency boundaries (for example, how to define and mitigate avoidable admissions).

12.8 Additionally, waiting times should be considered in terms of safe medical practice; in effective and efficient patient flows, the aim should be to eliminate waits.

Figure 17 Performance measurement steps

1. What are we measuring and why are we measuring it?
2. Are we measuring it in the right way?
3. What does the collected data tell us?
4. How can we do it better?

Important note:

Consider the potential pitfalls of each stage – e.g. conflicting measures by different parties within the A&E service

13 Risk

13.1 Risk can be described as “the uncertainty of outcome, whether positive opportunity or negative threat, of actions and events” (HM Treasury, 2004) or “the effect of uncertainty upon objectives” (BSI, 2008)
http://www.hm-treasury.gov.uk/d/orange_book.pdf

13.2 Risk can be considered to have two components: likelihood (or probability) and impact (severity).

13.3 Risk assessment through prospective hazard analysis (PHA) (see the reference section in Part 3) and others such as PESTLE analysis (see Figure 18) or prompt sheets should be carried out by the wider design team in order to consider the impact of design decisions on service and outcome.

13.4 Additionally, the multidisciplinary teams should consider the non-clinical risks and the importance of risk assessment both in terms of the build process itself and also how design can mitigate risks within the A&E department. Proximity and adjacencies of services should also be considered in terms of risk.

Figure 18 Risk management

13.5 The impact of sequential risk and the analysis of risk of an element within a larger system should be carried out with the support of sufficiently expert input, as risk can be considerably overestimated or underestimated. (For example, the removal of leaves from gutters may be considered of low priority until blocked drains during heavy rain cause flooding and failure of critical electrical systems located in basements.)

a. Consider the likelihood, consequence and cost of each alternative.

b. Consider the risk of a do-nothing option.

c. Ensure evaluation is undertaken by people who are sufficiently skilled and expert in this area.

•

Driver	Examples of risk
Political	Change of government strategy
	Cross-cutting policy decisions
	Machinery of government changes
Economic	Ability to attract and retain staff in the labour market
	Presentation of illness related to poverty
	Effect of global economy on UK economy (e.g. costs of international transactions)
Socio-cultural	Demographic change affects demand for services
	Stakeholder expectations change
Technological	Obsolescence of current systems
	Cost of procuring best technology available
	Opportunity arising from technological development
Legal/regulatory	EU requirements/laws that impose requirements (such as health and safety or employment legislation)
Environmental	Buildings need to comply with changing standards

Figure 19 PESTLE analysis of external risks (adapted from HM Treasury, 2004)
Risk can be assessed in terms of the above 'drivers' for change, and their impacts on the A&E department, both directly and indirectly.

14 Resilience and adaptability

14.1 As the front face of the hospital, the resilience of an A&E department is critical in order to provide a continued service, especially in a major incident.

14.2 The ability for the A&E department to flex with day-to-day ebb and flow should expand in order to meet the sudden rapid increase in numbers of patients arriving when a major incident occurs, and this demand needs to be considered carefully within the design of an A&E department.

14.3 Furthermore, the spatial and operational planning should be able to adapt to more extreme pressures, such as in a catastrophic event. Major incident and resilience planning will need to be tied into design for decontamination and infection control.

Resilience planning

14.4 The resilience plan for an A&E department should accommodate four key stages of escalating acute need:

a. **Run of the mill (business as usual):** system anticipates shifts beyond routine and adapts

b. **Operational adaption (resource changes):** key person initiates recruiting/reordering of multiple resources from other departments/back-up services (for example on-call specialists)

c. **Departmental adaption (flex belt):** system change for whole department to sustain operation

d. **Organisational adaption (crisis measures):** planned reorganisation for catastrophic event

Adaptability and future-planning

14.5 Future-proofing in terms of adapting to expanding need with service growth should be accommodated into the A&E department design strategy. Any appraisal of options should consider the long-term cost including repair/replacement cycles as well as staffing need.

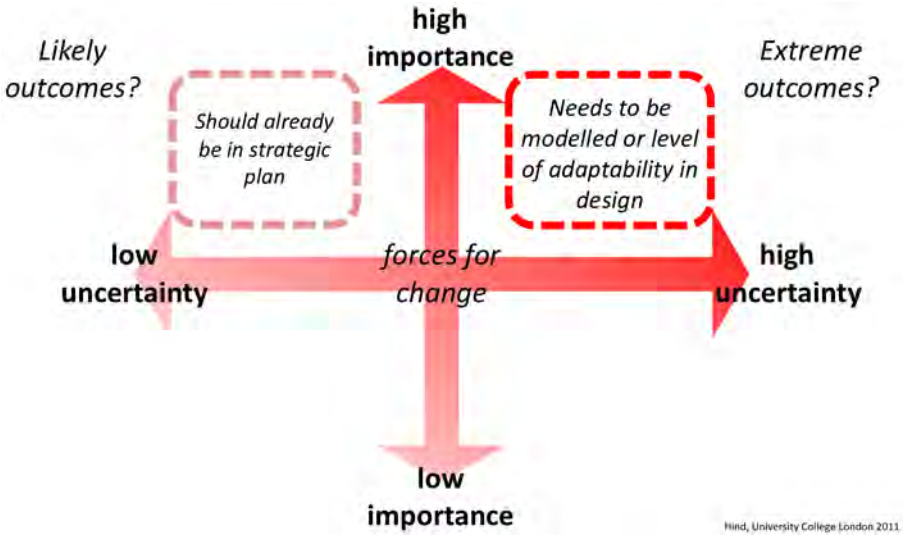


Figure 20 Diagram illustrating uncertainties mapped against importance to establish hierarchy of design adaptability.

14.6 Risk, in terms of both financial planning and operational performance, is clearly associated with lack of future adaptability of space and building services.

14.7 To better understand the possible future need of an A&E department, the design team should consider a future-planning workshop with stakeholder groups using a scenario planning approach: the potential change over a five-, ten- and 20-year period, which the A&E department may need to respond to.

14.8 The team should take into account lessons learnt from previous changes in service requirements, the accuracy of previous predictions and the cost of not meeting these changes.

14.9 The multidisciplinary team should consider questions such as “What if?” and “What happens if?”

15 Value for money

15.1 There are many different perspectives and categories of value for money (VfM) in a project. Whether a new-build or refurbishment of an A&E department, the planning team will set out the whole-life benefits of organising the design around acuity for efficient and effective activity-based processes and flows with technology use. Using the acuity-adaptable space principles in this guidance, an assessment can be made in how the design of the A&E department responds to changes in activity, clinical practice and innovation in diagnostics etc over the short- and long-term.

15.2 The aim is to make the case for change for this approach by illustrating these benefits from a multi-stakeholder user perspective. This will be a balance between assessing the quantitative and the qualitative elements related to available resources including:

- capital and revenue allocation;
- staff;
- procurement strategy;
- process-change strategy;
- acuity-adaptable single rooms.

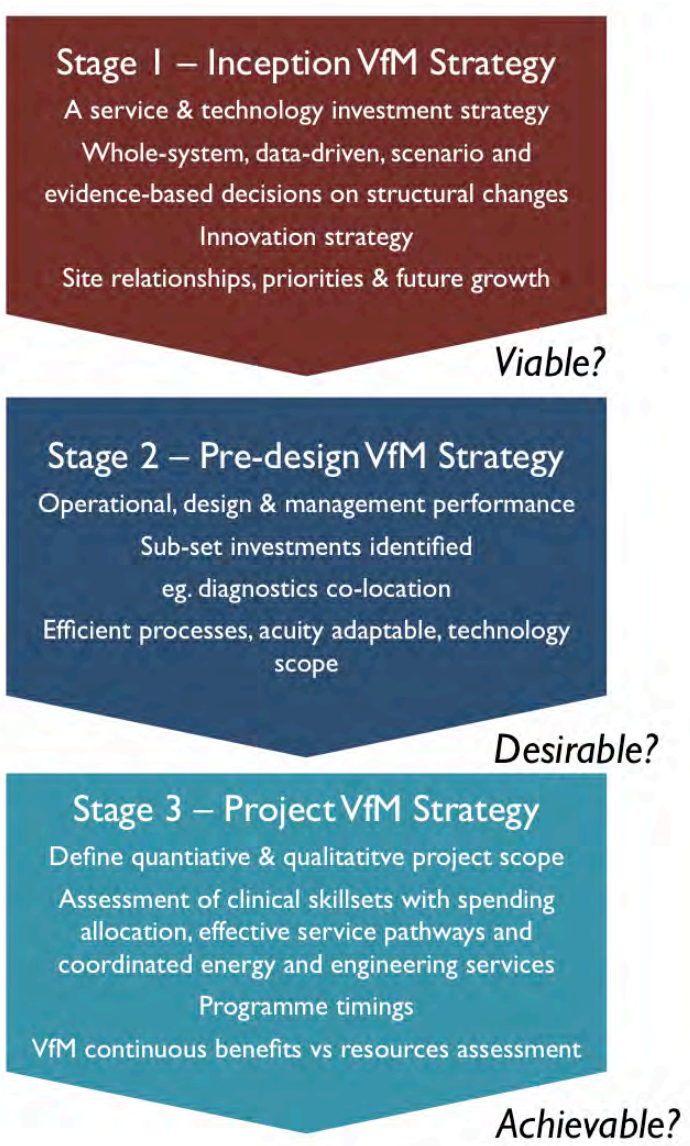


Figure 21 Stages in a value for money review

15.3 Stage 1 at the inception of the project is to agree what is viable in the service strategy. Stage 2 looks at what is desirable by innovating and assessing the relative benefits and risks. Stage 3 considers what is achievable, gauging the skills and competencies within the resource constraints to deliver the project.

15.4 This will require a complementary shift in thinking and a clinician-wide embracing of change and change management to ensure service improvements are met.

The National Audit Office (NAO) defines VfM as being “the optimal use of resources to achieve intended outcomes”.

Part 3: Building design

16 General design considerations

Developing a design strategy

16.1 The planning strategy developed by the multidisciplinary team through the processes described in Parts 1 and 2 should be drawn into an output specification document, which should then be translated into the building requirements to reflect the operational practice of the individual trust's A&E.

16.2 The A&E design strategy should be driven by the patient-focused activities and the spaces needed to accommodate these activities.

16.3 Some of these will be familiar to designers (for example wheelchair turning circles), but a more developed understanding by the team of the tasks and processes will be necessary.

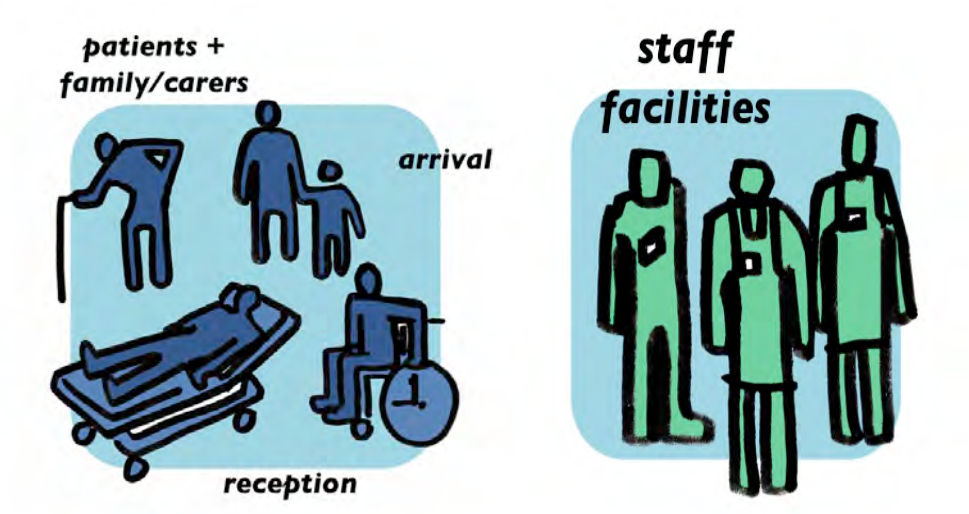


Figure 22 A hierarchy of space should be driven by patient and staff needs

Activity space

16.4 The functional space may be used for a number of different activities, but design around parallel or sequential activity should allow sufficient area to ensure clinical risk is quantified and minimised.

16.5 A starting point for this may be ADB (Activity DataBase), which generates datasheets developed for each project from a generic database including description of activities, personnel and planning relationships.

16.6 Engineering requirements such as room air temperatures, ventilation requirements and safe hot water temperatures, as well as surface finishes, building components, equipment and furniture are incorporated in the layout.

Figure 23 Activity around patient will begin to define spatial envelopes

16.7 Some categorisation and more intuitive grouping of elements may be necessary to reflect advances in clinical practice, which could be introduced more quickly than generic activity datasheets are updated.

Developing design hierarchies

16.8 Specific activities and the equipment needed for these activities to take place need to be thoroughly investigated by the wider team, with sufficient communication and inclusion of clinicians in the design process to ensure risk is minimised.

Activity

16.9 This should be defined around patient and staffing needs and:

- may include multiple activities (in parallel or sequential);
- may be changing over time (daily or hourly changes);
- will change in the future.

16.10 Patients are active participants in their care, not passive recipients. As such, they should be involved in the design process.

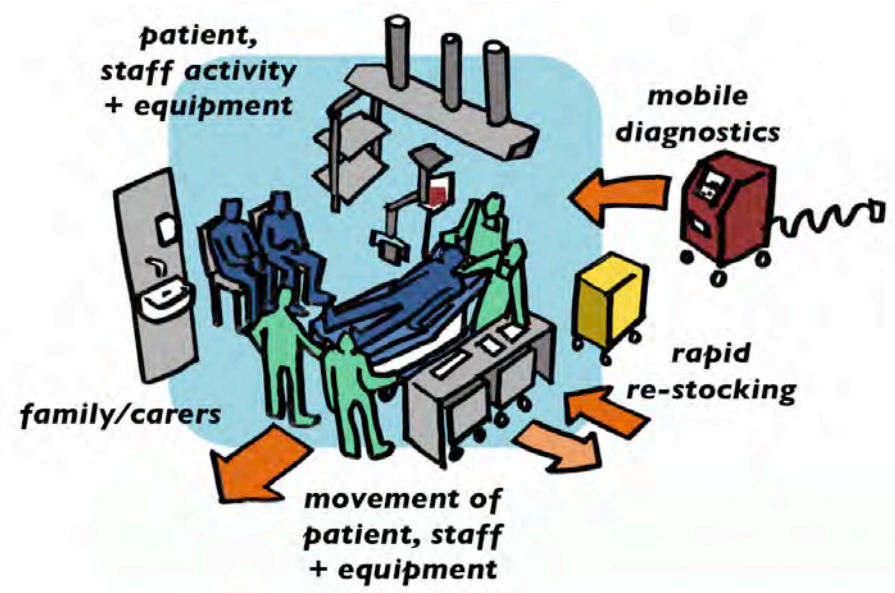


Figure 24 Space is developed around activity and equipment needs

Equipment

16.11 Design around the equipment needed to carry out the activity or activities discussed above.

16.12 Consider the lifespan of equipment and obsolescence/new equipment needed which may be bigger or smaller.

16.13 Estates and Facilities managers should ensure the designers are aware of upcoming equipment changes, local processes or regulations that may affect the design. Specialist health equipment providers should also be involved in the design process with the multidisciplinary team.

16.14 It is essential that the interfaces between building components and M&E/clinical components are understood, as well as the relationships that may exist between different pieces of equipment.

16.15 Furthermore, the operation of equipment, and by whom, should be considered. Basic needs such as lighting for examination should be considered in terms of when it may be needed, where it should be located, where it should be switched on/off and by whom, reflecting good medical practice and reducing clinical risk.

Spatial requirements

16.16 Derived from activity and equipment, focused around the patient, the spatial requirements should be considered in terms of free space as well as the equipment needed to perform the above, incorporating ergonomic data and the adjacencies of sequential activities to develop a dynamic task envelope.

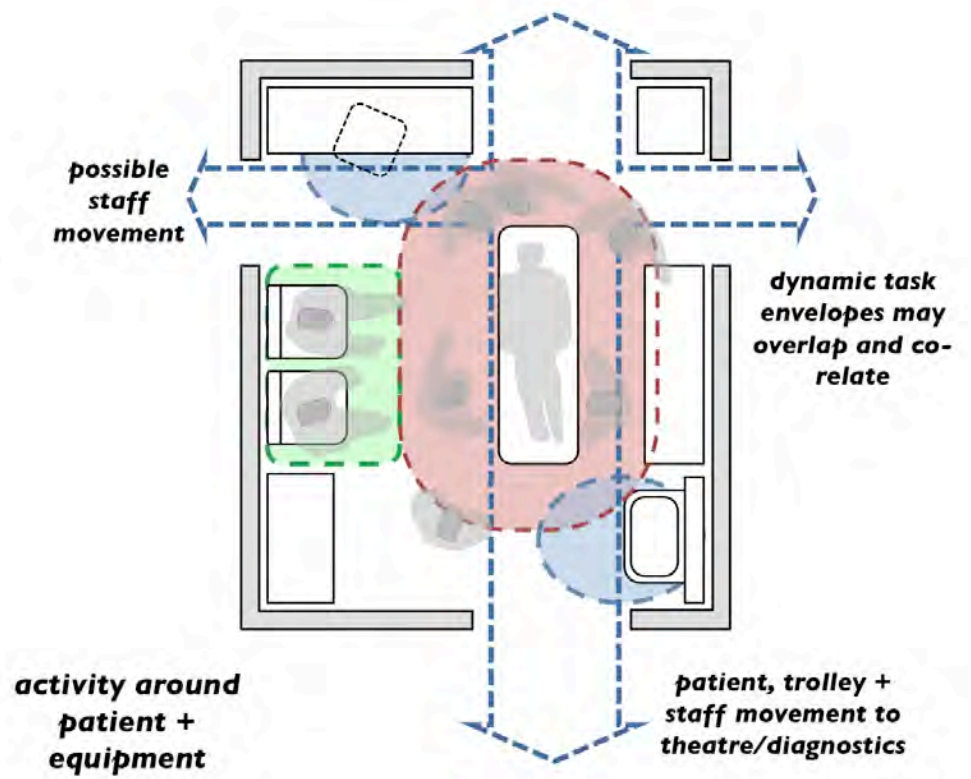


Figure 25 Dynamic task envelopes should be developed using up-to-date clinical processes and best practice

16.17 These will also be dependent on adjacency, proximity and handing requirements, which may be based on acuity. They may change to accommodate changing equipment and patient expectation; therefore the design should incorporate adequate adaptability.

16.18 Included in the spatial data should be area, height(s) including floor to ceiling height (as well as floor to soffit height) and

dimensional constraints such as critical (minimum/maximum) dimensions based on activity and equipment-driven requirements.

16.19 Additionally, it should include openings and minimum widths for the passage of trolleys (including bariatric trolleys where possible need has been identified), wheelchairs and teams attending to patients and their safe access and movement.

16.20 There may be conflicting spatial requirements such as the need for observation and the need for patient privacy. The design solution should be developed between the multidisciplinary team, ensuring that the design priorities and hierarchies of importance are fully understood, reflecting risk and good clinical practice.

M&E services

16.21 M&E services include the following considerations:

- Air:
  - temperature (for staff and patient);
  - air changes, air quality, need for negative pressure etc.
- Lighting:
  - service (space lighting);
  - local areas (activity related – for example, examination);
  - colour-rendering.
- Noise:
  - privacy (and confidentiality);
  - equipment noise and vibration;
  - communication (ability to maintain speech).
- Safety:
  - control of infection (for example non-touch technology, hand-wash facilities at entrance);
  - surfaces: material quality, moisture resistance, slip resistance;
  - hot surfaces/water;
  - water temperature, risk of Legionella;
  - cleaning;
  - waste disposal;
  - fire strategy, enclosure and separation, detection, alarms and escape.

16.22 Consideration should be given to ease of access to services for maintenance and potential shutdown (if necessary).

FM and equipment strategy (clinical and non-clinical)

16.23 The FM strategy of the A&E department should include operational planning of the replacement of equipment, restocking (just-in-time methodology or storage strategy), access, lifespan of equipment and the need for continuous service delivery (which may allow partial shutdown of areas).

16.24 Means of routine planned and unplanned maintenance, upgrading and replacement should all be considered.

16.25 Space is needed for the removal and replacement of equipment. The FM and equipment strategy should take into account the impact on surface integrity, infection prevention and control etc when removing and replacing equipment or fixed furniture. (Trusts may need to consider leasing of equipment based on rapid short-term change.)

ICT/digital strategy

16.26 The information and communication strategy (ICT) for A&E will need to be developed as part of the integrated design. This includes:

- patient registration;
- record of visits;
- results from tests;
- discharge or handover documentation;
- how patient records are accessed and shared;
- how re-stocking is managed;
- how performance is measured, recorded and shared;
- how movement of equipment or patients and staff is recorded;
- how visual information is displayed (such as waiting times to patients, critical information to clinical teams);
- how (tele-)communication between staff is maintained;
- how accessible telecommunication (for example Wi-Fi) is provided for patients;
- how security, observation and privacy issues are reflected in the design.

Design technology

16.27 Changes in technology are enabling new design methods and solutions.

16.28 Building information modelling (BIM) is contributing to the development of integrated three-dimensional space design, which allows collaborative working to ensure integrated construction design and embeds asset information into a coordinated computer model for the ongoing management of buildings, post-completion.

16.29 Construction Operations Building information exchange (COBie) is a means of sharing mainly non-graphical information about a building or asset. It combines relational datasets to provide linked spreadsheets of information and is used as the standard means of reporting BIM data.

16.30 ADB integrates with most current modelling tools used by the design team.

16.31 Additionally, simulation is being used more in the early stages of design as a way of understanding the flow of patient numbers and the impact of changes in processes, disruptive technologies and different design options. It should be

remembered that a simulation model is a simplified representation of a complex and dynamic system, so while it can inform decisions, it should not be relied on as the only source of information.

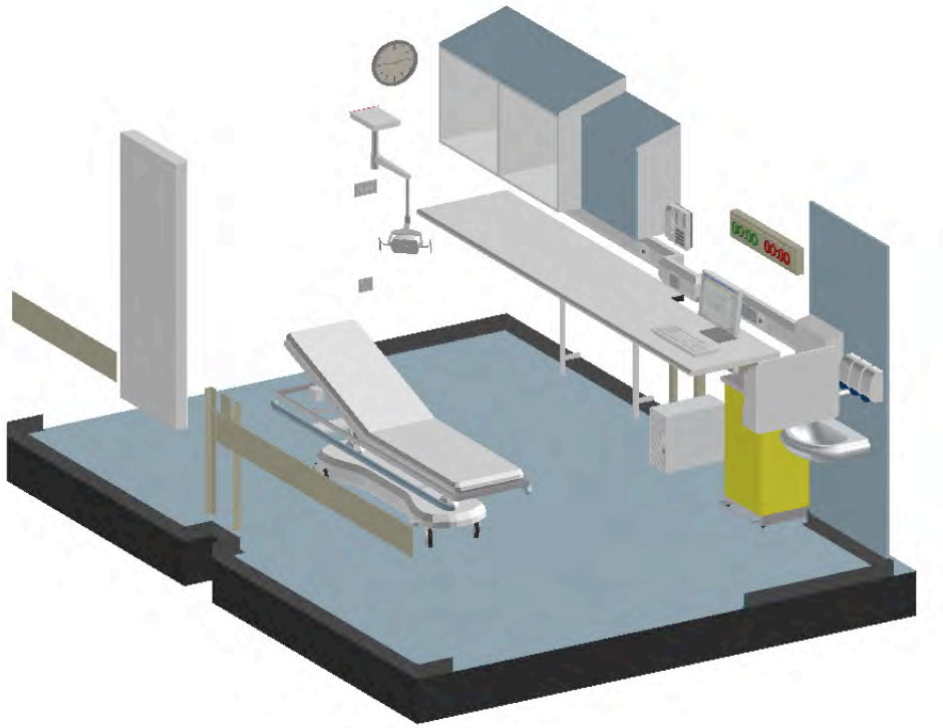


Figure 26 ADB and BIM will allow more clear communication of design between the multidisciplinary team (Source: CAM & LSI Architects)

17 Core facilities

17.1 Consideration should be given to the need for the following areas being accommodated in the A&E Department. When considering these areas, the activities to be carried out and clinical pathways should be an important influencing factor.

- Entrances
- Reception and waiting area
- Interview room
- Rapid assessment and treatment facilities
- Resuscitation area
- Decontamination room
- Clinical decision unit
- Dedicated children's facilities
- Availability of sitting room for bereaved persons
- Staff rest and changing facilities
- Teaching facilities
- Office accommodation and meeting rooms

Important

The following guidance should be read in conjunction with Chapter 8 on operational relationships.

Entrances

17.2 There should be two entrances to an emergency department: the "main emergency department entrance" for those arriving by their own means and the "ambulance entrance" for patients arriving by ambulance on a stretcher or chair. Level and unobstructed access to both entrances is essential.

17.3 Both entrances should have a canopied drop-off zone to offer protection from adverse weather and should be well-lit. The ambulance canopy should be high enough to clear lights and aerials. Ambulance parking bays should be provided close to the ambulance entrance so that the ambulance drop-off zone can be vacated as soon as possible.

17.4 Ideally, patients accessing the main emergency department entrance should not have to pass the ambulance entrance. Wheelchair storage facilities should be considered near the entrance but should not be in corridor or entrance space. There should also be wash-hand basins at the entrance.

Reception and waiting area

17.5 CCTV should be provided in accordance with current regulations.

17.6 Consideration should be given to hands-free telephones at the reception to enable reception staff to record information on computer systems while on the telephone.

17.7 Information about a patient's progression through the A&E system should be provided (for further guidance, see the Design Council's A&E toolkit).

17.8 Public toilets should be installed close to the reception area for men and women. At least one wheelchair-accessible WC, a nappy change facility accessible to either sex, and a separate infant feeding facility (where a woman, if she chooses, can breast-feed her baby in privacy) should also be provided.

Interview room(s)

17.9 An interview room should be considered for use by staff for talking to disturbed and distressed patients and relatives. It should be located in a quiet part of the department. An external view may be helpful.

17.10 Any room used for the assessment of patients with mental heath problems should comply with the standards set out in the College of Emergency Medicine's (2013) 'Mental health in emergency departments'.

Rapid assessment and treatment facilities

Emergency assessment/treatment room

17.11 A number of assessment/treatment rooms with all-round patient access should be provided for the assessment and treatment of patients. The exact number will depend on the number of attendances and the use of a chair-centric or vertical approach to treatment.

17.12 Unless acuity-adaptable rooms are used throughout, some will need to be designated for patients with minor injuries and illnesses and others for patients with major injuries or illnesses.

17.13 Some assessment/treatment rooms should be located close to the entrances to facilitate assessment on arrival.

17.14 An isolation suite at the front door will enable the rapid segregation of potentially infectious patients prior to registration. The layout of the room should enable efficient and safe care whereas the fixtures must facilitate the activity delivered within it.

17.15 Each room should be lockable with an external emergency override to the locking mechanism. A visual indicator of occupancy should be considered.

Head and neck assessment/treatment room

17.16 At least one treatment room should be equipped to deal with patients with ear, nose and throat (ENT), ophthalmic and dental problems.

Patient WC facilities

17.17 Accessible toilet facilities will be needed. Some patients may need to provide specimens.

Clinical equipment store

17.18 Storage space is required to store commonly used portable equipment such as an ultrasound machine and mobility aids (for example wheelchairs or crutches). This space should not encroach on corridor spaces.

Resuscitation area

17.19 If acuity-adaptable rooms are not being developed, an area is required for the resuscitation of patients.

17.20 There should be easy unimpeded access to the resuscitation area from the ambulance entrance that avoids the main waiting area. Direct access is also required from the assessment/treatment rooms to allow rapid transfer of patients from these areas.

17.21 The area should not be isolated from the assessment/treatment rooms.

17.22 The resuscitation area requires access to the body viewing/bier room (if provided) without passing through public spaces to allow discreet transfer of deceased patients.

17.23 Where individual rooms are not used, radiation protection will need to be provided and consideration given as to how to maximise audible and visual privacy.

17.24 The space should be adequate to accommodate the numbers of staff necessary for care and accompanying relatives.

17.25 The layout of the room should allow 360-degree access to the patient.

17.26 Patients in the resuscitation area may require surgical procedures, which will make them particularly susceptible to temperature changes; accurate temperature control is very important for many resuscitation patients.

17.27 Equipment will need to be parked in the bay in accordance with the procedures being performed and, when required, manoeuvred into place without disturbing clinical activity or impacting on the space available.

17.28 Staff will also need to take and view X-rays and digital images, view monitors, and access and record data on a computer.

17.29 The choice of equipment and fixtures should enable efficient and safe care but will depend on the range of activities to be carried out and may for example include:

- a ceiling-mounted twin-armed pendant to accommodate a range of equipment and for the provision of medical gases and electrical and data connectivity;
- a ceiling-mounted X-ray gantry, where applicable;
- a clinical wash-hand basin;
- a ceiling-mounted examination light (alternatively this may be attached to the pendant);
- patient trolley;

- space for a dressings trolley;
- space for an instruments trolley;
- a “grab” board at the head of the patient trolley, with “shadows” of small items of equipment, instruments and medical and surgical sundries stored here;
- sack holders for clinical waste and general waste;
- boards to record progress, drugs etc;
- screens for posting algorithms;
- storage space for a working supply of sterile and non-sterile consumables.

17.30 The following outlets should be considered on each pendant to enable maximum flexibility of use:

- 14 x 13-amp socket outlets;
- up to four data outlets, one of which should be networked to the hospital’s patient record system;
- one oxygen outlet;
- a 4 bar air outlet;
- one medical vacuum outlet;
- anaesthetic gas scavenging points, if nitrous oxide used;
- patient/staff and staff emergency call systems, including a separate switch for crash call;
- telephone outlet for internal and external calls;
- dimmer switch for overhead lighting.

17.31 The following equipment should also be considered for connection to each pendant:

- hands-free telephone;
- multi-parameter patient monitoring equipment;
- volumetric pumps;
- syringe drivers;
- blood warmer;
- transport ventilator.

17.32 Ceiling-mounted rather than floor-mounted pendants are highly recommended since they avoid the need to trail cables across the floor, thereby providing better access to the patient and improved safety for staff and visitors. They are also easier to keep clean.

17.33 Powered ceiling-mounted pendants enable staff of all heights to operate them easily.

17.34 Care should be taken in the positioning of the pendants to ensure convenient access by staff.

17.35 Each pendant should be connected to an isolated power supply and provide an uninterruptable power supply (UPS) to an agreed number of electrical outlets. IPS and UPS sockets should be coded to differentiate them from one another (see Health Technical Memorandum 08-01 – ‘Bedhead services’).

17.36 A dedicated area should be provided for the storage and charging of transfer equipment (transport trolleys, monitors etc).

17.37 Until recently, mobile X-ray machines were prevalent in resuscitation bays. However, planning teams should give preference to ceiling-mounted X-ray systems wherever practical. The case mix of patients will determine the type of system installed. Radiation protection will need to be taken into account.

17.38 Where ceiling-mounted X-ray equipment is provided, a gantry is required so that the equipment can traverse, and be used in, as many resuscitation bays as possible.

17.39 The design of all ceiling-mounted equipment and lighting should be coordinated to ensure that use is not compromised under any circumstances.

Decontamination facilities

17.40 If the A&E department is a "category one receiving unit" (designated to receive casualties in the event of a radiation or chemical incident as well as a major incident), decontamination facilities are required.

17.41 Resuscitation and minor surgical procedures will take place in this room.

17.42 The facilities should include a shower and provide access for medical equipment. A gowning area is required for staff and the facilities need to separate women from men and children from adults.

17.43 The facility requires external (as well as internal) access to allow patients with radiation contamination to be admitted directly from outside. The area surrounding the external entrance must be able to accommodate containment tents plus the fire and rescue service (people and vehicles).

17.44 External hot and cold water will be required and the provision of electricity for use of a generator to inflate the tents/units.

17.45 All drainage must be agreed with the Environment Agency.

17.46 The facility must meet the guidance given in chapter 9 of 'NHS guidance – incidents involving radiation' (DH, 2005).

Clinical decision unit (CDU)

17.47 Patients may be taken to the CDU for a further period of assessment or treatment. Here they will be accommodated for a number of hours before being transferred to other acute accommodation, or discharged.

Note:

A CDU and assessment unit may be co-located but may have differing functions depending upon local policies and procedures. In some situations there may only be a single common unit.

17.48 CDUs should meet the general requirements of an in-patient ward (see Health Building Note 04-01 – 'Adult acute in-patient accommodation'). Project teams may determine that it would be more appropriate to accommodate some patients on reclining chairs rather than in beds. Where this is the case, the room or bay should be similar in standard to in-patient accommodation with the exception of the bed being replaced by a reclining chair.

Dedicated children's facilities

17.49 Typically, 25–30% of patients attending A&E departments are children. Planning teams should consider the provision of a separate children's flow system and area. The waiting area should be provided to maintain observation by staff but not allow patients or visitors within the adult area to view the children waiting. Larger units may wish to consider providing a separate entrance and reception for the children's area (see Health Building Note 23 – 'Hospital accommodation for children and young people').

17.50 Babies, children and young people should be examined and treated in designated child-friendly assessment and treatment rooms.

17.51 Babies, children and young people needing resuscitation will require bays equipped with child appropriate equipment

17.52 Consideration should be given to the provision of facilities for nursery nurses, play specialists and others who are able to supervise young people as and when required.

17.53 Two unisex wheelchair-accessible WCs should be installed close to the reception area. They should not be overlooked from the waiting area to provide maximum privacy.

17.54 The WCs are for the use of children as well as adults. Hand-washing facilities, touch-free WCs and wash-hand basins should be installed.

Sitting room for relatives of seriously ill or deceased patients

17.55 A sitting room with a non-clinical atmosphere should be provided.

17.56 The room should be sensitively decorated, bright, well-lit and homely, where people accompanying seriously ill and injured patients or the recently bereaved may sit and talk, make telephone calls, prepare and consume beverages, use public toilets and wash and dry their hands and faces.

17.57 A variety of comfortable seating should be provided. Ideally, the sitting room should have a window with an outside view.

17.58 The sitting room should be:

- located close to the body viewing/bier room (if provided) and the resuscitation area but not within earshot of any sounds which may be disturbing;
- ideally accessible from the resuscitation area without having to pass through public areas of the department, where possible;
- accessible by, and with space to accommodate, a person in a wheelchair;
- close to a WC (en-suite an option);
- provided with tea and coffee-making facilities;
- clearly and well signposted.

17.59 Consideration should be given to nominated routes where the bereaved may leave the department without having to go through the general waiting or treatment areas.

17.60 Specific religious icons and artefacts should be avoided. A selection of literature may be appropriate.

See also the King's Fund's (2011) 'Environments for care at end of life'.

Staff rest and changing facilities

17.61 A rest room is required where staff can relax and take beverages and snacks. The room should have windows with a pleasant outlook, be comfortably furnished, and have a telephone. The room should have direct access to a pantry and be located with other facilities for staff and away from patient treatment and traffic areas. A dining table and chairs should be provided to enable staff to eat and drink in comfort.

17.62 The rest room should be designed so that staff wishing to read or talk are not disturbed by the noise from a television or music system.

17.63 An appropriate number of male and female WCs should be located within the rest and recreation facilities as well as in the staff changing rooms.

17.64 Clinical staff are in daily contact with patients' body fluids (blood, sputum, vomit, urine and faeces), encounter infection and handle contaminated instruments and dressings on a daily basis. They may need to shower and change their clothes while on duty. It may not be feasible for all staff to use the departmental changing facilities, but all clinical staff should be able to shower and change without having to leave the department.

17.65 Provision should be made for separate male and female changing facilities. Estimates of changing space and locker provision should take into account the numbers of full-time and part-time staff, including trainees and students.

17.66 Steps should be taken to ensure the security of personal belongings left in the staff changing facilities. There must be secure lockers, and access to the areas must be via doors with close-proximity card facilities.

Teaching facilities

17.67 Staff should be given every opportunity to use any quiet times to undertake pre-arranged or spontaneous personal or group learning.

17.68 Facilities should include a seminar room and library, along with access to a large multi-functional education and training room. All staff will need access to IT facilities.

17.69 A seminar room should be provided within the A&E department for teaching, tutorials, meetings, case conferences and clinical instruction.

Office accommodation and meeting rooms

17.70 Office accommodation should be located within the department. Entrance to the area should be through a single controlled access door with secure entry facilities.

17.71 All single and multi-occupied offices should be equipped with a computer terminal with access to the internet on each desk. Telecommunication facilities should also be provided.

17.72 In certain circumstances it is not appropriate to interview patients, relatives or staff in an office environment. Planners should consider including, as an alternative to more offices, one small informal room that is comfortably furnished and can be used for interviewing patients, relatives or staff, and one larger interview/meeting room that could be accessed by members of staff when required.

17.73 Such a strategy would ensure maximum utilisation of interview/meeting rooms, and office space would not need to be increased. All confidential meetings could take place in absolute privacy. Offices can then be used exclusively for administration and clerical work.

17.74 Most offices, providing they are appropriately located, should be able to be used flexibly.

18 Example layout diagrams

It should be noted that these are example layouts and for illustrative purposes only: individual trusts' layouts may look different.

18.1 As mentioned in Chapter 7, room size should be determined by analysis of the flow and type of activity to inform different clinical requirements and the capacities of room type, which should, in turn, be informed by the operational use of technology and mobile equipment. Where this a separation of staff and patient flows, consideration should be given for two main points of access to each room.

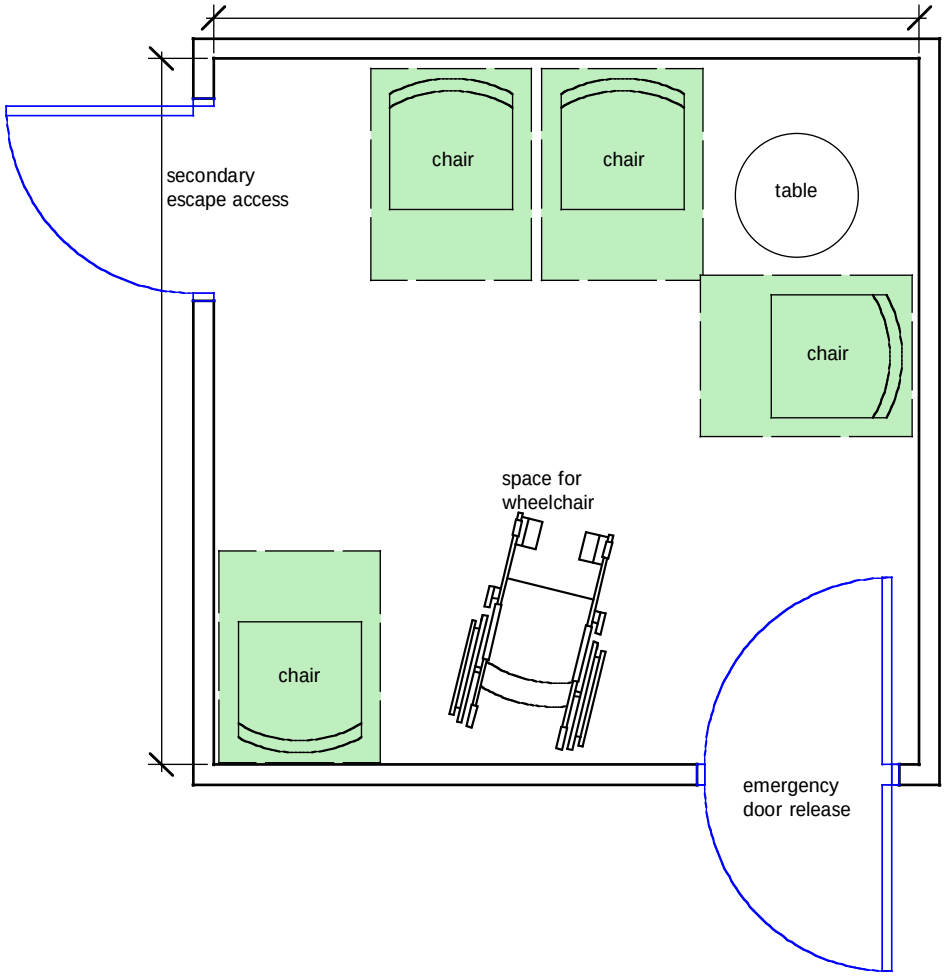


Figure 27 Example interview room

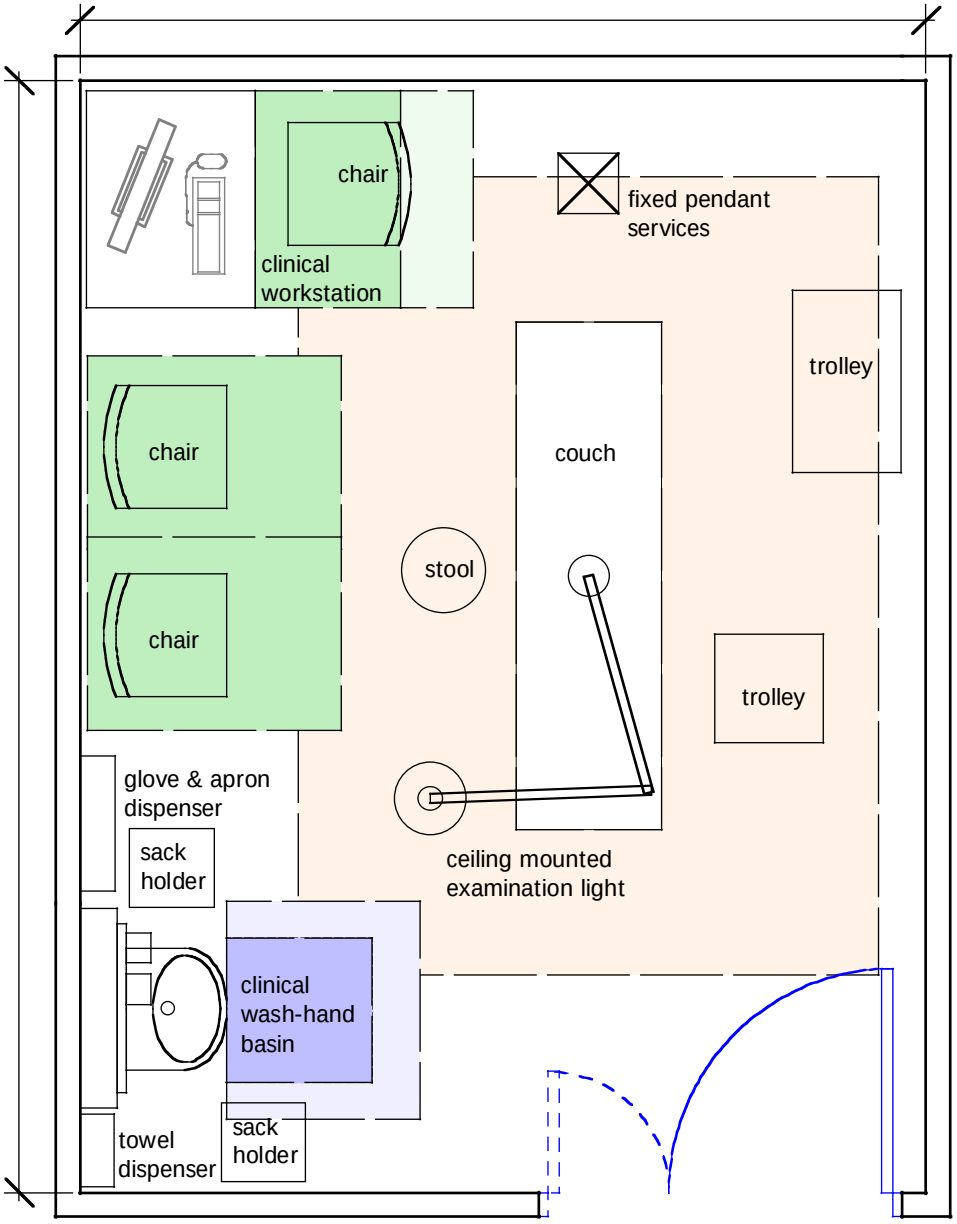


Figure 28 Example generic assessment room

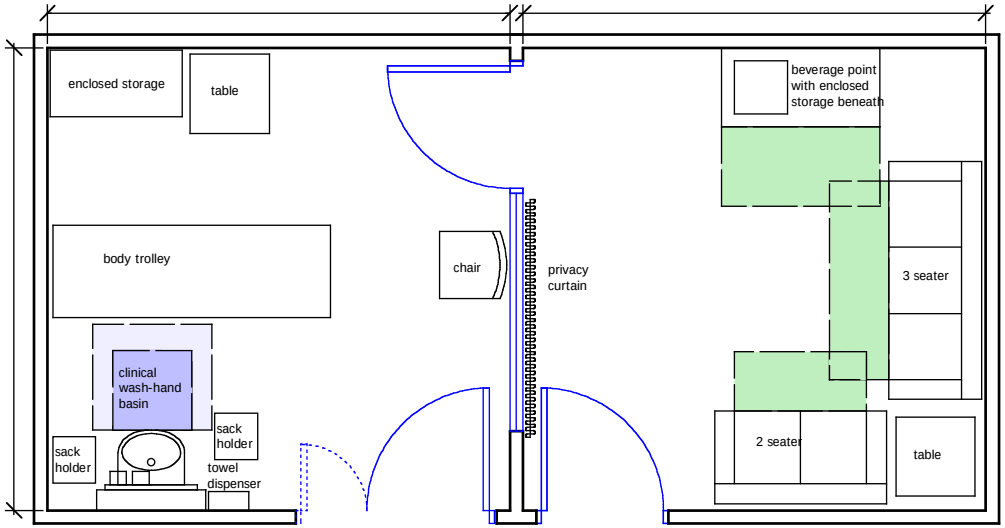


Figure 29 Example bereavement suite

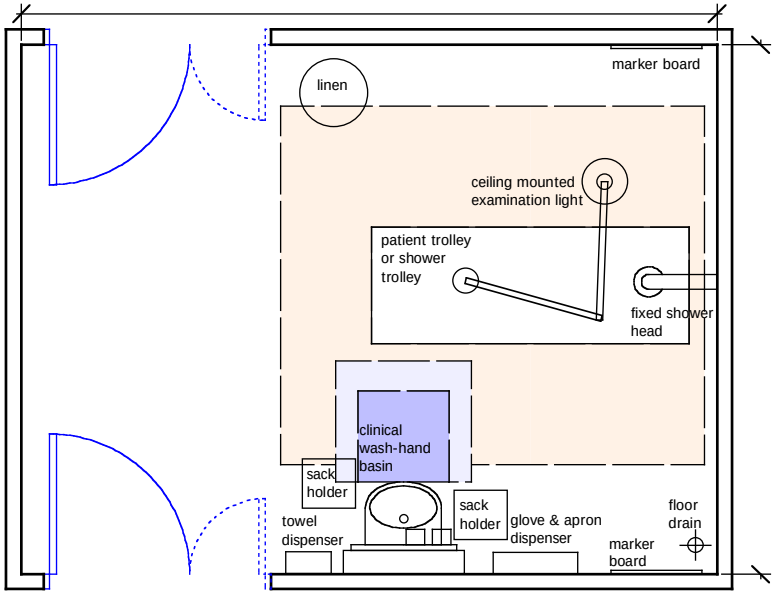


Figure 30 Example decontamination room

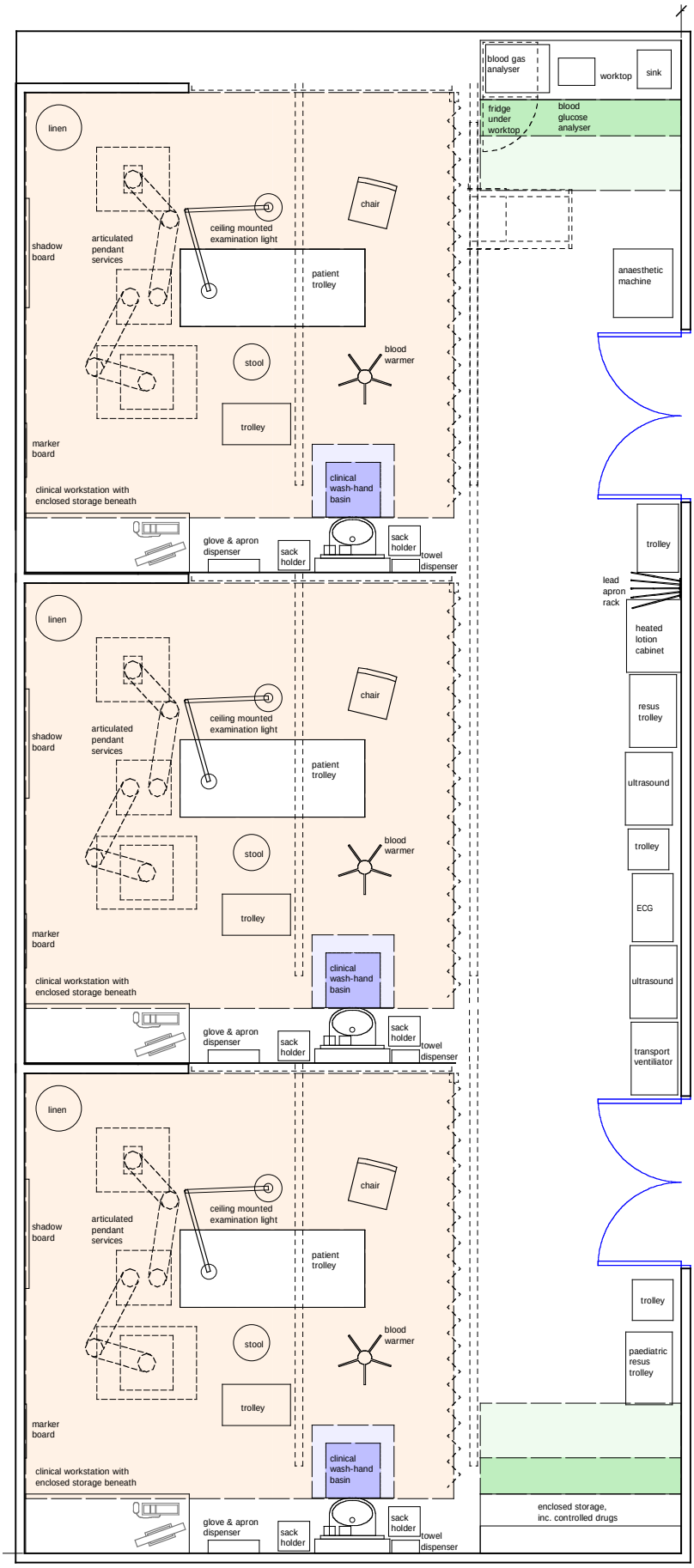


Figure 31 Example resuscitation bays

19 Case studies

Main case study: Emergency Care Centre, Queen Elizabeth Hospital, Gateshead

Introduction

Gateshead Health NHS Foundation Trust provides a full range of local acute services for elective and emergency care including in-patient, out-patient, day case and day care.

The Trust is based on four sites:

- Queen Elizabeth Hospital
- Bensham Hospital
- Dunston Hill Hospital
- QE Metro Riverside.

Urgent care provision for the people of Gateshead revolves largely around:

- an accident and emergency (A&E) department at the Queen Elizabeth Hospital;
- a walk-in centre and an out-of-hours general practitioner service based at Bensham Hospital.

Work has now started on a new purpose-built three-storey emergency care centre adjacent to the main Queen Elizabeth Hospital entrance (gross area circa. 10,000 m^2). This site is at the heart of the hospital. The walk-in centre and out-of-hours GP services currently based at Bensham Hospital are to relocate to the new emergency care centre at Gateshead. Services will not only be situated next to each other but co-located into an integrated service model, which delivers the single front door for all patients.

The need for change

The current service for non-elective patients is accessed through a number of points in the Trust:

- A&E sees adults and children with a range of presenting conditions, including major and minor injuries, medical, surgical and gynaecological conditions.
- A medical assessment and short stay unit (MAU/SSU) sees patients with medical conditions including those presenting at A&E who cannot immediately be discharged back to their own homes/place of residence, and patients admitted directly from general practice.
- Patients with surgical conditions may also be admitted directly to a surgical ward from home through general practice.
- Likewise, children are also seen directly on the paediatric day unit or (over night) on the in-patient children's ward, through referral from general practice or a consultant-led clinic.

The A&E department is physically located at the top of the site, adjacent to its radiology support. It is laid out to split services for patients with minor complaints from those with major illnesses or trauma.

The MAU is co-located (and managed as a single unit) with the SSU. It is located in older accommodation on the site, which is not appropriate to its modern purpose as a busy fast-turnover medical unit. It is physically some distance from A&E, is on a different floor and has an average transfer time for patients between MAA and A&E of over five minutes.

The distance between units causes problems. The travel times and distances involved give an indication of the inefficiencies that exist with the current service model. Not only is there excessive travel for patients and staff, but it is much more difficult for the clinical teams to communicate well and to review patients quickly.

Bensham Hospital is not a good location for a walk-in service as public transport is a problem.

The Trust recognised that it had to provide a clinical model and pathway that offers a patient-centred, accessible, prompt and clinically appropriate service where staff can access the right diagnostic and treatment interventions for each person. The model would need to address waste and duplication, and admission avoidance and reducing length of stay, to ensure that the best use of resources was made. It would need to be provided in an environment that is modern, appropriate, comfortable, affords privacy and dignity and is as pleasant as possible for the patients. The environment also would need to support staff working effectively and productively, reducing waste and stress in their working lives.

Identifying the preferred clinical model

The Trust has devoted much time to analysing the detail of the ideal clinical model:

- An extensive review of literature and evidence from the UK and internationally has helped with understanding both clinical and design solutions.
- Staff from the range of clinical teams have visited other units to identify the waste in the current system and to build and test new ways of working to overcome these.

- Clinicians have discussed and visited both the James Cook Hospital and Northumbria NHS Foundation Trusts. Both these organisations have undertaken a review of urgent and emergency care and developed new models. Comparisons with these local units have been helpful in developing the preferred approach.
- Three hospitals in the USA were visited in March 2009, each with different ways of working:
  - Washington Hospital Centre, Washington DC
  - Wake Forrest University Baptist Medical Centre, Winston-Salem, North Carolina
  - Duke University Hospital, Durham, North Carolina.

Lessons learned from the USA included:

- **The background work on patient pathways is imperative. The pathways need to be fully understood before the design process can begin. This is important**.
- The design should be future-proofed.
- Linear design works well as long as flexibility is inbuilt.
- Identical room layouts (same-handedness) is important.
- Single rooms are important in terms of privacy and dignity and minimising the risk of cross-infection.

All of this work and learning has fed into the clinical design brief from which the detail of the preferred option has been developed and on which basis the costs of the new facility have been prepared.

The new clinical pathway

The emergency care centre will be the single point of entry for non-elective patients – that is, all unplanned admissions.

The single front door to the hospital will ensure that all emergency care patients are directed to the same point of entry where they will be quickly streamed into the most appropriate care pathway for their clinical needs. The most appropriate clinical team will lead care in the most appropriate environment. This way, some patients will go directly to the assessment area for more detailed review, while others will be seen and assessed in the A&E environment. Through this model, there will be quick assessment and review, less duplication, and less travel for the patient. Prompt diagnostic investigations will be available to ensure timeliness of decision-making.

The following services will be offered:

Services	Location
Resuscitation	Upper ground floor
A&E and generic assessment of adult care including major incident storage and facilities	
Adult minor injuries/walk-in centre	
Radiology	
Paediatric A&E and assessment services	
35-room short stay and observation unit	Third floor

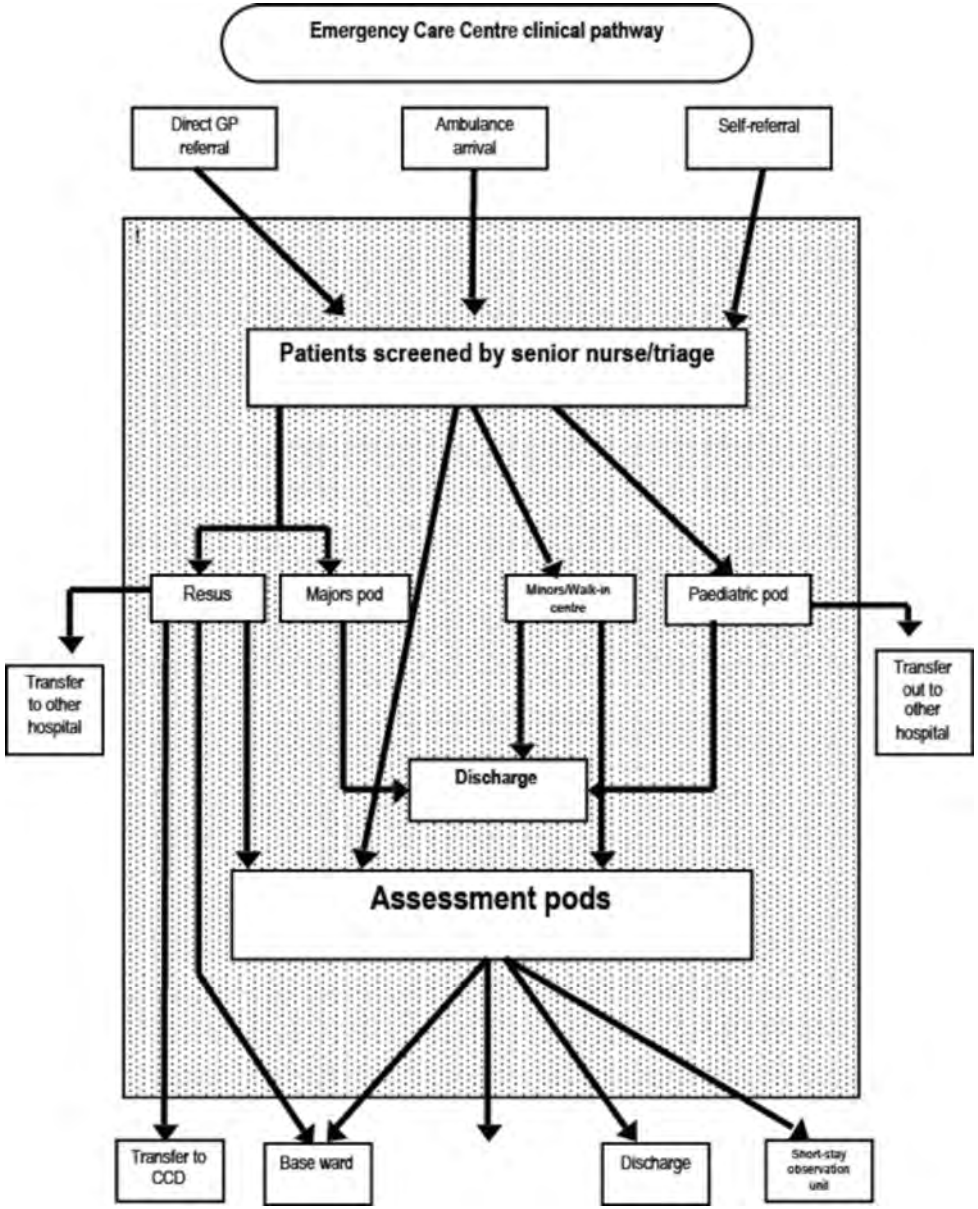
The flow chart opposite sets out the clinical pathway.

Building design

To implement and support this new clinical pathway, the brief needed to deliver the following:

- co-location of A&E, paediatric, medical and surgical assessment/adult short stay in a facility that allows integration of the service and facilitates teamwork across the various clinical teams;
- the right adjacencies for clinical services, including proximity and floor level for base wards and theatres;
- flexibility in design to accommodate surge capacity and peaks in demand and to meet future developments;
- facilitates ease of access for ambulances (that is, location at front of site);
- facilitates ease of access for pedestrians and is highly visible (A&E minors);
- the scheme needed to offer flexibility in terms of accommodation, recognising the changing needs of healthcare, such that it is sustainable in the long term.

The new build is based on a linear design: that is, separating the flow of patients and family members from staff, allowing for a more efficient workflow, greater privacy and confidentiality, and greater visibility of patients by staff. This is achieved by providing two separate access corridors for patients and public on one side and clinical staff on the other, separating the two flows. The overall circulation space is quite large because of the extra corridors needed, but it is justified as it



satisfies clinical functionality. The linear design also allows for optimal staffing because the emergency care department can expand and contract to accommodate changing patient and staff numbers over the course of any 24-hour period.

As it was difficult to calculate the level of staff-to-patient ratios in this linear design, it was decided to break up the assessment areas into zones called "pods" – a cluster of eight assessment rooms with decentralised workstations outside each room on the inner staff corridor. The pods are self-sufficient (that is, there are toilet facilities at each end and supporting accommodation, such as clean/dirty utilities, on the outside) but are interconnected so they can support each other. Consequently, staff would never need to leave this area, which makes better use of resources and staff time and helps to respond to peaks and troughs in demand. The pods can be locked down when not in use. For security, corridors are divided into zones, entries to which are pass-controlled. This ensures that patients/visitors only have access to the areas they need.

There are different pods for major illnesses/injuries, for minors/walk-in and for generic assessment, although they all can be adapted for any type of acuity if demand dictates.

There are four resuscitation bays, which are all open plan with sliding screens, ensuring adequate observation of each cubicle. All services can be doubled up to make eight bays when demand dictates.

All rooms are same-handed and acuity-adaptable for any purpose.

Benefits

The main benefits to adopting this kind of approach are:

- Creates single point of entry to the pathway, improving safety and aids prioritisation
- Allows flexibility in the degree of assessment prior to the decision to move into the hospital
- Creates a flexible divide between A&E and a generic assessment area allowing better use of staffing and resources
- Acuity adaptable, single rooms – allows flexibility, safety, infection control, supports "lean" principles (that is, eliminating waste and duplication).
- Creates decentralised working keeping staff closer to patients, increasing safety and reducing staff movement
- Allows expansion and contraction according to workload and can more easily adapt to surges in the demand for services
- This model would create a one-way flow of patients (that is, no backward step in the process) across the emergency pathway, reducing waste and duplication and thereby adhering to the "lean" principles.

Construction period

The construction of the new facility began in October 2012 and is due to officially open in October 2014.

The Department of Health would like to thank Darren Makepeace (clinical project lead) and Robert Young (project manager) for their help and use of resources in this case study.

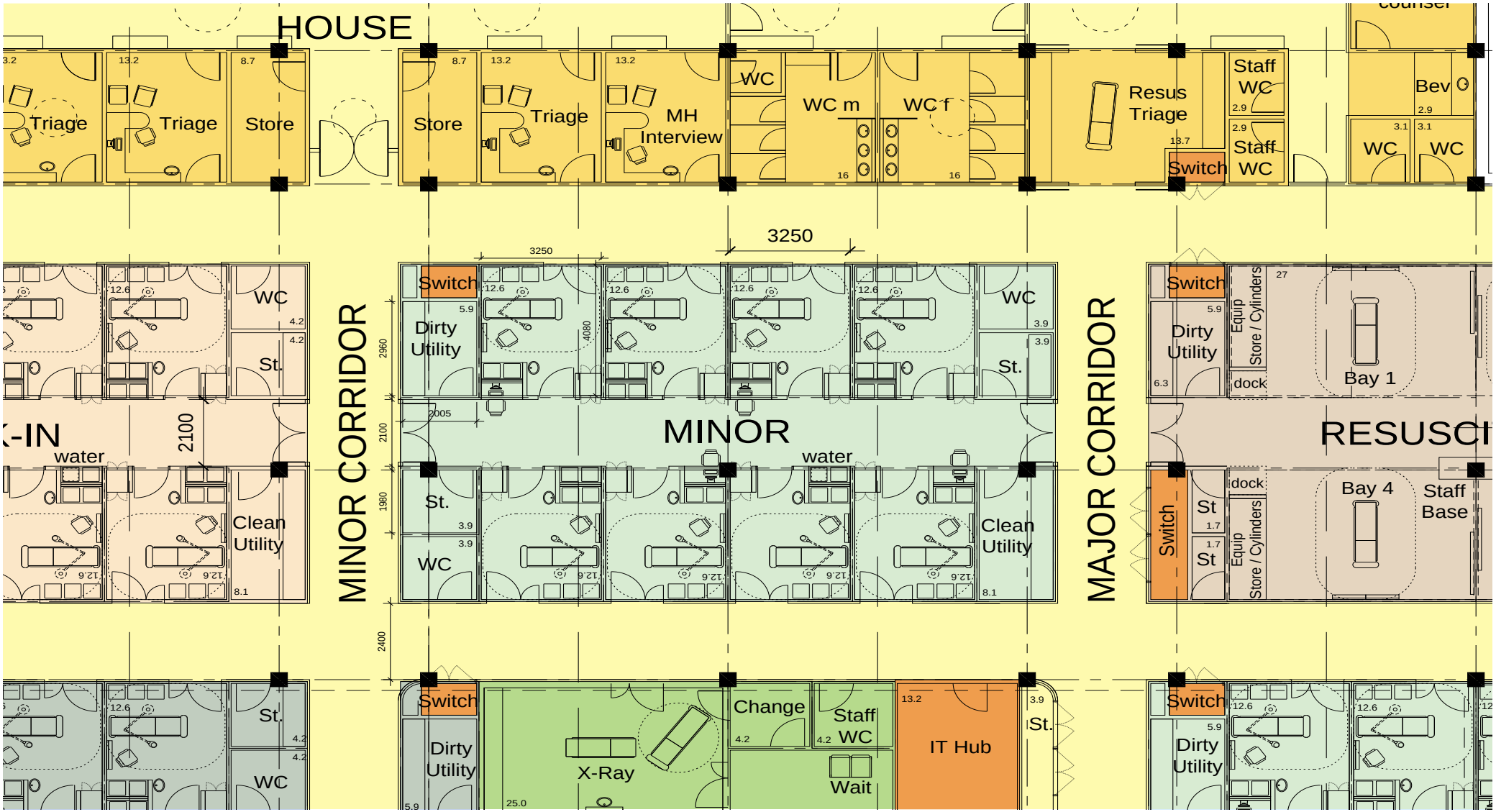


Diagram showing the layout of the minor injuries/walk-in pods. Note the same-handedness of the assessment rooms. Circulation spaces highlighted in yellow show the separate patient/visitor corridors.

Note: This plan is subject to minor revision as build progresses.

Case studies by theme

Left: Covered entrance and ambulance bay
Salford Royal NHS Foundation Trust
Source: Nicholas Cartwright

Above: Entrance with adult and children adjacent receptions
University Hospital Southampton NHS Foundation Trust
Source: Gary Spring

Above: Resilience planning for patient safety: Isolation zone accessed directly off entrance lobby.
Left: Hand-washing facilities before entrance lobby
Princess Margaret Hospital, Kowloon, Hong Kong
Source Sue Robinson, Albert Lit

Below: Chair-centric concepts: privacy dividers with supporting consultation spaces at perimeter
Jewish General Hospital, Montreal
Source: James Lennon, Lennon Associates

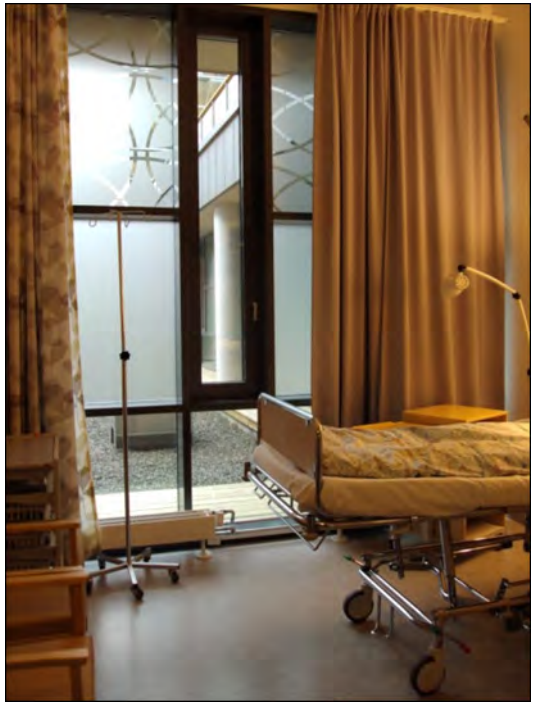
Informal layout of ambulatory assessment holding area.
Salford Royal NHS Foundation Trust
Source: Nicholas Cartwright

One of the key criteria for use of a chair-centric area is that the patient is relatively mobile. If a private discussion is necessary or the patients requires examination, an adjacent room is used. Chair-centric areas enable patients to be observed or treated using a recliner chair as opposed to remaining in a cubicle.

Below and right: Mobile equipment cart with charging point bays in the clinical corridor adjacent to single patient rooms
Salford Royal NHS Foundation Trust
Source: Nicholas Cartwright

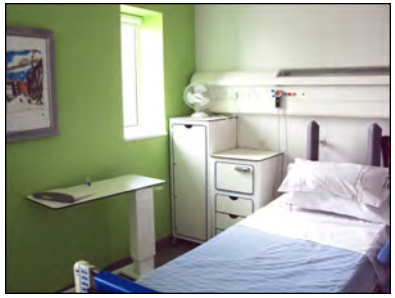
Consider storage bays with colour coding to demark the open zone.
Salford Royal NHS Foundation Trust
Source: Nicholas Cartwright

Right: Assessment reception point, mobile workstation
St Olavs Hospital, Norway
Source: Marte Lauvsnes SINTEF



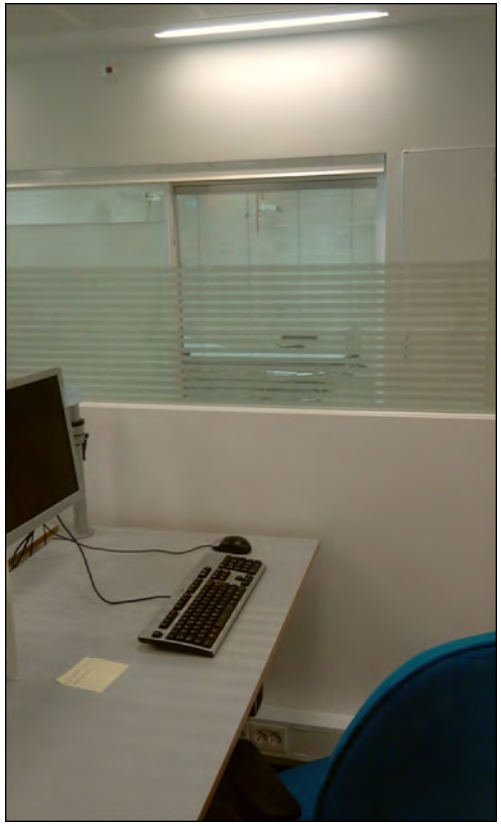
Left: Single patient room in A&E, maximised daylight with considered patient privacy in the fenestration detail and fabric use.

St Olavs Hospital, Norway
Source: Marte Lauvsnes SINTEF



Left and below: Typical single patient acuity-adaptable rooms for up to 72-hour clinical decisions. Mobile medical outreach teams access A&E.
Salford Royal NHS Foundation Trust
Source: Nicholas Cartwright

Right and below: Staff workstation adjacent to single patient treatment rooms, semi-private staff screening with observation
Malmo Emergency Department, Sweden
Source: Marte Lauvsnes SINTEF



Above and left: Staff base with visual contact with the treatment rooms. The experience is that patients are more calm when they see staff.

The layout demonstrates a linear peripheral circulation with decentralised working. Note above: all furniture and equipment on wheels.

Above source: Design James Lennon, AIA, ACHA, Lennon Associates

Right: Staff base, colour coded to acuity, with storage bays opposite patient rooms.
Malmo Emergency Department, Sweden
Source: Marte Lauvsnes SINTEF

Right and below: Staff workstation adjacent to single patient treatment rooms; sliding doors and semi-private patient screening
Malmo Emergency Department, Sweden
Source: Marte Lauvsnes SINTEF

Note: These layouts demonstrate a linear style, i.e. with separate clinical and public corridors, and single patient rooms in the adult A&E

Left, Staff workstation, colour coded to acuity, private area for dispensing and note taking
Malmo Emergency Department, Sweden
Source: Marte Lauvsnes SINTEF

Prefabricated modular system (pods)

When estates teams need to reorganise ward layouts to improve patient environments or increase the number of beds available, it may involve undertaking major refurbishment projects, which can mean significant capital investment and major disruption.

Prefabricated modular systems (or pods), some of which have been developed in conjunction with the Design Council and others, can enable hospitals to quickly convert under-used space without the need for major refurbishment. Some pods feature a retractable outer shell and an individual modesty screen that the patient can control for increased privacy.

Such systems are designed to be versatile, flexible and agile in terms of rapid installation without the issues concerning infection control, dust, noise, risk etc, which accompany any construction work.

The pods can be rapidly installed, creating additional bed/couch spaces with multiple A&E settings, such as:

- assessment beds;
- observation beds;
- paediatric beds;
- consultation/examination couches – majors;
- consultation/examination couches – minors.

Soft areas for expansion can be oversized A&E waiting areas which are becoming partially redundant, as in Scandinavia, by processing patients in new ways, such as “rapid see and treat” methods. Other opportunities for expansion into soft space are often back of department admin/office areas.

The pods can be easily cleaned to address infection control issues. They can reduce ambient noise, such as patient trauma sounds and sounds emanating from equipment, as well as addressing issues concerning privacy in terms of clinician/patient confidentiality. Monitors, life support systems and IVs can be freely suspended from the pod, making valuable space available around the bed for emergency events involving intubation and defibrillation.

Some pods incorporate new modesty screens, different types of light sources, including LEDs, medical gas systems, power supplies, bedside grab rails, storage, equipment/IV suspension systems and communication systems to call up patient medical records by the bedside.

An example of a further innovation being considered includes ultraviolet self-cleaning retractable curtains.

In some examples, the curved perforated metal bedhead and ceiling canopy redirect sound waves down onto the bed, rather than across the room, so that the volume of conversations between clinician and patient is reduced.

Other benefits can include off-site construction, speed of provision, reduced on-site disruption and reduced wastage.

In summary, pods can be a cost-effective alternative to traditional construction methods and can help to minimise disruption to patients and overall A&E service provision.

20 Checklists

Checklist for clinical leads

	Operational considerations	Comments
1	Do you know the reasons for the A&E build?	
2	Do you know what outcome measures and subsequent quality indicators need to be delivered by the new build? Are you able to prioritise these according to importance?	
3	Have you and your team reviewed all processes within the A&E department, particularly patient flow, to ensure they are the most efficient they can be? Do they ensure delay is minimised?	
4	How is the pattern and number of attendances going to change over the next 10, 15 and 25 years?	
5	What changes are planned locally that may impact on attendances and the requirements of the A&E department?	
6	Have peak workloads (do not use averages) by hour and day of week been calculated?	
7	What are the specialist functions of the A&E department?	
8	What would you consider the key adjacencies?	
9	Has the resource required to enable you to lead on this build been identified and agreed?	
10	Has the time necessary for other key staff to be involved been calculated and built into the design work plan?	

	Design considerations	Comments
1	Have you considered what design features would facilitate patient flow, associated processes and specific functions of the A&E department?	
2	What design solutions does the architect suggest to support the above to be delivered?	
3	Have all data and information related to complaints or incidents been reviewed?	
4	What is required to improve the work and rest environment for staff?	

Checklist for development and design leads

	Front-end planning considerations	Comments
1	Does the design support innovation in service planning? What are your performance benchmarks and comparative facility examples?	
2	Does the procurement programme ensure continuous design input to manage change in service specification through transformation?	
3	Will you test the design by reviewing support functions and understand how they flow in partnership to complement the patient journey?	
4	Have you carried out extensive searches to collect as much information as possible about the site?	
5	Are the future performance requirements of the project from the clinical and operational facilities management perspective, as well as equipment, technology and infrastructure, measured against a benefits realisation plan?	
6	Do you know what is mandatory and statutory regulation and what is guidance? Are all key decisions documented and linked to an evaluation of risk?	
7	Patient, staff and carer experience: are you consulting with patient liaison groups?	
8	Patient safety and infection control: are you up-to-date on resilience and infection control planning?	
9	Have you fully discussed facilities for staff and the benefits this development may have on staff recruitment and retention for the client organisation?	
10	Are the facilities management, infection control and equipment planning teams on board at the front-end planning stage, including supplies and communication technologies and administration, cleaning, waste and disposal, and others?	

	Design considerations	Comments
1	Are room areas/volumes based on a detailed service informed by activity analysis and process flows?	
2	Are room sizes informed by ergonomic design related to the range of acuity expected in that room?	
3	Does the design support future change with potential for expansion/contraction within the usual ebb and flow, surge planning, resilience planning, and future service requirements?	
4	Have you considered essential adjacencies of space to other departments, staff and equipment, including essential imaging facilities, accessibility requirements and the need for (or existing) level changes?	
5	Are support services located within the A&E department included in design discussions (e.g. psychiatry, homeless healthcare team and other medical, primary care, mental health or non-medical support)?	
6	Have you determined a small palette of same-handed acuity-adaptable room sizes, ceiling heights and the structural loading, and coordinated the fixed points (for services and equipment) for maximum flexible use of space?	
7	Are outline environmental requirements based on current best practice referenced and recorded?	
8	Will security and safety include ICT, passive security and active surveillance, as well as infection control?	
9	Are you designing a healthy environment? (Lighting, ventilation, materials, landscape and planting should be developed along best practice and in line with BREEAM Healthcare http://www.breeam.org)	
10	Does the choice of finishes ensure ease of cleaning and durability?	
11	Once the design is agreed, how have you tested the layout from the perspective of the patient's experience to ensure that the spaces are ergonomically and efficiently laid out?	

21 Additional information

General design principles and room layout guidance

Note:

Health Building Notes can be accessed from the Department of Health's website:
https://www.gov.uk/government/organisations/department-of-health/series/health-building-notes-core-elements

Health Technical Memoranda can be accessed from the same site at:
https://www.gov.uk/government/organisations/department-of-health/series/health-technical-memorandum-disinfection-and-sterilization

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/147842/HBN_00-01_Final.pdf

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/148502/HBN_04-01_Final.pdf

Health Technical Memorandum 07-07: Sustainable health and social care buildings: Planning, design, construction and refurbishment.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/147950/HTM_07-07_Final.pdf

Patient Information

See the Design Council's website:

http://www.designcouncil.org.uk/AEtoolkit/Why-design/Design-solutions/Guidance/

http://www.designcouncil.org.uk/AEtoolkit/Procuring-design/People/

Space design for specific diagnostic imaging and interventional radiology

Facilities for Diagnostic Imaging and Interventional Radiology
https://www.gov.uk/government/publications/facilities-for-diagnostic-imaging-and-interventional-radiology

Applicable legislation for diagnostic imaging

1999 Ionising Radiations Regulations (which focus on protecting staff);

2000 Ionising Radiation (Medical Exposure) Regulations (which focus on protecting patients);.

1993 Radioactive Substances Act (which is concerned mainly with the safe use of radioactive substances).

Codes of practice issued by the Health and Safety Executive and the National Radiological Protection Board should also be adhered to.

Policies and principles of healthcare engineering

Guidance policies and principles of healthcare engineering
https://www.gov.uk/government/publications/guidance-policies-and-principles-of-healthcare-engineering

Safe management of healthcare waste

Health Technical Memorandum 07-01: Safe management of healthcare waste
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf

Guidance on flooring, walls and ceilings and sanitary assemblies in healthcare facilities

https://www.gov.uk/government/publications/guidance-on-flooring-walls-and-ceilings-and-sanitary-assemblies-in-healthcare-facilities

Firecode

https://www.gov.uk/government/publications/suite-of-guidance-on-fire-safety-throughout-healthcare-premises-parts-a-to-m

Gas cylinder storage

Medical Gas Pipeline Systems
https://www.gov.uk/government/publications/medical-gas-pipeline-systems-part-a-design-installation-validation-and-verification

Acoustics

Guidance on acoustic requirements in the design of healthcare facilities
https://www.gov.uk/government/publications/guidance-on-acoustic-requirements-in-the-design-of-healthcare-facilities

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The following references, to January 2012, are organised into main themes.

Key aspects of texts are included to signpost particular contributions

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