HEALTH BUILDING NOTE 57

Facilities for critical care

STATUS IN WALES APPLIES

This document replaced
HBN 27 - Intensive therapy unit
1992
Facilities for critical care

HBN 57
Facilities for critical care

HBN 57
It has been 10 years since the last guidance on the built environment for critical care areas was published. During this time intensive care medicine has become a recognised specialty and its delivery is undergoing a complete overhaul following the publication of ‘Comprehensive Critical Care’ by the Department of Health (2000). The Intensive Care Society had a major input into that document, and also into Health Building Note (HBN) 57 – ‘Facilities for critical care’. The Society, on behalf of those working in critical care areas, welcomes the foresight of NHS Estates in seeking as wide an input as possible into the design of the areas where they work. It is a credit to the process that HBN 57 now addresses such matters as the need for natural light, adequate staff changing facilities, appropriate areas for the patient’s family and a host of others. Hopefully, users will now be able to more easily influence design teams who have in the past not appeared to listen to such concerns. A considerable amount of research and work has gone into the preparation of this guidance. Design teams now have an up-to-date resource to use during the process of creating a new facility or altering an existing one. Failure to follow this guidance may quite rightly be questioned.

Because the practice of intensive care medicine continues to change rapidly, it is likely that HBN 57 will require regular review. NHS Estates has made an excellent decision in enabling this process by placing updates on its website.

Peter Nightingale
President, Intensive Care Society
Critically ill patients are highly vulnerable, and most are completely dependent on the care provided by expert staff. The experience of being admitted to a critical care area (CCA), whether planned or as an emergency, is likely to be a highly physically and psychologically stressful experience for patients, their families and friends and sometimes staff.

One of the recommendations made in ‘Comprehensive Critical Care’ (Department of Health (DoH), 2000) is a review of the built environment in CCAs. Since the publication of that document, the NHS Modernisation Agency has initiated a development programme to reconfigure critical care services. The programme acknowledges that it is the level of care required by the patient that is important, not where the patient is located in the hospital; patients who fulfil the criteria for critical illness may be found in locations other than designated intensive care units (ICUs) and high-dependency units (HDUs). This ‘critical care without walls’ approach to the identification and management of the critically ill is reflected in this guidance.

Key to ensuring excellence is providing state-of-the-art technology and facilities that are fit for the purpose. This should include the clinical areas in which patients are cared for and the support facilities that underpin these.

This guidance supersedes HBN 27 – ‘Intensive therapy unit’ (NHS Estates, 1992). It will be of interest to:

- planning and design teams;
- executive directors and senior managers of NHS trusts, including estates directors and their staff;
- clinicians from every profession working in, or in partnership with, CCAs;
- infection control teams;
- all support staff employed within CCAs;
- representatives of patients and their families;
- manufacturers of information technology (IT), clinical and support equipment and furnishings; and
- the medical engineering industry.

There are substantial differences between this guidance and its predecessor HBN 27. They are listed in Appendix 2 and are based on evidence from a series of visits to CCAs made by the Working Group, the responses obtained from a postal survey of existing ICUs and HDUs, the views of the Reference Group, the strategy outlined in the NHS Plan and the experiences of critically ill patients, their families and friends.

This guidance includes all general CCAs that admit adult (or adolescent) patients whose dependency levels are classified as level 2 or level 3 (see Appendix 2). It will require review with reference to the provision of intensive or high-dependency care for patients under the age of 16 years admitted to a general CCA either for definitive treatment or for stabilisation prior to transfer to another location. Guidance on hospital accommodation for children will be published later this year in conjunction with the Hospital Services module of the Children’s National Service Framework.

The guidance outlines the emerging principles in planning facilities for critically ill people: user requirements, location and departmental factors and the views of users. The main issues related to improving patient areas are discussed including increasing the area of bed-spaces, increasing the number of single bedrooms, reducing Hospital Acquired Infection, the patient’s right to privacy and dignity, strategies for noise reduction, and maximising natural light.

The patient/staff ratio in critical care is very high. More space is required in staff facilities, including rest rooms, catering facilities, changing rooms, en-suite overnight accommodation for on-call staff, and education and training facilities. Improvements in support facilities for family and friends are also discussed.

The guidance covers general design considerations and provides detailed information on the specific functional and design requirements and engineering requirements for CCAs. It provides cost information, which includes schedules of accommodation.

Included in the appendices are recommended room layouts, along with a comprehensive list of useful references.
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PATIENT-FOCUSED CRITICAL CARE FACILITIES

1.1 Critically ill patients are highly vulnerable and most are completely dependent on the care provided by expert staff. The experience of being admitted to a critical care area (CCA), whether planned or as an emergency, is likely to be a highly physically and psychologically stressful experience for patients, their families and friends and sometimes staff. Key to ensuring excellence is providing state-of-the-art technology and facilities that are fit for the purpose. This should include the clinical areas in which patients are cared for and the support facilities that underpin these.

1.2 Within an adult general CCA, there will be patients of both sexes and of a range of ages. The degree to which individual patients are aware of their surroundings will vary owing to the effects of illness and sedative medication. Some may be unconscious while others are lightly sedated or alert. The built environment of the CCA should support the provision of physiological and psychosocial support to patients as individuals and to their family and friends.

1.3 ‘The Essence of Care’ (Department of Health (DoH), 2001, p 182) identifies a number of benchmarks of good practice, focusing on the issue of respect for the individual so that:

- patients feel that they matter all of the time;
- patients experience care in an environment that actively encompasses individual values, beliefs and personal relationships;
- patients’ personal space is recognised by all staff;
- communication between patients takes place in a manner that respects their individuality;
- patient information is shared to enable care with their consent;
- the care of patients actively promotes their privacy and dignity and protects their modesty; and
- patients can access an area that safely provides privacy.

1.4 Achieving these benchmarks when caring for critically ill patients poses a particular challenge for health professionals. The majority of patients are totally dependent. They are unable to communicate or have difficulty in communicating their views, are unable to express consent, unable to protect their own dignity and modesty, and ultimately have to trust that their family and clinicians can act as their advocates. Concern about patients’ lack of privacy and dignity is perhaps the most frequent criticism levelled by staff working in critical care.

1.5 The majority of patients requiring critical care survive and are discharged after a few days to a ward with other less dependent patients and finally back into the community. Others experience a longer stay, with some requiring critical care for many weeks. A minority of critically ill patients cannot and do not survive in spite of the best efforts of the clinical staff. This group of patients may die within a short period after admission, while others require intensive care over a longer period.

1.6 Innovative and imaginative architecture and design is essential for the development of an environment that enables the safe and effective management of critical illness while providing a welcoming, secure, comfortable, non-intimidating atmosphere.

1.7 Patients not only have the right to expect that their clinical care reflects best practice and is evidence-based, but also that their individuality, privacy and dignity are preserved and that they, along with their family and friends, can have absolute confidence in the quality of the overall experience regardless of the eventual clinical outcome.

1.8 The NHS Plan acknowledges that to ensure the basics of healthcare are available, investment is needed in new facilities. As the first priority this scale of investment will be used to get the basics right in the health service – the right number and the right type of beds, buildings, services and equipment – alongside the right number of staff (NHS Plan 4.2, Department of Health, 2000). To reflect the investment needed to provide “consumer-focused” facilities the Departmental Cost Guidance Allowances (DCAGs) have been reviewed to take into account 36 patient “needs and desires”. For more information see Appendix 1.
POLICY BACKGROUND

1.9 The NHS Modernisation Agency has initiated a development programme to reconfigure critical care services. This follows publication of the report by the Audit Commission on critical care services in England and Wales, ‘Critical to Success’, in 1999, and the Department of Health publication, ‘Comprehensive Critical Care’, in May 2000. The programme acknowledges that it is the level of care required by the patient that is important, not where the patient is located in the hospital; patients who fulfil the criteria for critical illness may be found in locations other than designated intensive care units (ICUs) and high-dependency units (HDUs). ‘Critical care without walls’ embodies a hospital-wide approach to the identification and management of the critically ill. A review of the built environment in CCAs is one of the recommendations made in ‘Comprehensive Critical Care’. An innovative approach has been encouraged to provide the optimal environment for critical care, combining modern technology with architecture sensitive to the expectations and needs of patients, their friends and family, and the staff who care for them. The NHS Plan (DoH, 2000) offers the opportunity to achieve this reform.

1.10 Starting in April 2000, a series of iterative documents were circulated among members of the Reference Group (working in collaboration with the Intensive Care Society (ICS) and the NHS Modernisation Agency) in order to accumulate, condense and refine information regarding the built environment for critical care. The documents were based on a number of seminal papers including ‘Comprehensive Critical Care’ (DoH, 2000), ‘Critical to Success’ (Audit Commission, 1999), and ‘Standards for Intensive Care Units’ (ICS, 1997). These, combined with advances in techniques of information management and diagnostic imaging, and the need to implement changes in order to meet new statutory requirements, demonstrated that the schedules of accommodation described within HBN 27 ‘Intensive Therapy Unit’ (NHS Estates, 1992) no longer meet best practice in the built environment for critical care. This guidance supersedes HBN 27.

INTENDED READERSHIP

1.11 This guidance will be of interest to:

- project and design teams;
- executive directors and senior managers of NHS trusts, including estates directors and their staff;
- clinicians from every profession working in, or in partnership with, CCAs;
- all support staff employed within CCAs;
- representatives of patients and their families;
- manufacturers of IT, clinical and support equipment and furnishings; and
- the medical engineering industry.

INCLUSION CRITERIA

1.12 This guidance includes all general CCAs that admit adult (or adolescent) patients whose dependency levels are classified as level 2 or level 3. The guidance will require review with reference to the provision of intensive or high-dependency care for patients under the age of 16 years admitted to a general CCA either for definitive treatment or for stabilisation prior to transfer to another location. Recommendations for hospital services for children will be published later this year as part of the new Children’s National Service Framework.

EXCLUSION CRITERIA

1.13 This guidance excludes the following:

(i) bespoke critical care facilities for infants and children;
(ii) facilities required for the “high-security isolation” of any patient;
(iii) transplant and dialysis units;
(iv) regional centres for burns patients;
(v) coronary care units (see HBN 28 ‘Facilities for Cardiac Services’, NHS Estates, 2001);
(vi) bespoke cardiac units (see HBN 28 ‘Facilities for Cardiac Services’, NHS Estates, 2001);
(vii) neurosurgical units including neuro-ICUs;
(viii) liver units;
(ix) areas within the hospital where level 2 or level 3 patients are managed on a time-limited basis, for example a 24-hour post-operative recovery area.

SCALE OF PROVISION

1.14 In July 2001 the total number of critical care beds available in England was recorded as 2940. Of these, 2261 were classified as general (1327 ITU beds and 934 HDU beds) with the remaining 679 as “specialist” beds.

1.15 The NHS Plan indicates that there is an urgent need to increase facilities for critical care in every acute hospital. One of the ways to achieve this is by increasing the number of beds in a bespoke CCA, but
a more flexible approach to the configuration of beds on general wards should be adopted at the same time.

1.16 The total number of level 2 and level 3 patients admitted to a CCA each year depends on local workload patterns. The number of bed spaces required should therefore be calculated from:

- data on number of admissions, number of refused admissions, number of premature discharges, bed occupancy and length of stay;
- local admissions policy;
- future developments influencing critical care service demand;
- availability of other specialist units;
- the number and type of acute beds, the number of operating theatres and surgical specialties served;
- the annual workload of the A&E department; and
- location factors which may increase demand (such as proximity to motorways or airports).

1.17 The Central Southern Critical Care Network are developing a model for planning critical care capacity. It should be possible to configure it to match any given unit and programme it for the unit’s own operating rules and case mix using detailed information about arrival patterns and length of stay (for more information see Costa et al, in press, “Mathematical modelling and simulation for planning critical care capacity”, in Anaesthesia.

1.18 Local requirements will inform the total number of beds required for all level 2 and level 3 patients in each CCA. The schedules of accommodation in this guidance are based on an eight-bed template and then increased accordingly with every four additional beds.

1.19 ‘Comprehensive Critical Care’ describes “networks” as one of the characteristics of a modernised critical care service. These integrated networks involve several trusts working to common standards and protocols, providing a comprehensive range of critical care services, and taking responsibility for all the critically ill in all the specialties within a geographical area.
2.0 Emerging principles in planning facilities for critically ill people

2.1 A number of core themes apply to the planning and design of any healthcare facility. These are:

- fitness for purpose;
- infection control;
- security;
- health and safety;
- risk management;
- access to appropriate support and resources;
- best practice; and
- a quality patient environment.

2.2 In addition, there are a number of general principles that the project team should consider from the outset with reference to CCAs. These include:

- user requirements;
- location and departmental relationships; and
- the views of users.

USER REQUIREMENTS

2.3 All level 2 and level 3 patients need:

- a bed space that is large enough to permit all clinical interventions and accommodate multi-parameter monitoring and life-support systems;
- access to medical gases and electrical outlets;
- access to a comprehensive range of therapies for organ system failure, including dialysis equipment;
- visual and auditory privacy;
- natural daylight, with outside views wherever possible;
- full-spectrum lighting;
- adequate ventilation, which can be controlled all year round; and
- homely waiting and rest facilities for their relatives and other visitors.

2.4 Staff working in CCAs need:

- a working environment that reflects best practice;
- sufficient space around all sides of each bed to provide easy access to the patient, equipment and clinical hand-washing;
- sufficient natural light, with supplementary lighting, in which to work;
- adequate ventilation, which can be controlled all year round;
- a way in which to summon help from other members of staff;
- sufficient storage for essential supplies and equipment in each bed space;
- technical support services for urgent pathology tests and imaging;
- space and privacy for exchanging information with other staff;
- appropriately equipped facilities for changing, resting, eating and drinking; and
- provision for teaching activities within the CCA.

2.5 Family and friends of critically ill patients need:

- a welcoming reception and waiting area;
- a comfortable sitting room in which they can rest and recuperate, equipped with beverage-making facilities;
- a designated interview room in which they can have private conversations with the clinical staff;
- designated WCs including a wheelchair-accessible WC;
- overnight accommodation within the CCA, the hospital boundaries or in a local hotel.

LOCATION AND DEPARTMENTAL RELATIONSHIPS

2.6 CCAs should be centrally located within an acute hospital development. Their proximity and ease of access to A&E departments, operating theatres and
imaging facilities is viewed as crucial by clinicians. The location of the central laboratories has become less important since the widespread introduction of near-patient testing facilities sited in CCAs and the use of pneumatic tube systems within some hospitals to convey specimens to laboratories.

2.7 In the UK it is unusual to locate CCAs on the ground floor next to an A&E department; however, this is common practice in a number of other countries. The concept seems to work well for the following reasons:

- many emergency admissions to critical care are transferred from resuscitation rooms in A&E;
- planned admissions tend to be patients who have undergone major surgery and thus their transfer takes place once they are stabilised post-operatively. It is likely in future that in some recovery units the bed spaces will be furnished and equipped as in critical care. The practicalities of safe transfer should be considered. Operating theatres can be located on the floor above the CCA and a dedicated lift can be installed for rapid transfer;
- in the event of fire, critically ill patients can be moved more quickly to safety on the ground floor or to an appropriate area such as an operating theatre or recovery unit;
- CT scanners and other imaging equipment tend to be located on the ground floor close to A&E and the out-patients department. Although there have been rapid advances in technology and mobile CT scanners are being developed, it is likely that there will be a continued need to transfer patients to the imaging departments for CT scanning for a number of years;
- in addition to the near-patient testing laboratory within the CCA there should also be a full laboratory service available, staffed on a 24-hour basis;
- there should be an infection control team based on-site.

SEEKING THE VIEWS OF USERS

2.8 The views of those who use critical care facilities are fundamental to improving the built environment. These include patients, their friends and family and the medical, nursing and support staff.

The views of patients

2.9 Patients’ perceptions of the environment of the CCA are frequently distorted because of the effects of illness, medication, unfamiliar patterns of light, sound and shape, and lack of sleep. All may contribute to physical and mental distress. A good-quality environment can alleviate or minimise distress.

2.10 There is a lack of well-collated information concerning the experiences of patients in CCAs;
however, this deficit should be addressed in the future. Some information is available from units that run intensive care follow-up clinics.

**The views of relatives**

2.11 Information about the views of patients’ families is being obtained from an ongoing study in the UK (Holden, in progress). Unstructured interviews with the families of critically ill patients about the environment revealed that current provision of space at the bedside is inadequate to allow families to attend the bedside for long periods without feeling that they are interfering with patient care.

2.12 Many relatives’ sitting rooms are too small, remote from the clinical area, inadequately furnished, uncomfortable and impersonal. A communal sitting room for relatives is unlikely to be used unless it is large enough and comfortable and welcoming.

2.13 The positioning of beds in relation to each other is also viewed as important. Patients’ privacy and dignity, or lack of it, is obviously of concern to relatives as well as the staff.

2.14 Poor positioning or acoustics in the communications base can mean that confidential conversations are overheard.

**The views of staff**

2.15 The views of nursing and medical staff, physiotherapists, housekeeping staff, administrators and receptionists from a number of CCAs have been obtained. The ICS’s Linkman Network was used to distribute a questionnaire giving members the opportunity to identify, in their opinion, good and poor aspects of their working environment. Of the 220–230 questionnaires sent out, 58 were returned; these give a valuable insight into existing critical care facilities in the UK.

2.16 In addition, visits were made to a small number of CCAs. Informal interviews were conducted with staff members from a range of professions to identify good and poor aspects of the built environment. The main deficiencies identified were:

- inadequate bed spaces;
- a lack of single bedrooms;
- high ambient noise levels; and
- a lack of visual and auditory privacy.

2.17 There was no evidence that these issues had been addressed in either new facilities or refurbishments. New-builds were particularly criticised for lack of space, lack of adherence to HBN 27 recommendations, and incorrect fitting of new equipment. A few respondents gave examples where building regulations or health and safety requirements had not been met.

**Support facilities**

2.18 Very few respondents believed that support facilities were acceptable. A number indicated that there were no designated waiting areas or interview rooms for relatives. Respondents reported discussing with relatives the condition of the patient and conveying bad news in corridors, at the patient's bedside, in the communications base, or even in the doctor's overnight accommodation room, where relatives are invited to sit on the bed while the doctor and nurse remain standing. Many places did not have designated WC and hand-wash facilities for relatives or a place where they could make a hot drink. Clearly this does not represent best practice and is unacceptable in a patient-centred health service.

**Staff facilities**

2.19 Facilities for staff were generally unsatisfactory. A number of CCAs had just one unisex WC, while other places shared these facilities with other busy departments (for example operating theatres). Many units did not have staff showers, and a few did not have integral staff changing rooms. Staff rest areas were very poor on the whole, being much too small and inadequately furnished.

**Other facilities**

2.20 Lack of storage space and office accommodation, and the total absence of education facilities and overnight accommodation for doctors on call, were frequent causes of complaint. This was particularly the case in some new buildings, where the respondents complained that the support facilities had been severely compromised.
ENTRANCE AND GENERAL WAITING AREAS

3.1 One preferred option is a single entrance to a CCA that is locked and protected by CCTV. All patients, staff, and visitors share this access but should be immediately streamed into the visitor waiting area/reception and staff/patient areas so that staff and patients do not have to pass through the visitor waiting area. This allows complete privacy for patients and staff who wish to enter or leave the area without meeting visitors. All patients, regardless of their original source, are admitted through this entrance and transferred immediately to their bed space. This entrance should also allow for the sensitive removal of deceased patients to the mortuary without being viewed by visitors.

3.2 An alternative solution is to have a combined patient/staff entrance, which should be locked at all times and is accessed via a close proximity card, and a dedicated entrance for visitors, which has CCTV and an entry system. Admission is granted by the receptionist, whose office is located next to the general waiting area, or during the night by clinical staff located at the communications base.

3.3 On gaining entry, visitors should be received in the general waiting area, where they should remain for a short period only. Families and friends of the patients should be invited to enter the clinical area if appropriate or to wait in the designated sitting room or interview room.

3.4 The waiting area should be warm, welcoming and well-lit. Further information regarding the enhancement of this area is described in paragraphs 7.10–7.11. See also ‘Welcoming entrances and reception areas’ (NHS Estates, forthcoming). On occasion, children may visit a patient in critical care. Strategies for making the waiting area more child-friendly are described in detail in ‘Friendly healthcare environments for children and young people’ (NHS Estates, forthcoming).

INCREASED SPACE REQUIREMENTS

3.5 Lack of space in CCAs is the most frequent complaint made by the staff working in them. The allocation of space in clinical areas, particularly for each bed space, and in the staff and support facilities, is viewed as inadequate. Clinical representation (doctors, nurses, allied health professions (AHPs) and members of the infection control team) is essential on every project team to ensure that the requirements for space are incorporated into the design.

3.6 A number of new and refurbished builds have not met the minimum standards recommended in HBN 27. There are concerns that failure to meet standards is infringing the Human Rights Act 1998. Users of this guidance are reminded of the importance of complying with legal requirements. These have been established to protect staff, patients and the public, as well as to ensure the appropriate management of facilities; organisations that fail to comply with them are liable to prosecution. Where advice in this document reflects legislation, this is clearly indicated.

3.7 The Reference Group (see page v) is of the opinion that lack of space in all areas is the single most important issue in the design and building of CCAs. Inadequate space in which to deliver quality care has a negative impact on the clinical governance framework and is consequently hard to defend.

Bed space requirements

3.8 The size of each patient bed area should be not less than 26 m² in order to accommodate the following essential requirements:

- space to allow staff access to the patient from all sides of the bed;
- space to enable staff to manoeuvre the patient, themselves and equipment safely;
- space to accommodate all clinical equipment permanently located around the bed;
- sufficient additional space to accommodate any mobile equipment that may be required;
- sufficient space to enable a minimum of five members of staff to attend to the patient in an emergency situation;
- sufficient space between each bed to protect the patient’s visual and auditory privacy and dignity;
- sufficient space to accommodate the patient’s chair; and
• sufficient space to enable at least two visitors to sit at the patient’s bedside.

3.9 Patients are quite frequently moved to other departments for investigation or treatment. However, the variety and number of clinical interventions that take place within a CCA is increasing. Minor surgical interventions may be undertaken at the bedside, and more patients are requiring renal support. There is an increase in diagnostic imaging at the bedside. Some of the mobile equipment is large and unwieldy and requires adequate space. The floors should be strong enough to support the weight of this heavy equipment, and the walls should be protected to prevent damage from impact.

3.10 New options in the provision of imaging services within critical care are available. These include the replacement of conventional film-based mobile X-ray imaging with the recent computed radiography (CR) option. This involves the use of CR plates in cassettes, which are a direct replacement for conventional film-based imaging. The cassettes are used in conjunction with conventional X-ray systems but use laser CR units in place of conventional film processors. The images are generated in electronic form and may be used locally with a suitable imaging workstation and/or transmitted over a wide-bandwidth network. This latter option is often employed as a means of obtaining the opinion of an off-site radiologist in a rapid and convenient fashion. The technology and its use in hospitals, together with the influence on design of facilities, is extensively described in HBN 6 ‘Facilities for diagnostic imaging, Volume 2: PACS and specialist imaging’ (NHS Estates, 2002).

3.11 Clinical interventions can continue without the need to ask visitors to leave the patient, and hence sufficient space is required to accommodate them comfortably.

CEILING HEIGHTS

3.12 Adequate ceiling heights in clinical areas are crucial. The underside of a finished ceiling should be no lower than 3 m high. There may be a difficulty in complying with ceiling heights throughout the hospital in the case of refurbishments, but within a new-build this difficulty should be overcome. Low ceilings have a negative effect upon the acoustics and luminosity within a CCA, and a number of the staff described the effect as claustrophobic.

3.13 Problems have been encountered when calculating the correct position and weight-bearing factor for hoists and other weight-lifting equipment and patient data management systems. When mounted at the foot of the bed, these cannot be raised high enough to avoid accidental head contact. There is a significant risk that staff or visitors may sustain injury if equipment is fitted too low.

INCREASING THE NUMBER OF SINGLE BEDROOMS

3.14 Ideally every patient would be cared for in an individual bedroom, as this can help reduce the incidence of cross-infection, and ensures that each patient can maintain his or her privacy and dignity.

3.15 The clinicians in the Reference Group are of the opinion that this is not a realistic option, as there are insufficient clinical staff to supervise each patient safely using single bedrooms. There is, however, agreement that the number of single bedrooms should be increased. A number of questionnaire respondents also identified the lack of single bedrooms as a problem. There is a particular problem in adult CCAs that admit babies and young children. Individual project teams should decide the minimum number of single bedrooms required, basing their decision on case mix and acting on the advice of the infection control team.

3.16 Using the eight-bed template, it is recommended that four beds are enclosed in single bedrooms, each with a lobby for isolation purposes, the rationale being that this increases the flexibility of use. The size of each bedroom should be identical to an open bed space to fulfil the requirements listed in paragraph 3.8. See paragraphs 7.22–7.26 for the design requirements of a single bedroom.

REDUCING HOSPITAL ACQUIRED INFECTION

3.17 Hospital Acquired Infection (HAI) is a major problem to which critically ill patients are particularly susceptible. Adherence to best practice in the built environment is crucial.

3.18 The design of every new building or refurbishment, and all furnishings and fittings, should be selected with the specific purpose of reducing the risk of HAI. The infection control team should be represented on every project team from the outset. The project team should apply the standards set out in ‘Infection control in the built environment’ (NHS Estates, 2001).

3.19 This guidance is not prescriptive in relation to furnishings and fittings and their cleaning and maintenance, as account should be taken of the rapidity of new innovations and materials arriving on the market. However, thorough cleansing of all furnishings and fittings in CCAs is vital if the risk of transmission of HAIs is to be minimised. Guidance on methods of cleaning should be sought from the infection control team.
The following general principles apply.

- Daily, weekly and monthly cleaning duties should be set out in a written protocol, monitored and reviewed regularly and amended when necessary. The cleaning schedules should also include rapid cleaning between patients, as sometimes one patient is awaiting the discharge of another. ‘National standards of cleanliness for the NHS’ (NHS Estates, 2001) covers building elements, fixtures, patient equipment and the patient environment and is an excellent guide to cleaning frequencies required in high-risk areas such as CCAs. The housekeeping staff have an essential role to play in maintaining high levels of cleanliness.

- The furnishings and fittings within CCAs should be easy to clean without forfeiting quality, comfort and ambience.

- Air-conditioning should be controlled on a zonal basis throughout a CCA. Inability to control the temperature within clinical areas is a cause of great complaint by the clinical staff.

- Horizontal surfaces should be kept to a minimum because they harbour dust and become contaminated with resistant micro-organisms, for example Acinetobacter. Open shelving packed with disposable equipment such as syringes and needles harbours dust and makes it impossible for the housekeeping staff to clean. All equipment should be kept either in glass-fronted cupboards or in cupboards that are clearly labelled externally.

- For best practice, every patient should have his or her own room.

- Curtain rails and curtains harbour dust. Many curtain fabrics lose their fire resistance once washed. Alternative ways of screening patients should be sought. Electrically controlled opaque glass and double-glazed windows with inset blinds are two possible options. In multi-bed areas a lead-lined curtain system should be installed (see paragraph 7.28).

- All equipment should be easy to move to enable thorough cleaning. Electrical cables should be enclosed in protective containment and should not be allowed to drape across the floor. Housekeeping staff report that current arrangements mean that cables are impossible to keep clean as any spills on the floor make them sticky, dirty, attract dust and increase the risk of infection. The use of a medical supply unit for services minimises the number of cables on the floor. Responsibility should be agreed and designated for cleaning of mobile equipment and associated cables.

- Each bed space should be completely damp-dusted daily. Sufficient space is required to enable free access to all sides of the bed. The housekeeping staff should be able to clean high and low surfaces without putting patients or themselves at risk.

- Each bed space should have a designated clinical hand-wash basin. It is fundamental that staff wash their hands before they approach patients or touch equipment. The basin should therefore be located at the front of the bed space. It should be designed to avoid splashing and be fitted with non-touch taps. To minimise the risk of legionellae, taps should be run on a daily basis. This is a particular issue when a basin is used infrequently.

- In view of the increasing number of surgical interventions that now take place at the bed space, one surgical scrub sink should be installed for every eight bed-spaces. The surgical scrub sink should be large enough to accommodate at least two people scrubbing up simultaneously.

- The safe storage and disposal of clinical waste is essential. Storage arrangements are discussed in detail in Chapter 7.

- Keyboards used for entering patient data should be protected with a clear plastic cover, which should be cleaned daily and then disposed of along with other disposable clinical equipment following a patient’s discharge. All mouse mats should be cleanable and not manufactured from fabric-type material, which can harbour bacteria.

### DECONTAMINATION OF EQUIPMENT

3.21 The effective decontamination of medical devices is essential in reducing the risks to patients from HAI (see HSC2000/032 ‘The Decontamination of Medical Devices’; DoH, 2000).

3.22 The process assessment tools in the ‘Decontamination Programme Technical Manual’ act as a useful checklist for planning areas in the built environment that are involved in purchasing, processing, maintaining, storing and using medical devices (DoH, 2001). Further information can be found in ‘Infection control in the built environment’ (NHS Estates, 2001).

### GENERAL CLEANLINESS AND HOUSEKEEPING

3.23 Good housekeeping and general cleanliness are of prime importance when caring for critically ill patients. The fittings and furnishings should reflect the need for easy and thorough cleaning on at least a daily basis. Localised cleaning around a patient’s bed space may be necessary at any time. The walls and floor surfaces chosen should therefore be suitable. Permanent domestic staff trained in the principles of infection control can handle the daily cleaning.
control should be included in the critical care team. See ‘Housekeeping’ (NHS Estates, 2001).

**SEPARATE TREATMENT/PROCEDURE ROOM**

3.24 HBN 27 did not include a requirement for a separate procedure room. The NHS Modernisation Agency’s National Patient Access Team (NPAT) is in agreement with this. A number of procedure rooms are never used or are used inappropriately as an extra bed space, or more usually as an extra storeroom. In the survey only two respondents indicated that there was a procedure room in their CCA, one of which was intended for cardiac pacing but had never been commissioned because of a lack of funding and staff. The second respondent indicated that their procedure room was used as an overspill storage space.

3.25 Moving critically ill patients is hazardous. This is one reason why an increasing number of surgical interventions are taking place at the patient’s bedside rather than in a separate procedures room.

3.26 In a new-build for acute services, where all critical care facilities should be co-located or located in close proximity to the operating theatres, A&E, laboratories and imaging suites, it is unlikely that there will be a need for an integral procedure room, as procedures that cannot be undertaken at the patient’s bedside will take place in the appropriate departments.

3.27 In an existing build due for refurbishment where there is no possibility of locating all critical care facilities adjacent to the operating theatres, it may be reasonable to include an integral procedure room as an optional extra. This should remain a local decision and, if included, should not be at the expense of single bedrooms or other spaces.

3.28 The majority of clinicians indicated that they would opt for more space around each bed in preference to a procedure room because of the increase in diagnostic imaging at the patient’s bedside and the additional space this requires.

**LIFTING AND TURNING PATIENTS**

3.29 Many critically ill patients (some of whom are nursed prone) are moved with the aid of lifts and hoists. New manual handling and safety laws and regulations are very specific with regard to lifting and turning patients and moving heavy equipment. These new directives must be incorporated into future plans.

3.30 There are, therefore, a number of issues that should be considered with regard to the selection and installation of equipment for lifting and turning patients. Consideration has been given to the use of hoists and crane systems. Ceiling tracks cannot be used with fixed partitions, unless this is included as a separate en-suite track in each bed space.

3.31 A hoist at every bed space is the ideal solution, and should be built into a new design or major refurbishment. This decision is based on the recommendation from the therapy professions that the intensive rehabilitation required by many critically ill patients necessitates the use of hoists.

3.32 Infection control experts indicate that installing a hoist over each bed space is best practice as far as minimising the risk of cross-infection is concerned. One sling per patient is required plus spares, to enable slings to be laundered between patients.

**INFORMATION HANDLING**

3.33 Each bed space should be fully equipped for multi-parameter monitoring so that level 2 and level 3 patients can be supervised. All monitors should be linked to the central communications base. A minimum of 28 twin power points is required in each bed space. Data lines are required at every bed space for networking, digital imaging and patient records, plus a telephone point for the communication purposes of staff and relatives.

**ENGINEERING CONSIDERATIONS**

3.34 Since patients in a CCA are extremely vulnerable, an uninterrupted power supply (UPS) to all essential services for every patient should be considered, as back-up in the event of mains failure. The extent of this provision will be governed by the capacity of the IT electrical distribution system described in the IEE Regulations Guidance Note 7 on ‘Special locations’ (IEE 1998). Some internal battery systems are an option on equipment. This option should be a feature of the Pre-Purchase Questionnaire and a decision should be made at the procurement stage. Manufacturers advise the need for rapid power restoration in the event of supply failure on the majority of equipment. Interruptions of 600 ms are seen by many systems as “power off”.

3.35 Patient safety is paramount in a CCA and, following a number of reported incidents, strategies need to be adopted to distinguish between domestic and clinical devices in power supply/earth terms. Dedicated plug arrangements are preferable to colour coding, which can lead to error and may be ignored at times of pressure. However, colour coding has been commonly adopted in installations where isolation transformer, residual current detection and standard power–earth strategies are in use.

3.36 Waterproof plugs are required to overcome the problems associated with water and other fluid spillage for monitoring and life-support systems.
3.37 Many patients are transferred from different hospitals, and interchangeable equipment is not always available.

3.38 The use of ceiling- or floor-mounted medical supply units to support equipment is strongly recommended owing to the considerable safety factors involved. They minimise the number of trailing power cables that are difficult to clean and harbour micro-organisms. Likewise, the need for 360° access to patients makes this system the preferred option.

3.39 All services, drainage and hot and cold water supply should be enclosed in an accessible duct wherever possible to prevent the collection of dust and dirt and aid the control of infection in these sensitive areas.

THE PATIENT’S RIGHT TO PRIVACY AND DIGNITY

3.40 Preserving the privacy, dignity and confidentiality of patients (and their families) at all times is essential. The design of CCAs should incorporate strategies that allow control of sound, vision and smell. There has been a great deal of debate surrounding the idea of a single bedroom for each patient, with many clinicians supporting such a development as constituting best practice. However, clinicians believe that numbers of staff available currently make this suggestion impracticable because of issues surrounding patient safety and the provision of an overview of every patient from the communications base. A single room for each patient should be the long-term strategy.

3.41 For guidance on selecting a curtain system that takes into account these issues, see paragraph 7.29.

THE COMMUNICATIONS BASE

3.42 Opinions differ among clinical staff regarding the need for a central communications base. There are a variety of views about its size, location and function.

3.43 A number of options have been reviewed. Some units have a large, raised central station, enclosed by partition walls of double-glazed glass, from which all beds are visible. Advantages of this arrangement are that people can conduct a wide variety of formal and informal discussions on the telephone or face-to-face, while remaining close to the clinical area. All incoming information for the CCA, including via computer links, arrives at a central point where medical and nursing staff congregate. The sound insulation is such that the clinical areas are minimally affected by the noise of persistent conversation. Disadvantages include the use of the communications base as a repository for junk and as a social gathering place.

3.44 There is a tendency for people to stick notices over the glass partition walls and to stack equipment on the surfaces outside the windows, greatly hampering the safe observation of the clinical area.

3.45 On balance, it is recommended that a small, modified communications base should remain as a focal point and observation post within the clinical area, but that this should be enclosed in a glazed partition to reduce noise levels.

3.46 Each bed space should have a clinical workstation and computer terminal so that the staff can retrieve results and other information and input patient data without leaving the bedside.

3.47 In order to preserve privacy and dignity, reduce noise levels and reduce the risk of cross-infection, staff who are not directly involved with patient care should be accommodated outside the clinical area of the CCA. This includes receptionists, administrators and secretarial staff.

STRATEGIES FOR NOISE REDUCTION IN CCAS

3.48 Historically, CCAs are very noisy. Sources of noise include external noise from road traffic or industry, the general noise of a large number of people (patients, staff and visitors) within a relatively confined space on a continuous basis over a 24-hour period, and machinery and alarms. Noise prevents sleep and rest, deprivation of which contributes to the confusion and distress of patients. The reduction of noise levels in CCAs is essential.

3.49 The following points should be taken into consideration in order to reduce noise levels:

- Double-glazed windows as a minimum are essential in reducing the level of external noise penetrating the area.

- Silent methods of communication should be identified as an alternative to audible telephones and doorbells. Cordless telephones with a vibrate system have been installed in at least one hospital to good effect. A telephone located at each bed space, with a light signal rather than an audible ring tone and linked to the central console, enables the nurse to communicate with the rest of the team without leaving the patient’s bedside.

- Curtains between bed spaces provide no insulation from noise. In particular, conversations can be overheard that should be private and confidential. Curtains should therefore be avoided.

- Floor coverings should be selected carefully in order to minimise sound transmission. Carpets are unacceptable in clinical areas because they are
difficult to clean and maintain and increase the risk of cross-infection. Wearing soft-soled shoes is best practice for all members of staff and for visitors.

- The communications base tends to be very noisy and thus patients in a multi-bed area should be insulated by a surrounding clear glass screen.
- Glass partitions in single bedrooms allow observation but provide effective sound insulation and protect the patient from noise and disturbance.
- Restriction of staff working within the clinical area to those involved in patient care is also viewed as an effective noise reduction strategy.

NATURAL LIGHTING

3.50 Scientific evidence indicates that daylight has beneficial effects on patients (Rubin & Owens, 1996), visitors and staff, by reducing psychological problems and improving outcomes in patients, and increasing morale and reducing sickness levels among staff. An external view is also beneficial, even if limited. It is essential to provide glazing that allows staff and patients to see out but prevents anyone else from seeing in, irrespective of which floor the CCA is on. All staff benefit from working in an environment where there is plenty of natural light. Windows with no view are preferable to no natural light at all. The use of natural lighting should be maximised, but adequate artificial lighting throughout the CCA is also essential. See paragraphs 6.28–6.33 for general design considerations regarding windows.

ARTIFICIAL LIGHTING

3.51 The positioning of artificial lighting should be considered carefully. “Clinically useful” artificial lighting individual to each bed space is essential and can be part of the medical supply unit. It should be dimmable, flexible and discreet. Each light should be adjustable from the patient’s bedside and also from the communications base. Staff should be able to read prescriptions and observation charts at night. Further consideration should be given to the type of lighting that can be used by more alert patients, so that they can control their own environment.

3.52 It is not acceptable to install ceiling-mounted fluorescent lighting directly over a bed space, as an awake or lightly sedated patient cannot avoid the glare. If ceiling-mounted fittings are used they should be two-directional so that they can be adjusted to prevent unwanted glare. The lighting should be dimmable without flicker.

3.53 Lighting is also important for effective cleaning, and uplighters alone may not be sufficient to view corners and edges where dust can harbour.

3.54 Floor or low-level lighting is an essential resource in order that the clinical staff can monitor chest drains and urinary drainage. The light can also be used around the bed space at night or when the patient is resting.

ASSISTED BATHROOM/WC

3.55 Many ICUs report that assisted bathroom/WCs are never used except as additional storage space. The Reference Group recommends that assisted bathroom/WCs should remain an inclusion in view of the increasing number of CCAs that accommodate both level 2 and level 3 patients. It is envisaged that use of assisted bathroom/WCs will increase. A reasonable ratio is for planners to include one assisted bathroom/WC for every eight-bed template.

3.56 It is clear from the results of the survey that a number of general CCAs admit trauma or burns patients, some of whom require treatment baths.

STORAGE AREAS

3.57 Inadequate space for storage is one of the most frequent complaints made by all the clinicians who have informed this guidance. Equipment is often “stored” in patient areas, support facilities such as offices and frequently in corridors, which restricts access and poses a significant fire hazard.

3.58 There should be sufficient designated and easily accessible storage space for large items such as specialist beds, orthopaedic traction equipment and...
hoists. Mobile imaging equipment should be stored securely in an easily accessible space.

3.59 In addition, separate workshop facilities are required for equipment that needs regular maintenance and recharging. Technical support services should be available 24 hours a day for urgent servicing and decontamination of equipment.

3.60 Storage is a whole hospital issue. An increasing number of UK hospitals have installed the “just-in-time” storage system, which involves a large centralised store on each site where all non-specialised clinical equipment is kept for regular distribution on a “top-up” basis to the different departments when it is required. Agreement should be reached about the minimum level of equipment that should be retained in each department at all times. All just-in-time equipment should be barcoded. Before a piece of equipment is used, a computer should read the barcode. This informs central stores that the equipment should be replaced. Clinicians who are using this system in acute hospitals are impressed with the results.

3.61 In CCAs in Scandinavian hospitals, top-up deliveries from the central stores are made at least daily. In the UK top-up currently occurs much less frequently. In departments such as a CCA, where there is a rapid turnover of equipment, top-up should take place at least once a day.

3.62 Software programs exist that connect the clinical areas to the central stores in order that hardware and large items can be ordered immediately and delivered to CCAs immediately. Linen supplies can also be ordered in a similar manner.

DIRTY UTILITY

3.63 One practice commonly observed during the Working Group’s visits was the storage of clean (unused) disposable urinals and bedpans in the dirty utility room. On several occasions these were seen on top of the bedpan macerator or on the draining board beside the sink. This is not acceptable practice, as the equipment can become contaminated and may be then taken into the clinical area for subsequent use. It should be kept in clean storage areas. Disposable urinals and bedpans can be replenished twice daily using the just-in-time system.

DISPOSAL HOLD

3.64 A large amount of clinical waste is generated in CCAs, much of which is bulky in size, for example ventilator tubing and humidifiers. Safe storage of clinical waste, along with regular collection and disposal, is paramount. In CCAs, clinical waste should be collected at least once a day. Clinical waste storage should meet health and safety and security regulations. Soiled linen is also stored in the disposal hold. For best practice, it is recommended that there should be a clinical waste disposal room for every eight bed spaces. The size will depend on the local arrangements for collection and onward transmission. See paragraph 7.39 for the full design requirements.

IMAGING FACILITIES

3.65 Critically ill people, considered too unstable to move, frequently require mobile imaging techniques. A designated area for storing this bulky imaging equipment within the department should be identified. See paragraph 7.42 for the full design requirements.

SATELLITE PHARMACY

3.66 Every CCA should be serviced by a fully equipped main hospital pharmacy located on the same site. All CCAs, however, require a lockable drug cupboard located in the clean utility or similar.
4.0 Facilities for staff

4.1 Excellent staff rest and support facilities are viewed as essential factors in recruiting and retaining staff, and in enabling them to carry out their roles to the best of their ability. The NHS Plan makes it clear that increasing staff morale by improving the environment in which they work is a priority.

4.2 Complaints about staff facilities featured very highly in the survey and were further evidenced during the visits made by the Working Group and comments received from the Reference Group.

4.3 The patient/staff ratio in critical care is very high. This implies that the greater the number of bed spaces, the larger the number of staff employed. This in turn indicates that more space is required in staff facilities, including rest rooms, catering facilities, changing rooms, en-suite overnight accommodation for on-call staff, and education and training facilities.

4.4 All staff need the opportunity for regular “time out” from the clinical area, but should be able to return immediately if required. It is essential that rest and recreation facilities reflect their need for peace and quiet, are able to cater for their nutritional needs on a 24-hour basis, and enable them to shower and change on their arrival and departure. The size and number of rooms required should be calculated, which of course will be greater in larger CCAs. The workforce should be consulted and their views reflected in the business case.

4.5 Innovative ways of creating flexible spaces that will enhance staff comfort need to be identified. Excellent design, quality fittings and furnishings, the use of colour, and the inclusion of natural light are viewed as essential.

STAFF REST FACILITIES

4.7 Most staff rest facilities in CCAs are much too small to enable the staff to even sit at a table to eat and drink. A staff rest room should be provided away from the bed areas and general circulation areas, where staff can relax but be called to the clinical area in case of an emergency. The need to balance peace and quiet with the noise of televisions, videos and microwaves should be borne in mind. A refrigerator, microwave, toaster and dishwasher are essential. A fresh drinking-water source should be included. Natural light should be maximised. See paragraphs 7.55–7.56 for the full design requirements.

OFFICE ACCOMMODATION

4.8 It is important to provide a quiet environment where staff can deal with administrative tasks and acquire and collate information about patient care in the interests of clinical governance. Every office should have a window and should be equipped with a computer terminal and internal and external telephones. See paragraphs 7.63–7.69 for the full design requirements. The need for personal space is not in question, and where space is at a premium it is suggested that a number of offices are located adjacent to, rather than within, the CCA.

4.9 Increased use of IT provides an opportunity for reducing the size and number of single occupancy offices. An increase in hot-desking is also anticipated within the next few years. A much more flexible and innovative approach to office accommodation is required, with greater use of multi-function rooms for meetings, interviews or staff appraisals.

4.10 Offices are required for:

- the clinical director;
- the manager;
- the clinical staff (doctors, nurses, allied health professions);
- administrative and support staff (data clerks etc);
- the outreach team; and
- teaching and research staff.
4.11 The project team should base their decision on the number of offices required within the CCA on local knowledge about alternative and proximal locations within the building.

MEETING/INTERVIEW ROOM

4.12 There is an argument for the provision of space to conduct confidential meetings, for example interviews or professional reviews with other staff. Offices are not the appropriate place for such activities to take place. A small comfortably furnished meeting room seating approximately six people would fit the purpose. See paragraph 7.69 for the full design requirements.

EDUCATION AND TRAINING FACILITIES

4.13 Excellent education and training facilities for staff are viewed as essential in the NHS Plan. Education has always been a high priority in critical care, and the appropriate facilities should be provided. Trainee medical staff, medical students and students of nursing and professions allied to medicine make up a substantial proportion of staff found in a CCA. While some teaching takes place in the clinical area on a one-to-one basis or in small groups, the teaching of large groups is an imposition on the function of the area.

4.14 Within the hospital complex there should be an education centre with a skills laboratory. A skills laboratory contains equipment for training in resuscitation, such as manikins, defibrillators, and simulated body parts for venepuncture or suture practice, and is an essential resource for all clinical staff. The local project team should decide whether there is a need for an additional skills laboratory in critical care.

4.15 The number and size of rooms required for education and training should be increased on a pro-rata basis depending on the number of staff working in the CCA and hence the additional numbers of trainees and students who are there. As a minimum standard there should be one seminar room large enough to accommodate 20 people in a CCA that has eight bed spaces. See paragraph 7.70 for the full design requirements.
5.0 Support facilities for family and friends

SITTING ROOM

5.1 The sitting room should be large enough to accommodate several groups of visitors at one time. Its size should increase on a pro-rata basis with the number of beds within the unit. The décor should be selected carefully. People may need to wait here for long periods of time, so comfortable seating is essential, with sofas being ideal. Beverage-making facilities should be available at all times. A television should be provided.

INTERVIEW ROOM

5.2 The general waiting room used by family and friends should not double up as a “breaking bad news room”. A small room should be designated for this purpose. There should be a separate exit door into the main corridor, as it is vital that family and friends are able to leave the area if they so choose, after receiving bad news, without having to meet up with other anxious families or having to walk back through the clinical area itself. In common with the general waiting room, this room should convey an air of calm and comfort. A telephone should be provided. An en-suite wheelchair-accessible WC should be included.

OVERNIGHT ACCOMMODATION

5.3 Each individual project team should decide what overnight accommodation for family and friends is required within the CCA. Views differ as to whether it is necessary or appropriate to provide overnight accommodation for family and friends within the CCA. A number of clinicians advise that both the patient and family get more rest if they sleep elsewhere. There are practical difficulties in providing overnight accommodation for a large number of families and at the same time ensuring equity of access. Simple criteria should be established and included in the “family and friends” brochure. It may be reasonable to provide limited facilities in combination with more extensive provision for the hospital as a whole.

5.4 A number of hospitals offer on-site centralised accommodation for families – this sort of accommodation is frequently used by parents of sick children. Others have permanent arrangements with local hoteliers who can accommodate relatives at short notice.

5.5 Relatives need to be certain that they can return to a patient’s bedside immediately if required. Accommodation that is outside the hospital premises should be close and easily accessible, and the journey between the two places should be considered to be a low security risk.

SMOKING POLICY

5.6 In recent years many NHS trusts have implemented a total ban on smoking anywhere on the premises. There is evidence, however, that some trusts have revised this decision and re-introduced designated smoking areas. The reasons for this are twofold, the first being that patients, relatives and staff who smoke continued to do so in areas that could present a danger through the increased risk of fire. The second and perhaps more significant reason is that as long as tobacco remains a legal substance, a complete ban in all areas may constitute a breach of the Human Rights Act. Smoking policy should therefore be decided locally.
TELEPHONES

6.1 Outlets should be provided for fixed payphones for the use of staff and visitors only. Payphones for visitors should be located near to the visitors’ accommodation and the waiting area. One should be wheelchair-accessible and fitted with an inductive coupler to assist people using a hearing aid. Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is given in HBN 48 ‘Telephone services’ (NHS Estates, 1997).

SECURITY/CONTROL OF ACCESS

6.2 Security measures are needed to control unauthorised access to the CCA and to reduce the likelihood of thefts from changing areas, supply areas and pantries. It is recommended that access through the main entrance to the CCA be controlled by use of an entryphone or intercom system with CCTV, linked to the reception/clerical office and communications base. Programmable close-proximity card or similar systems should be fitted to changing-room doors and used broadly across the CCA. Ideally the programmable system should grant different patterns of access to suit the needs and privileges of authorised staff and visitors. The security measures chosen should not inhibit emergency escape from the CCA or access by the staff at any time.

6.3 An added benefit of the entryphone system is the control of access by visitors to prevent them entering the bed areas at inappropriate times, for example during reporting/handover or while procedures are being carried out.

FIRE SAFETY

6.4 To ensure progressive evacuation to areas capable of accepting patients reliant on life-support equipment, great care needs to be taken in the choice of location of the CCA in relation to other departments. The post-anaesthesia recovery area of the operating department is the most desirable area for receiving patients evacuated from the CCA.

6.5 It is essential that project teams familiarise themselves with the guidance contained in the Firecode suite of documents, which contains Department of Health policy and technical guidance on fire precautions in hospitals and other NHS premises. In particular, the need for structural fire precautions and means of escape from the whole accommodation should be taken into account as early as possible. The key document for these aspects in hospitals is HTM 81 ‘Firecode: Fire precautions in new hospitals’ (NHS Estates, 1996).

6.6 In addition, the Department of Health Fire Safety Policy (2001) sets out the key policy requirements. Management guidance is contained in ‘Firecode: Policy and principles’. Other Firecode documents include the HTM 80 series (which gives technical guidance on various building, engineering and equipment issues) and the Fire Practice Notes series, which covers various specialist aspects of fire precautions.

6.7 It is important to establish during the design stage those aspects of fire safety strategy that affect the design, configuration and structure of a CCA. The architect and engineer should discuss and verify their proposals with the Building Control Authority or Approved Inspector, and ensure that the project team and all other design staff are fully acquainted with the fire safety strategy for the design in terms of operation (staff responsibilities, equipment provision and building and engineering layouts). The principles of fire safety apply equally to new projects and to alterations and upgrading of existing buildings.

INTERNAL ENVIRONMENTAL CONSIDERATIONS

6.8 A restful atmosphere for patients and an appealing working environment for staff can be created by the appropriate use of lighting and colour and attractive furnishings and finishes. It is, however, essential that the choice of lighting and colour does not adversely affect the clinical assessment of patients. Pastel colours are preferable to bright or heavily patterned finishes, and the introduction of pictures and coloured panels can create a calming atmosphere (Tope et al, 2001).

NOISE AND SOUND ATTENUATION

6.9 The CCA should be located away from noise-generating departments. Careful consideration should also be given to deciding where, within the area, monitoring equipment alarms will sound. Provision should be made to ensure confidentiality for staff reporting/handover activities.

VENTILATION

6.10 Three categories of ventilated facility within CCAs should be considered. These are summarised as follows:

- provision of mechanical ventilation – upgrade to air-conditioning where local conditions so require;
- for CCAs where there is a reasonable likelihood of intervention requiring minor surgery, the use of a suitably filtered air supply system should be considered;
- for patients who have special vulnerability to infection or who constitute an infection risk, the use of a mechanical ventilation system with appropriate filtration should be considered (see Chapter 8, “Engineering services”).

6.11 While all bed areas should be mechanically ventilated and cooled, other areas should be naturally ventilated where possible.

6.12 All single bedrooms should include a system which can provide “source and protective isolation” of the patient. Filtration is also required to reduce the risk of infection; the use of high efficacy filtration may be necessary for pressure-controlled bedrooms. Overall strategy as well as particle size restrictions should be discussed with the infection control team. Extreme care is required in the positioning of grilles to prevent “draughts” passing over patients and to obtain viable flow characteristics. The grilles and the siting of ventilation input and output flows should be carefully considered. These rooms require entrance control lobbies to prevent unauthorised entry and to protect the airflow regime.

6.13 At commissioning, tests on the utility and performance of the ventilation system in limiting infection are required, and should be planned in consultation with the infection control and nursing teams. The control system features a locally-mounted panel with clear indication of correct or deviant flow together with simple selection and indication of over- or under-pressure relative to the surrounding rooms.

6.14 Clinical areas should be provided with humidity control and locally adjustable temperature control.

6.15 At the design stage, the use of computational fluid dynamics (CFD) technology should be considered to justify the design parameters of the project.

HEATING

6.16 General space heating can be supplied by low-pressure hot water radiators. They should be of the low surface temperature type, free of sharp edges and easy to clean. Exposed hot water pipework that is accessible to touch should be insulated.

FINISHES

6.17 The choice of finishes should form an integral part of the design process and be co-ordinated within the overall design scheme. Finishes should be functional and compatible with the need for comfort, cleanliness and safety. The quality of finishes should, in general, conform to the standard of finishes specified for the rest of the hospital. Cleaning regimes should be considered when materials are selected. The advice of the infection control team should be sought throughout the project.

FLOORS

6.18 Floors in a CCA should be able to withstand harsh treatment, including:

- the rolling loads of heavy mobile equipment;
- frequent spillages with subsequent “mopping-up”; and
- regular hard cleaning.

6.19 Flooring should be smooth, easily cleanable and wear-resistant. There should be coved skirtings, which allow easy cleaning and avoid microbial colonisation. The material used should be integral with, and have properties similar to, the floor finish. In areas where frequent wet cleaning methods are employed, the flooring material should be unaffected by germicidal cleaning solutions.

6.20 Floor finishes should be slip-resistant vinyl sheeting; joints should be welded. Such flooring is tolerant of small movements in the structural floor. The floor screed should be perfectly smooth, crack-free and stable. Adhesives should be powerful enough to resist the formation of “waves” in the floor finish that can result when heavy equipment is moved. Sufficient time should be allowed for the adhesive to set prior to use. Thresholds at doorways between adjacent rooms require particular attention because they are points of stress in the floor finish. See HTM 61 ‘Flooring’ (NHS Estates, 1995).

6.21 Carpets should not be used in clinical areas. They may be considered for use in the offices, staff rest room, overnight stay accommodation, if included, and visitors’
waiting rooms, but not the reception area. Carpets are extremely difficult to keep clean and need to be meticulously maintained. For further information on soft floor coverings see HTM 61.

WALLS

6.22 Wall finishes in a CCA should be durable and able to withstand wet cleaning and the accidental impact of trolleys and heavy mobile equipment. Especially vulnerable points should have additional protection. Smooth paint surfaces are the easiest for cleaning – eggshell or vinyl silk emulsion.

6.23 Vinyl wall-coverings can be used in rest, interview and relatives’ rooms. Ceramic wall tiles are preferable in kitchen, shower and toilet areas.

6.24 Single bedrooms should have glass partitions for observation purposes, complete with integral venetian blinds for privacy.

CEILINGS

6.25 An acoustically absorbent ceiling helps to reduce noise. While some acoustic surfaces now available do not present an infection hazard, it is essential that the architect, building services engineer, infection control officer and facilities manager together ensure that the choice of ceiling and the maintenance routines are satisfactory. The ceiling in single bedrooms should be sealed.

6.26 The choice of ceiling construction and finish should reflect the necessary compromise between sound control and the control of infection. A modest risk analysis may be the appropriate way of addressing this aspect of design.

DOORS AND FRAMES

6.27 Materials used for doors and frames should be able to withstand frequent impact from mobile equipment. All double-swing doors should incorporate appropriate glass vision panels; however, privacy, safety and other considerations may require the panels to be capable of being obscured. Where necessary, doors should be capable of being held in the open position. In the case of fire doors, this should only be by means of an approved or recognised product linked to the fire alarm and detection system, which is designed to fail to safety. Magnetic door retainers should not restrict the movement of traffic. Automatic door openers can be provided to aid patient movement on beds through the area.

6.28 Doors to single bedrooms should be tight-fitting, with proprietary neoprene seals to minimise air transfer in the closed position.

WINDOWS

6.29 In addition to the various statutory requirements, the following issues require consideration:

• daylight and natural ventilation;
• insulation against noise;
• user comfort;
• energy conservation;
• the prevention of glare; and
• the provision of a visual link with the outside world.

6.30 Care should be taken in the orientation of the CCA with regard to the positioning of windows. External windows on southwest-facing buildings should be of the oriel type with solar glazing. Oriel windows are full-height and project from the external wall. They can be angled to avoid high glare at midday but let in soft morning and evening light.

6.31 All windows should be at least double-glazed as a minimum to provide thermal and sound insulation as required by Approved Documents L1 and L2 of the Building Regulations (2002).

6.32 Blinds should be installed between the glass that can provide “blackout”, essential for ultrasound examinations and other imaging procedures.

6.33 It should be possible for cleaners to gain easy access to the inside and outside of windows.

6.34 Windows in the single bedroom and multi-bed areas should be non-openable. This is essential to maintain air-conditioning and positive/negative airflow. Guidance on types of windows and on the safety aspects is available in HTM 55 ‘Windows’ (NHS Estates, 1998).

MAINTENANCE AND CLEANING

6.35 Materials and finishes should require minimum maintenance and be compatible with their intended function. Building elements that require frequent redecoration or are difficult to service or clean should be avoided. Special consideration should be given to elements such as door sets, corners, partitions and counters that may be subject to heavy use. Floor finishes should be restricted in variety and, where soft floor coverings are specified and spillage likely, should have a backing impervious to fluids and a non-absorbent pile. Wall coverings should be chosen with cleaning in mind. Advice on these topics is published in HTMs 56 ‘Partitions’ (NHS Estates, 1998), 58 ‘Internal doorsets’ (1998) and 61 ‘Flooring’ (1995). Ceiling tiles should be acoustic tiles and secured in a way that
minimises the collection of micro-organisms. The ventilation grilles should be easy to clean and they should not be located immediately over the bed space, in order to avoid dust and debris falling directly onto the patient when cleaning.

WAYFINDING

6.36 It is essential to refer to NHS Estates’ guidance ‘Wayfinding’ (1999), HBN 40 ‘Common Activity Spaces, Volume 4, Corridors’ (NHS Estates, 1995) and HTM 65 ‘Signs’ (NHS Estates, 1984) should be consulted for general guidance.

COMPLIANCE WITH STATUTORY AND OTHER REQUIREMENTS

6.37 Health authorities, trusts and service providers have various responsibilities, both as legal entities and as individuals, to comply with statutory and other requirements as these relate to their statutory duties, and to the broader context within which they carry out those duties. This document takes account, as far as is possible, of all statutory and other requirements and guidance in force or available at the time of publication. Trusts are reminded of their overriding duty to ensure compliance with all relevant statutory instruments and established procedures. There is a responsibility to ensure that due weight and consideration is given to relevant guidance. General advice on compliance is given in ‘Health building and estates management: building legislation compliance procedures’ (HC (88) 60; DoH, 1988). The following is intended only as a brief summary of compliance requirements.

ACTS AND REGULATIONS

6.38 In this document, reference is made to services and facilities, the provision of which is controlled by legislation in the form of either Acts of Parliament or Regulations. Some parts of this legal framework incorporate UK Codes of Practice that are mandatory in their application, others are derived from European Union Directives that have been incorporated into UK Health and Safety legislation. In providing the services and facilities that are required to support the implementation of a CCA, the NHS therefore has a duty to comply with a considerable body of statutory and other requirements, the majority of which are mandatory.

6.39 Trusts are also reminded of their duty to conform to the requirements of the Disability Discrimination Act 1995, and the various Acts and Regulations that have preceded it and which remain in force. The Human Rights Act 1998 should also be enforced.

LEGAL STATUS

6.40 Acts and Regulations are approved by parliament and represent part of the law of England. In the majority of cases, breaches of Acts and Regulations are dealt with under the criminal rather than civil legal system and constitute non-lawful conduct. Where items of advice contained within this document are in support of Acts or Regulations, this is clearly indicated.

THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS

6.41 Throughout this document, detailed attention is paid to considerations of safety, risk control and the implications for design. The requirement to give such attention in building projects is embraced by The Construction (Design and Management) Regulations. These are broadly based, but ascribe particular and specific duties to both designers and others who contribute to the shaping of design solutions. The Regulations were subject to technical amendment in 2000, with a clarification on the statutory definition of a designer.

6.42 The primary duty is concerned with due regard to health and safety in design work. This includes a requirement to conduct risk assessments in respect of both the product building and the process of its construction. In addition to an overall consideration of broad risk categories, the Regulations also instruct on the need for safety and risk analysis at the detailed design level. There is a requirement to evaluate design options in terms of risk reduction and the cost of such, although a balanced approach with due consideration of many other factors is described as appropriate.

6.43 A large part of the design process should always consist of close collaboration and consultation with end-users of the new development and those responsible for existing buildings within the same or closely related institutions. The Regulations may be interpreted as requiring broad care in respect of overall design and facility management as well as technical alignment. There is a particular need to avoid solutions that may be technically acceptable but not compatible with organisational and operational requirements.

6.44 The designer and planning supervisor should take into account not only the duties affecting them directly but also those affecting the client or end-user. This often requires close cooperation between employers, including all participant parties in PFI and Public–Private Partnership agreements.
7.0 Specific functional and design requirements

7.1 This chapter provides guidance on the functional requirements and design implications for each of the activity spaces in a CCA.

FUNCTIONAL RELATIONSHIPS

7.2 A CCA contains three zones:

a. patient bed areas;

b. associated support facilities; and

c. staff areas.

7.3 Both within and between these zones are key functional relationships that should be taken into account when designing accommodation. Factors to be considered include the physical relationship between the communications base, single rooms and multi-bed areas, the design of the enclosed communications base, the positioning of glazing panels around single rooms, and the positioning of mobile equipment within bed areas. Every bed space should have direct communication with the communications base. Details of the relationships are given below.

Communications base/patient bed areas

7.4 Although nursing staff are based in the patient bed areas, visual observation of patients from the communications base is still important. A balance should be struck between providing adequate observation for staff and privacy for patients.

Figure 3  Functional relationships
Patient bed areas/utilities and equipment storage

7.5 Utility areas and medical equipment storage should be located to provide ease of access to patient bed areas and also security of supplies and equipment. The multi-bed areas should not be used as a thoroughfare to these support spaces.

Patient bed areas/staff areas

7.6 Staff rest rooms and offices should be located far enough away from patient bed areas for staff to withdraw, but also close enough for them to return quickly to the patient bed areas if required.

Bed space/bed space

7.7 The layout of the multi-bed area and relationship to the single bedrooms should enable nurses to easily summon assistance from one bed space to another.

DESIGN REQUIREMENTS

Entrance

7.8 All patients, visitors, staff and supplies access the area through a single entrance. The entrance should be the delivery point for supplies and the collection point for specimens. The access should be wide enough to accommodate the delivery of large items of equipment to aid onward transmission to storage areas.

7.9 Appropriate staff should be provided with a close proximity card or number to facilitate access for deliveries and collections. A bell or entryphone system, coupled with CCTV connected to the reception area during the day and communications base at night, should control access to the CCA by relatives or visitors (see paragraphs 3.1–3.3 for discussion).

Waiting area

7.10 The waiting area should provide seating for a minimum of ten people including wheelchair users. Payphones for use by visitors should be located near to the visitors’ accommodation and the waiting area. One should be wheelchair-accessible and fitted with an inductive coupler to assist people using a hearing aid. A wheelchair-accessible WC should be provided close by.

7.11 It should be welcoming, with a relaxed and calming atmosphere and an uncluttered and spacious environment. Interesting and stimulating features can be incorporated including lighting features, water features, sculptures, murals, aquaria and plantscapes. See ‘Welcoming entrances and reception areas’ (NHS Estates, 2003).

Reception/clerical office

7.12 A reception/clerical office is required adjacent to the waiting area for meeting and greeting relatives and visitors to the area. The entryphone system for the area should be located in this room. There should be a hatch between the office and the waiting area. This room should be large enough to accommodate four staff along with computer and telecommunications equipment.
Communications base

7.13 The communications base should be located so that it commands a clear, unobstructed view of the whole of the patient area. This base serves as the central communications area for all the clinical management of patients. See paragraphs 3.42–3.47 for discussion.

7.14 Activities taking place at the communications base include observation of patients, reporting, report writing, telephoning, viewing images, examining data on a central monitor, and the use of computers. The increasing use of electronic communications means that the base should be able to accommodate telecommunications facilities and a number of networked computers with Internet access. A computed radiography reader may also be required, depending on local policy.

7.15 Considerable noise is generated in this area, and sound deadening should be considered. It is recommended that the communications base be enclosed in a glazed partition to assist soundproofing. A wallboard should be provided to discourage the sticking of notices to the glazed screen, which limits visibility.

7.16 The controls for lighting and heating and medical gas isolation valves are located on the back wall of the communications base. Task lighting is required at night to prevent disturbing patients. Control of the entry system is transferred from the reception area to the communications base at night.

Bed areas

7.17 Because of the need for good staff access around the patient, an island bed layout is preferred to a peninsular solution.

7.18 Each bed space requires a ceiling- or floor-mounted medical supply unit to provide sufficient socket-outlets to cope with the wide range of equipment in use at the same time. Staff indicated that a ceiling-mounted system was their preferred option. Care should be taken in the selection of medical supply units and their mounting to ensure ergonomically satisfactory positioning for convenient access by staff. Equipment can include as many as 12 syringe drivers, 4–5 volumetric pumps, an electric bed, a ventilator, monitors, an air mattress, a dialysis machine, a humidifier, a suction machine and a television. To meet increasing demand, the current recommendation is for a minimum of 28 single socket-outlets at each bed. The medical supply unit supplies medical gases and electrical socket-outlets, thereby allowing relatively unimpeded access to the patient by medical, nursing and therapy staff. A strategy based on services supplied from the ceiling provides unobstructed access and uncluttered floor space around the patient’s bed. Waterproof floor sockets should also be provided for use when necessary.

Equipment at each bed space (including bedrooms)

7.19 For maximum flexibility, each bed space requires the following equipment located within a medical supply unit adjacent to the bed-head:

- 28 single power-points and connection to the UPS system, where risk considerations in terms of patient safety dictate;
- multi-parameter monitoring;
- ventilation and humidification equipment;
- six infusion pumps;
- eight syringe pumps;
- two low-pressure vacuum points;
- two high-pressure vacuum points;

Figure 6 Well-designed bed space using medical supply units to accommodate medical equipment, providing unobstructed access for clinical staff
7.20 Other equipment at each bed space includes:

- an examination lamp;
- four oxygen outlets;
- two 4-bar air outlets;
- one 7-bar air outlet for surgical equipment connection – the point should be clearly labelled with the appropriate warning;
- a nitrous oxide point, where local anaesthesia policy and risk considerations permit;
- a scavenging system (optional as above);
- a feeding pump;
- a blood warmer; and
- drugs storage space.

7.21 Equipment used intermittently at the bed space includes:

- an EEG machine;
- mobile imaging;
- ultrasound/echocardiography;
• endoscopy (fibre-optic light source);
• defibrillators;
• haemodialysis;
• haemofiltration.

Single bedrooms and lobbies

7.22 Single bedrooms are required to provide isolation of patients. They may also be used:

• if a patient requires additional privacy, peace and quiet;
• for confused or aggressive patients; or
• for children.

7.23 Single bedrooms should be rectangular, not L-shaped, with an entrance wide enough to allow bulky equipment to pass easily – at least a door and a half wide. Care should be taken to ensure that the door opening is sufficient to allow the passage of the bed and equipment.

7.24 All single bedrooms should have a lobby to provide protective and source isolation. The lobby entrance requires a clinical hand-wash basin, plastic apron dispenser and disposal facility. Ceilings and windows should be sealed. Doors should be tight-fitting with seals to minimise air transfer.

7.25 Single bedrooms should have a minimum area of 26 m² to allow for manoeuvring bulky equipment, for example a mobile imaging machine, and space for staff to undertake procedures from all sides of the bed. A clinical hand-wash basin with automatic taps or foot control should be provided in each room. The room also requires an overhead hoist for lifting patients. The recommended ceiling height is therefore 3 m (see Appendix 4 for drawings). See paragraphs 3.12–3.13 for discussion.

7.26 Windows and natural light are essential in the single bedrooms and multi-bed areas as an aid to patient orientation. Outside views are desirable, and the windows should be as large as possible to allow patients to see out. See paragraph 3.50.

Multi-bed areas

7.27 The size and shape of a multi-bed area should allow space for the use of mobile equipment and for staff to undertake procedures from all sides of the bed. Multi-bed spaces may, on occasion, be used for haemodialysis. A clinical hand-wash basin should be provided at the front of all bed spaces, with automatic taps or foot control coupled to a storage unit. All bed spaces should have a minimum floor area of 26 m² with a 2.5 m unobstructed corridor space beyond the working area. It is imperative to maintain the required bed separation for infection control reasons. Over and above the provision of one clinical hand-wash basin per bed space, one surgical scrub sink per eight beds is required close to the entrance of the ward area. Each bed space should have an overhead hoist to support lifting, so a minimum ceiling of height of 3 m is required.
7.28 Adjustable bed-space divisions are desirable to cater for the varying service and equipment requirements generated by different types of patient. The use of a curtain system is a suitable solution. Project teams should select a curtain system that meets the following criteria:

- the radiation protection requirements should be met. A lead-lined system is therefore suitable;
- when the curtains are pulled around the bed space, there should be 100% visual privacy;
- it should be possible to pull the curtains back completely against the wall, thus allowing an uninterrupted view of the patient from the central communications base;
- the density of the curtains should reduce the level of general noise transmitted and also improve the level of auditory privacy in the bed-space. Again, a lead-lined system would help to achieve this;
- the curtains should be easily movable and easy to clean. UPVC-coated curtains are suitable as they can be wiped or washed clean in situ. Fabric curtains are not suitable as they increase the risk of HAI.

**Bed-space storage**

7.29 There are several ways of providing bed-space storage. It is necessary to avoid over-ordering as this leads to costly waste, as well as introducing infection control problems from stocking too many items at the bed space. Storage provision is only required for small quantities of medical and surgical supplies for the treatment of each patient. The combination of the storage unit coupled to the clinical hand-wash basin at the front of the bed space is an ideal solution. Project teams should also refer to the local decontamination policy for the area, to ensure that medical devices are stored and reprocessed/disposed of in a safe manner. See HSC 2000/032 (DoH, 2000) and ‘Decontamination Programme Technical Manual – Part 1: Process Assessment Tool and Decontamination Guidance’ (updated) (DoH, 2001).

7.30 Storage of patients’ clothes and personal effects should be dealt with in accordance with whole-hospital policy. This may vary from area to area and may depend on the type of patient and length of stay. They should not normally be kept at the bedside; however, some personal items such as family photographs can help the patient’s orientation and provide emotional support.

**Assisted bathroom/WC**

7.31 Admission policy and length of stay vary from unit to unit, and project teams should therefore consider whether provision of an assisted bathroom is necessary. Facilities required include a height-adjustable bath, stretcher hoist, WC and hand-wash basin. The room should also be fitted with oxygen, air and vacuum and waterproof electrical socket-outlets.

**Patients’ pantry**

7.32 The patients’ pantry is used for the preparation of beverages and snacks and for receipt of meals from the central kitchen. If a cook–chill system is in operation, space is required for holding and manoeuvring chilled meal service equipment. A sink/drainer, refrigerator and separate stainless steel hand-wash basin are required. The provision of an ice-making machine is recommended.

**Clean utility with blood bank**

7.33 The clean utility should provide space for preparing trolleys for sterile procedures, preparing and checking drugs, and for storage of sterile supplies and procedure packs. Controlled drugs in a secure cupboard and medical and surgical supplies are also stored here. This space should be easily accessible from the communications base and bed areas. Small quantities
of supplies may also be held near the bed space for immediate use. Empty pharmacy boxes may be kept in the clean utility for collection by the pharmacy porter. A clinical hand-wash basin with automatic taps or foot control is required in the clean utility. Clean disposable bedpans and urinals can be stored in this area.

7.34 A blood refrigerator may be required in the CCA, unless there is a blood store in the immediate locality, or a means of immediate delivery (pneumatic air tube transport system). Use of such a refrigerator is governed by national and local blood transfusion service regulations. The clean utility is an ideal place to locate the refrigerator and may require networking to a central monitoring system.

Dirty utility

7.35 The dirty utility provides facilities for disposal of the contents of bedpans, urine bottles, vomit bowls, washbowls etc. The dirty utility should be situated close to the patient areas. Project teams should decide between using disposable bedpans and a bedpan macerator, or a bedpan washer/disinfector. A disposal unit consisting of sink and hopper with concealed cistern should be provided. Mechanical extract ventilation and clinical hand-washing facilities should be provided. In larger units, it may be appropriate to provide more than one dirty utility.

7.36 To reduce the risk of HAI, clean disposable or non-disposable items such as bedpans, urine bottles and vomit bowls should not be stored here. These should be stored in the clean utility or bulk stores.

7.37 Space for holding of materials for disposal or reprocessing should be limited because sacks and bags, once full, should be closed and taken to the disposal hold to await collection. The whole-hospital policy for disposal will determine the frequency of collection. “Sharps” containers can be stored in and collected from the dirty utility or the disposal hold, depending on hospital policy. Sufficient space should be allowed to accommodate soiled linen skips. Project teams should also refer to the decontamination policy to ensure that medical devices are stored and reprocessed or disposed of in a safe manner.

7.38 The dirty utility may also used for urine testing and holding specimens. These should be zoned separately within the room. It can also be used as a holding bay for contaminated clinical equipment where it is cleaned prior to being taken to the equipment service room for maintenance. See Appendix 4 for the recommended layout.

Disposal hold

7.39 This locked room should be accessible from the hospital street. Collections may then be made without porters needing to enter the main circulation space of the area. Bagged refuse and soiled linen are held here safely and securely while awaiting collection.
They are identified by colour-coding, in line with whole-hospital policy. The size of the disposal hold should be determined by the frequency of collection.

**Bulk supplies storage**

7.40 This space is intended as a bulk supplies holding store for medical and surgical supplies and intravenous fluids, from which to stock the clean utility and other areas. The amount of storage required is determined by local supplies policy and use of the “just-in-time” system. Supplies can be stored using the modular storage system – see HTM 71 ‘Materials Management Modular Storage’ (NHS Estates, 1998) for details. Clean disposable bedpans and urinals can be stored in this area.

**Linen storage**

7.41 Storage is required for clean linen supplies, either in a linen store or on a linen exchange trolley. The amount of linen storage required depends on the linen supplies policy and the number of patients.

**Imaging equipment bay**

7.42 An open bay should be provided close to the clinical equipment store for the storage of imaging equipment and protective lead aprons. A socket-outlet should be provided for charging the imaging equipment. Lead aprons should be stored vertically to maintain their protective capability. Suitable wall brackets attached to a load-bearing wall, or mobile stands, are required for this purpose. The bay should be 5 m² to accommodate one mobile imaging machine and a single ultrasound unit. A larger storage area, 8 m², is required if mobile image intensifiers are used. It is a statutory requirement that the regulations pertaining to the use of ionising radiation, such as IR (ME) R2000 and IRR 99, are complied with.

**Cardiac arrest/emergency trolley**

7.43 A second cardiac arrest trolley/defibrillator should be sited outside the clinical area of the CCA, and areas with more than eight beds should have a third cardiac arrest trolley. At least one defibrillator should be equipped for external cardiac pacing.

**Medical gas cylinder ready use store**

7.44 The project team should ensure that the provision of standby gases and equipment reflect the emergency procedures and contingency planning processes developed for the area. The store should be in a room that is easily accessible and enclosed in fire-resisting construction.

**Furniture store**

7.45 This store holds beds, bed cradles, cots and other bulky items of furniture when they are not in use. Special beds and mattresses are sometimes required for patients. Beds and mattresses removed from the bed space require a suitable place for storage.
Clinical equipment store

7.46 Floor space within this store is needed for a variety of equipment including drip stands, monitoring equipment, ultrasound machines and haemodialysis equipment. Shelf space is needed for smaller items of equipment such as infusion pumps, ventilator accessories, monitoring equipment and suction apparatus. Electrical socket-outlets are required for charging equipment. Under-provision of storage for equipment may lead to unused equipment being kept in bed areas. This store should be located within easy access of the bed areas and adjacent to the equipment service room.

Equipment service room

7.47 Facilities are required within this room for equipment servicing as defined in the user manuals supplied by equipment manufacturers, supplemented by any formally agreed local instructions. Such local instructions may require the provision of additional facilities. Visiting electronics and medical engineering (EME) technicians carrying out minor scheduled or unscheduled servicing also use this room. The space provision should be sufficient to park and manoeuvre equipment and accommodate a workbench with integral lockable cupboards, preferably in a self-contained room or space. There should be sufficient socket-outlets protected by residual current devices (see paragraph 8.108). A hand-wash basin should also be provided. It is recommended that manufacturers’ user manuals be kept in this room.

7.48 Medical gas outlets supplying oxygen, medical compressed air and vacuum should be provided. The provision of nitrous oxide together with gas scavenging facilities is a local decision. Some items of equipment may require decontamination prior to scheduled servicing being done. Local policy will identify where this is undertaken (for example in the SSD and/or EME department).

7.49 Equipment should be held in the dirty utility where it is cleaned prior to immediate transfer to the equipment service room.

Laboratory

7.50 A near-patient testing laboratory is required for blood gas, electrolyte and glucose analysis and other tests carried out within the CCA. The main requirements are for a sink, laboratory benching and adequate bench space onto which equipment is placed, electrical socket outlet provision, gas cylinder storage for blood gas machine, a specimen fridge and sufficient space for staff.
to perform tests and use computer equipment. Separate clinical hand-washing facilities are also required.

**Staff changing**

7.51 Changing facilities are required for a minimum of 30 females and 20 males in an eight-bed CCA. The number of WCs and showers should be calculated on the basis of the number of staff using the facility. For guidance see the Workplace (Health, Safety and Welfare) Regulations 1992. A minimum of two WCs/showers is recommended for each changing room.

7.52 Space is required for changing, clothes storage, showers and sanitary 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. Separate changing rooms for males and females are needed, each with its own shower room, hand-wash basin, shaving point, power-points for hair dryers and a large, well-illuminated mirror with a shelf. The sanitary and shower facilities should be provided in self-contained, full-height rooms to provide maximum privacy. Cubicle partitions are not acceptable.

7.53 Steps should be taken to ensure the security of personal belongings left in the staff changing area. Code-entry lockers are needed for permanent staff. A number of coin-operated, returnable lockers should be available for transient visitors. Access to the area should be controlled by a close-proximity card system.

7.54 Additional space is required for the storage and disposal of scrub suits and footwear. Mechanical ventilation is required to provide sufficient air changes.

**Staff rest room/beverage bay**

7.55 The staff rest room may be used for meal, tea and coffee breaks. Account should be taken of the total number of staff working in the area and also the effect of shift overlaps. The rest room should be large enough to incorporate a galley kitchen, with an integral dining area and additional space for sitting comfortably in easy chairs. It should have natural daylight and an outside view. Smoking policy should be clarified so that both smokers and non-smokers are catered for, in separate areas. Access should be controlled via a close-proximity card system to ensure personal safety. A call system is essential to recall staff to the clinical area in case of an emergency.

7.56 Facilities are required for making beverages and snacks and for washing-up. Facilities should include a sink/drainer, refrigerator, dishwasher, microwave oven, toaster, drinks machine and storage space for crockery and dry goods. A separate hand-wash basin is required. The beverage bay may be provided as a separate space adjacent to the staff rest room, but is normally designed as an integral part of the rest room.

**On-call facilities**

7.57 Doctor’s on-call facilities are required within the unit and may be provided separately or in combination with one of the doctor’s offices. Facilities should include a bed, en-suite shower/WC, clothes storage, a hand-wash basin, a desk and chair, and a computer with Internet access. This space should be linked into the staff communication system. The room should be protected from noise by location and the use of double doors and sound-reducing materials. Natural light is essential for all staff areas.

**Facilities for relatives – waiting area, overnight stay, pantry**

7.58 Both day and overnight stay facilities for relatives are required. The latter may be provided elsewhere in the hospital or off-site as previously discussed (see paragraphs 5.3–5.5).

7.59 A designated interview room is required where counselling with relatives can take place. This room should have its own en-suite WC. The room should have direct exit to the hospital street without the need to go back through the CCA. This door should not provide access back into the CCA.

7.60 A second room is required for use as a sitting room for relatives to wait, and should have comfortable seating and a television.

7.61 Adjacent to the sitting room should be a separate pantry for making snacks and drinks.

7.62 All these rooms should be located close to the waiting area so that they share the sanitary and telephone facilities.

**Office accommodation**

7.63 Activities requiring office accommodation include administration, interviewing of staff, telephoning,
teaching and research work. All offices should have windows and natural ventilation. The following offices are required.

**Clinical director’s office**

7.64 This office should include a desk with a networked computer terminal with Internet access and points for telephone and fax transmission. Discussions take place here with other members of staff, therefore space for additional chairs is needed based on local requirements.

**Manager’s office**

7.65 The manager’s office is similar to the clinical director’s office.

**Clinical staff office/IT resource room**

7.66 Facilities are required to allow “hot-desking” by clinical staff. At least four networked computer terminals are required, with Internet access and points for telephone and fax transmission. This room should also provide facilities for self-education and study.

**Outreach office**

7.67 An outreach office is required for use by the outreach team. This room should be large enough to accommodate two members of staff along with computer and telecommunications equipment. There should be sufficient space to accommodate one visitor.

**Teaching and research office**

7.68 This room should be large enough to accommodate two members of staff with computer and telecommunications equipment as well as room for one visitor.

**Meeting/interview room**

7.69 A meeting room is required, to seat a maximum of six, with comfortable furnishings for staff interviews and meetings. It is unnecessary to include a desk, and there should be no telephone; however, an emergency call system operated from the communications base within the clinical area should be provided.

**Seminar room**

7.70 A seminar room should be provided within the CCA. The space should accommodate at least 20 people and contain slide and computer projection facilities, wallboards, image viewing facilities, computer terminals with access to the Internet and local colour printers, along with secure storage for audio-visual aids, computer equipment and printers. An intercom system should be installed between the seminar room and the clinical area to recall staff in an emergency. The hospital education centre is used for other more formal and programmed teaching events such as a skills laboratory.

**Battery/uninterrupted power supply room**

7.71 A room is required to house the UPS to the essential electrical supply to patient ventilators and monitoring equipment. It should be ventilated and kept locked at all times, with access only permitted for estates staff. The room may also be used to house the data hub for the CCA. Monitoring of the UPS status is advised; this may be connected to the communications base monitoring equipment where appropriate. The use of centralised rather than distributive UPS arrangements within CCAs should be considered in view of the likely security and maintenance advantages.

7.72 Care should be taken to ensure that lighting circuits as well as specialist power supplies within critical care are provided with adequate UPS to ensure that lighting is maintained at all times.

**Housekeeper’s room**

7.73 A ventilated, lockable storeroom is required for the storage of cleaning supplies and domestic equipment. Facilities should be provided in this space for filling and emptying cleaning equipment via a bucket sink with hot and cold running water. A sluice hopper for the disposal of soiled mop water, a sink for washing soiled mop buckets and a drainer should be provided, as well as a separate hand-wash basin. Disposable mop heads should be used. Electrical socket-outlets should also be installed. (See ‘The Control of Substances Hazardous to Health – Guidance for the Initial Assessment in Hospitals’ (1999) relating to safe storage and use of chemicals and cleaning materials.)

**Switchcupboard**

7.74 The departmental switchcupboard, which houses the main isolators and distribution fuse switchgear, should be:

- sited within the department;
- accessible directly from a circulation area providing clear and safe access for maintenance staff (access space may be part of the circulation area);
- sited away from water services; and
- lockable.

7.75 Care should be taken to ensure that safety is not compromised during maintenance from passing traffic or the opening of adjacent doors.
This chapter describes the engineering services contained within CCAs and how they integrate with the engineering systems serving the whole site. The guidance should acquaint the engineering members of the multidisciplinary design team with the criteria and material specifications needed to meet the functional requirements. Specific requirements should be formulated in discussion with both end-users and manufacturers of specialist equipment. Some issues, particularly those relating to radiation safety, require specific and detailed discussion with other professional consultants, including the local radiation protection advisor.

Given the complexity of the critical equipment and systems, and the dependency of patients on them, it is important that the project team has a clear understanding of the risks that are being managed by the physical, fixed installation. By adopting a comprehensive risk management approach to the design, the project team will be able to demonstrate an appropriate level of investment in the engineering services and infrastructure necessary to support the department.

This risk management approach extends beyond the normal requirements of the Construction (Design and Management) Regulations 2000 and requires the design to be fully integrated within the control assurance framework for risk management. Clear design philosophies should be developed and agreed with the project team that enable the users to understand how risks are being managed within the built environment, through facilities management support and by the actions of the local team. These philosophies can be developed to refine the operational policies of the department and provide an effective briefing and monitoring mechanism throughout the design, construction, commissioning and operational phases of the area.

The National Health Service Model Engineering Specifications 1997 are sufficiently flexible to reflect local needs. General engineering guidance relevant to CCAs is contained in Health Technical Memoranda (HTMs). Specific references are provided throughout the text.

Engineering services are a significant proportion of the capital cost and a continuing charge on revenue budgets. Value engineering should be carried out at the inception stage. The project design engineer should therefore ensure:

a. economy in provision, consistent with meeting the functional requirements and maintaining clinical standards through effective risk management; and

b. optimum benefit from the total financial resources these services are likely to absorb during their lifetime.

Consideration should be given to generating “life-cycle costings” as part of the cost–benefit analysis for the selection of systems and equipment within a given risk management framework.

Where various design solutions are available for a given level of risk reduction, their consequential capital and revenue costs should be compared using the discounting techniques described in the Capital Investment Manual (1994).

Maintainability and the cost of maintenance are key factors in both the business planning and design solution evaluation processes.

The economic appraisal of various locations and design solutions should include the heat conversion and distribution losses to the point of use. Where buildings are located remote from the development’s load centre, these losses can be significant.

In providing an energy-efficient solution, account should be taken of the local environmental policy in line with the mandatory energy-efficient targets set out for the NHS in England. Users are expected to achieve ongoing improvements in the use of engineering services for a given level of clinical activity. As a result, the design of the building management system (BMS) and metering arrangements should enable the estates manager to identify areas for performance improvement in the use of fossil fuels. Energy management should be part of the hospital BMS, and this should also include metering of all services where practical. If a hospital BMS is not available, the energy management for this
department should be stand-alone. It should also be suitable for subsequent integration with a future BMS. Further detailed guidance is contained in HTM 2005 ‘Building management systems’ (NHS Estates, 1996).

8.11 The project team should consider the environmental benefits and economic viability of heat recovery and combined heat and power systems (CHPs). Further guidance on CHPs can be found in ‘A strategic guide to combined heat and power’ (NHS Estates, 1993).

MAXIMUM DEMANDS

8.12 User demand on engineering services is often difficult to predict, but experience indicates that services designed for simultaneous peak conditions are seldom fully used in practice. The estimated maximum demand, and storage requirement (where appropriate), for each engineering service in this accommodation needs to be assessed individually to take account of the size and shape of the department, geographical location, operational policies and intensity of use. As a guide and for preliminary planning purposes only, the table below gives the estimated maximum demands for an eight-bed area.

<table>
<thead>
<tr>
<th>Service</th>
<th>Typical maximum demand</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating/ventilation/ DHWS (kW)</td>
<td>90</td>
<td>720 litres storage (2 hours recovery) 4000 litres storage (24-hour supply)</td>
</tr>
<tr>
<td>Domestic HWS (l/s)</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Cold water (l/s)</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Supply ventilation (m³/s)</td>
<td>2.26 (or as required for filtered supply)</td>
<td></td>
</tr>
<tr>
<td>Extract ventilation (m³/s)</td>
<td>2.34</td>
<td>Clean and dirty</td>
</tr>
<tr>
<td>Cooling (kW)</td>
<td>33</td>
<td>Includes essential 9 kVA</td>
</tr>
<tr>
<td>Electrical (kVA)</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Medical gases (l/min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Medical compressed air</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Vacuum</td>
<td>100</td>
<td>Project option. Anaesthetic gas scavenging (AGS) required</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

ENVIRONMENTAL REQUIREMENTS

8.13 Detailed environmental requirements for specialist equipment should be obtained from manufacturers. The comfort of patients and staff should be considered in respect of temperature stability and the effects of waste heat derived from high-powered diagnostic or treatment systems. Risks to patients, staff and equipment associated with inappropriate environmental conditions need to be clearly identified and the level of investment in physical infrastructure agreed with clinicians.

SPACE FOR PLANT AND SERVICES

8.14 Space for plant and services should include an easy and safe means of access for frequent inspection and maintenance, protected as far as possible from unauthorised entry. Sufficient access panels should be provided for this purpose. In the provision of panels and access points, consideration should be given to ensuring that the integrity of fire barriers and the control of smoke is appropriately maintained.

8.15 The impact of eventual plant removal and replacement upon the safe, ongoing operation of the area and its facilities should be minimised to an agreed level.

8.16 Recommended spatial requirements for mechanical, electrical and public health engineering services are contained in HTM 2023 ‘Access and accommodation for plant and services’ (NHS Estates, 1995). Reference is also made in HTM 2023 to the Construction (Design and Management) Regulations. The information in this HTM is specifically intended for use during the initial planning stages, when precise dimension details of plant are not available. In the design of infrastructure to support specialist systems and equipment, designers should choose solutions that enable users to select alternative items of equipment in the future without extensive cost and disruption to the associated engineering services infrastructure. This is particularly important, given the range and criticality of patient care provided, during equipment replacement or refurbishment, when there is limited opportunity to isolate significant sections of the facility.

8.17 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls and above ceilings. Heat emitters should be contained within a 200 mm wide perimeter zone under window-sills, and critical dimensions should be taken from the boundary of this zone. The 200 mm zone includes the floor area occupied by minor vertical engineering ducts and is included in the building circulation allowance.

8.18 Only equipment required for services in the department should be stored in the space above the false ceiling, with the exception of drainage.

ACCESS TO CONTROL AND ISOLATION DEVICES

8.19 Devices for control and safe isolation of engineering services should be:
• located in circulation areas rather than working areas to avoid disruption of clinical work;
• protected against unauthorised operation – for example, switchgear and distribution equipment should be housed in secure cupboards;
• clearly visible (at all times, including during periods of primary engineering services failure) and accessible, where intended for operation by the facilities staff, complete with operating and maintenance instructions that enable the safe management of the service;
• clearly identified on computer-aided design-based drawings and schematics; and
• monitored (where required) and linked into whole-site operation and maintenance regimes, including emergency and contingency planning arrangements.

ACTIVITY DATA

8.20 Environmental and engineering technical data and equipment details will be provided in the relevant updated Activity DataBase information. They should be referred to for space temperatures, lighting levels, outlets for power, telephones, equipment details etc. It is the designer’s responsibility to ensure that the project team are aware of and approve the engineering service provision included within the activity data sheets. This information should reflect the design philosophies and operational policies for all of the activity areas and meet the risk management strategy agreed with the users. Where variations to the agreed philosophy or strategy are requested by the users, the designers should ensure that the implications of such variations (in clinical and organisational terms) are understood and accepted by the project team.

SAFETY

8.21 Section 6 of the Health and Safety at Work etc Act 1974, as partly amended by the Consumer Protection Act 1987, together with the Management of Health and Safety at Work Regulations 1999, the Workplace (Health, Safety and Welfare) Regulations 1992 and the Provision and Use of Work Equipment Regulations 1998, impose statutory duties on employers and designers to minimise any risks arising from the use, cleaning or maintenance of engineering systems. One of the requirements of this legislation is to ensure that, as far as is reasonably practicable, design and construction is such that articles and equipment are safe and do not pose a risk to health at any time when they are being set, used, cleaned or maintained by a person at work.

8.22 At the time of handover, the health and safety file should contain information on the safe operation and maintenance of all engineering services and systems to meet the design philosophies and risk management strategies agreed with the project team. Where specific design assumptions have been made, these should be documented within the file, with recommendations on any specific monitoring or operational management activities that need to take place on an ongoing basis to ensure satisfactory operation of services and systems.

8.23 The Ionising Radiation (Medical Exposure) Regulations 2000 and the associated Codes of Practice place onerous requirements upon engineering aspects of design and operational practices. Over and above this, there are additional requirements from the 1993 Radioactive Substances Act in respect of storage, use and disposal of radioactive materials. The local radiation protection adviser and custodian of radioactive substances should be consulted.

FIRE PRECAUTIONS

8.24 It is essential that project teams familiarise themselves with the guidance contained in the Firecode suite of documents, which contains Department of Health policy and technical guidance on fire precautions in hospitals and other NHS premises. In particular, the need for structural fire precautions and means of escape from the whole accommodation should be taken into account as early as possible. The key document for these aspects in hospitals is HTM 81 ‘Firecode: Fire precautions in new hospitals’ (NHS Estates, 1996).

8.25 In addition, the Department of Health Fire Safety Policy (2001) sets out the key policy requirements. Management guidance is contained in ‘Firecode: Policy and principles’. Other Firecode documents include the HTM 80 series (which gives technical guidance on various building, engineering and equipment issues), and the Fire Practice Notes series, which covers various specialist aspects of fire precautions.

8.26 It is important to establish during the design stage those aspects of fire safety strategy that affect the design, configuration and structure of a CCA. The architect and engineer should discuss and verify their proposals with the Building Control Authority or Approved Inspector, and ensure that the project team and all other design staff are fully acquainted with the fire safety strategy for the design in terms of operation (staff responsibilities, equipment provision and building and engineering layouts). The principles of fire safety apply equally to new projects and to alterations and upgrading of existing buildings.

Existing fire policies, drawings and inspection inventories also need to be considered as part of the integration of design for fire safety. The principles of fire safety apply equally to new projects and to alterations and upgrading of existing buildings.

NOISE AND SPEECH PRIVACY

Excessive noise and vibration from engineering services, whether generated internally or externally and transmitted to individual areas or noise from other sources (for example, speech which can be transmitted by the ventilation system), can adversely affect the operational efficiency of the department and cause discomfort to patients and staff.

In addition to designing for control of noise levels, there may also be a need to ensure speech privacy, so that confidential conversations are unintelligible in adjoining rooms or spaces. This is important in office areas and at the communications base. The use of induction loop facilities for those with hearing impairment should be considered, but the provision for privacy should equal that granted to able-bodied persons.

ENGINEERING COMMISSIONING

At the time of commissioning, the project team should assess the ability of the engineering services and systems as installed to meet the agreed design philosophies and risk management strategies. Where variations occur against agreed performance parameters, the designer should ensure that the implications of such variations (in clinical and organisational terms) are understood and accepted by the project team.

The engineering services should be commissioned in accordance with the validation and verification methods identified in the latest HTMs. Engineering services for which a specific HTM is not currently available should be commissioned in accordance with ‘Guidance to engineering commissioning’ published by the Institute of Healthcare Engineering and Estate Management (1995). Test facilities for flow measurement and proportional balancing of air and water systems need to be incorporated at the design stage. Guidance is also contained in commissioning codes A and W published by the Chartered Institute of Building Services Engineers (1996, 1994).

LOCATION OF ELECTRICAL AND MEDICAL GAS OUTLETS

Electrical power, data cabling and medical gas outlets should be provided at each bed space from the ceiling or floor via a medical supply unit suspended from the building structure. Medical supply units are articulated arms which can support items of equipment such as infusion pumps. The second arm supports larger items of equipment such as ventilators. The two arms can accommodate a large number of electrical and medical gas outlets. A smaller telescopic arm at the foot of the bed accommodates a communication link for computerised data collection and a television for the patient.

MECHANICAL SERVICES

Heating

In providing appropriate environmental conditions, the designer should review with the project team the full range of clinical activity proposed within the area.

Patients are often lightly clad in the CCA, so local temperature control is required. Heating should be designed for continuous operation all year round. Should small children need to be accommodated, parameters including environmental temperature will need to be reviewed.

Clinical areas should have a selectable range of temperatures from 16°C to 27°C. Staff areas should be between 18°C and 21°C, apart from the dirty utility (16°C) and stores (10°C). The temperature in the area of the drugs cupboards should not exceed 20°C. Each area has independent zone control to achieve the required temperatures.

The impact of extremes in external space temperatures upon internal room temperatures needs to be addressed to ensure that operational policies and contingency plans reflect the actions necessary to provide continuity of care.

Spaces heated by low-pressure hot water systems should use radiators of the low surface temperature type. Surface temperatures should not exceed 43°C. Exposed hot water pipework, accessible to touch, should be insulated to achieve the same surface temperature. Further guidance is contained in the Health Guidance Note ‘Safe’ hot water and surface temperatures’ (NHS Estates, 1998).

Radiators should normally be located under windows or against exposed walls, with sufficient clear space between the top of the radiator and the window-sill to prevent curtains reducing the output. There should be adequate space underneath to allow cleaning machinery to be used. Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric.

It is recommended that radiators be fitted with thermostatic radiator valves. These should be of robust construction and selected to match the temperature
and pressure characteristics of the heating system. The thermostatic head, incorporating a tamper-proof facility for pre-setting the maximum room temperature, should be controlled via a sensor, located integrally or remotely as appropriate. To provide frost protection at its minimum setting, the valve should not remain closed below a fixed temperature. In calculating heating requirements, care should be taken to include heat yield from high-powered equipment. Where thermostatic radiator valves are used, these should be mounted and labelled to permit easy access. Care should be taken when such valves are integrally mounted and silicon beading is used to reduce the trapping of dust and dirt.

8.40 Radiators may also be used to offset building fabric heat loss in mechanically ventilated spaces.

8.41 Flow temperatures to heating appliances should be controlled by the BMS in accordance with space requirements and external temperatures. The system should be zoned to reflect a number of requirements including the characteristics of the building, maintenance activities and external environmental factors.

Ventilation

General

8.42 Wherever possible, non-clinical spaces should be naturally ventilated. Deep-planned and clinical spaces need mechanical ventilation. Planning should therefore seek to minimise the need for mechanical ventilation by ensuring that, wherever practicable, core areas are reserved for:

a. rooms that require mechanical ventilation for clinical or functional reasons, irrespective of whether their location is internal or peripheral (for example sanitary facilities, dirty utility and beverage preparation areas); and

b. outside patient care spaces that have only transient occupation and therefore require little or no mechanical ventilation (for example circulation areas and some storage areas).

8.43 Air movement induced by mechanical ventilation should be from clean to dirty areas where these can be defined. The design should allow for an adequate flow of air into any space having only mechanical extract ventilation via transfer grilles in doors or walls. Such arrangements, however, should avoid the introduction of untempered air and should not prejudice the requirements of fire safety or privacy.

8.44 Mechanical ventilation should ensure that both supply and extract systems are in balance, and take account of infiltration as appropriate.

8.45 Fresh air should be introduced via a low-velocity system and should be tempered and filtered before being distributed via high-level outlets. Diffusers and grilles should be located to achieve uniform air distribution within the space, without causing discomfort to patients.

8.46 The ventilation supply plant should include a primary air filter with a minimum arrestance of 85% when tested in accordance with BS EN 779. The extent of secondary filtration should reflect clinical requirements, for example HEPA EU 10/11. In urban or other areas of high atmospheric pollution, a higher standard of filtration may be economically justified to reduce the level of staining to internal finishes. Filters should be readily accessible for replacement and should be provided with a pressure differential indicator.

8.47 A separate extract system is required for “dirty” areas, for example utility and sanitary facilities. It should operate continuously throughout the day and night. A dual-motor fan unit with an automatic changeover facility should be provided.

8.48 External discharge arrangements for extract systems should be protected against back-pressure from adverse wind effects and should be located to avoid the reintroduction of exhausted air into this or adjacent buildings through air intakes and windows.

Multi-bed areas

8.49 Bed spaces and surrounding areas should be fully air-conditioned to ensure consistency of environmental conditions. The extent of air change within this area should be agreed with clinical representatives to enable safe and effective clinical and nursing practices to be implemented.

Single bedrooms

8.50 The air-conditioning for single bedrooms should be designed to provide a “simultaneous source and protective isolation”. A simple non-changeover system that provides balanced supply and extract ventilation to each single bedroom and gowning lobby is proposed. A “constant mode” system has a number of advantages and avoids the complications and reliability problems associated with changeover systems.

8.51 A single bedroom may require humidity within the range 40–60% RH, depending on the specialty.

8.52 The lobby, which functions as an airlock, requires a relatively high and balanced supply and extract air change rate to be effective against airborne organisms moving between circulation areas and single bedrooms. For this reason, the lobby should be relatively small.
8.53 The ventilation system dilutes the air entrained from the corridor when staff wash their hands in the lobby. Further entrainment and dilution occur as staff move from the lobby to the single bedroom. The amount of air and number of organisms transferred from the corridor to the single bedroom through this process should be exceptionally low and is inversely proportional to the time spent "gowning up". The reverse applies as staff leave the single bedroom.

8.54 The layout of ventilation grilles should be co-ordinated with adjacent engineering services and designed to minimise the risk of patient discomfort.

Ventilation controls

8.55 The space temperature within the multi-bed areas and single bedrooms is usually controlled by the mechanical ventilation heating and cooling system. The temperature in the multi-bed areas should be centrally controlled, whereas single bedrooms should have local temperature controls that are accessible to nursing staff. Humidity in single bedrooms should also be centrally controlled. Facilities for temperature and humidity adjustment should be provided to parameters agreed with clinical representatives on the project team.

8.56 Supply and extract ventilation systems should include controls and indicator lamps in the plantroom to confirm the operational status of each system. Where a system is used in a regular daily pattern, time switch control with manual override for a limited period should be considered. The indicators for a system serving a particular space should be in or immediately adjacent to that space. It may be appropriate to locate all indicators at the communications base. Where manual controls are available for staff use, they should be provided with labels that clearly define their function. Alarms should be repeated in the works department. Their selection should take account of the extent to which they can be linked to, or provided by, a BMS serving the whole hospital. The strategy for local control and monitoring of environmental conditions needs to be agreed with the project team to ensure that users have sufficient information and control to provide appropriate patient care.

Hot, cold and drinking water services

8.57 Guidance on the design and installation of hot and cold water supply and distribution systems is contained in HTM 2027 ‘Hot and cold water supply, storage and mains services’ (NHS Estates, 1995).

8.58 The requirements for the control of legionellae bacteria in hot and cold water systems are set out in HTM 2040 ‘The control of Legionellae in health care premises – a code of practice’ (NHS Estates, 1994).

8.59 Prior to undertaking the design of the hot and cold water services supplying critical care facilities, the project team should undertake a risk assessment of the susceptibility of patients, given the range of treatments provided.

8.60 This risk assessment should identify any special measures required in the physical infrastructure and operational policies necessary to minimise the risk of legionellae. Whole-site policies need to be established with regard to the prevention of legionellae, including the pasteurisation or chlorination of pipework systems and the use of water treatment processes (for example chlorine dioxide and silver ion injection). Their potential impact upon patient care should be assessed with the project team and appropriate risk minimisation actions taken.

8.61 The design of the pipework systems should enable the maintenance of the water systems in accordance with HTM requirements with a minimal adverse effect upon patient care, as agreed with the project team. This will affect the routing of pipework, location of valves and zoning of the systems. Where water services supplying critical care facilities are connected to an existing hospital system, facilities should be provided for the safe connection and isolation of pipework systems in CCAs.

8.62 All cold water pipework, valves and fittings should be economically insulated and vapour-sealed to protect against frost, surface condensation and heat gain.

8.63 The domestic hot water supply should be taken from the general hospital calorifier installation at a minimum outflow temperature of 60°C ± 2.5°C and distributed to all outlets such that the return temperature at the calorifier is not less than 50°C. See the Health Guidance Note ‘Safe’ hot water and surface temperatures’ (NHS Estates, 1998).

8.64 Architects and engineers should collaborate to ensure any landscape design/water features are included in the design and form part of the risk assessment process for water services.

Dialysis

8.65 If local policy dictates that haemodialysis is undertaken in a CCA, water and drainage should be piped to each bed space. The specification for the performance of the water quality service should be agreed with the project team. For initial planning purposes, designers may wish to use the following information:

- the quality of the water for haemodialysis should comply with ISO TC 150/SC 2/WG5 – ‘Renal Replacement, Detoxification and Apheresis’ (in progress);
• water treatment normally consists of water-softening, particle filters and reverse osmosis.

8.66 As there are a small number of dialysis machines in a CCA, it is more economical to supply potable water to small water treatment units at the bed space.

8.67 As part of the risk assessment process, the impact of water leakages within the bed space should be identified and their potential impact upon other critical engineering services minimised.

Piped medical gases

8.68 Piped medical gases should be located at every bed space and include oxygen, medical air, surgical air and vacuum. Optionally, nitrous oxide and anaesthetic gas scavenging (AGS) may also be provided. Services to the bed space should be duplicated in the equipment service room. Guidance on piped medical gases systems and gas storage is contained in HTM 2022 ‘Medical gas pipeline systems’ (NHS Estates, 1997).

8.69 The extent of medical gases provision should reflect the clinical and nursing requirements identified by the project team, including the provision of standby arrangements. The design of the medical gas pipeline system (MGPS), including data on the planned use of medical gases (both initial and projected), the provision of isolation of valves and local/central pressure monitoring arrangements and alarms, should be agreed with the authorised person (MGPS) for the site.

8.70 For medical oxygen systems, trusts may wish to consider the use of a local backup automatic manifold, installed downstream of the department AVSU, in accordance with HTM 2022. This should constitute part of the emergency and contingency planning process.

Pneumatic tube transport

8.71 Pneumatic tube transport may provide a viable alternative to porters for moving specimens to the pathology department. Pneumatic tube transport may also be provided to the pharmacy department. Factors to be assessed include:

• distance, time and cost of travel between the two locations;
• time to process specimens in the laboratory;
• proportion of specimens that require urgent results;
• whether general post etc will be transported in the system;
• security of data.

8.72 The total capital and revenue cost of each option should be determined in accordance with the principles set out in the Capital Investment Manual (1994). Further guidance on pneumatic conveyor systems are contained in HTM 2009 ‘Pneumatic air tube transport systems’ (NHS Estates, 1995).

8.73 Care should be taken in the design of these systems to zone or group client and supplier in a way that promotes an efficient service.

ELECTRICAL SERVICES

Electrical installation

8.74 Electrical installation should comply in all respects with BS 7671: 2001 – ‘Requirements for Electrical Installations; IEE Wiring Regulations 16th Edition’ (and subsequent amendments), IEE Guidance Note 7 on ‘Special locations’ (IEE, 1998) and HTM 2007 ‘Electrical services: supply and distribution’ (NHS Estates, 1993). Zonal earth circuit provision should be considered in consultation with equipment manufacturers (section 607).

8.75 The point of entry for the electrical supply is a switchcuboard housing the main isolators and distribution equipment. This space is also the distribution centre for subsidiary electrical services. Supplies should be metered and, whenever possible, equipment should be mounted at a height to give easy access from a standing position. Switchgear should be lockable in the “off” position.

8.76 The electrical installation in occupied areas should be concealed using thermoplastic insulated cables and screwed steel conduit or trunking (in certain circumstances, mineral insulated, metal-sheathed or other type of cable with resistance to extreme temperatures and physical damage may be used depending on requirements). External installations should use PVC-insulated cables in galvanised screwed steel conduit with waterproof fittings.

8.77 For major second-fix items such as medical supply units, the design team should take account of the requirements and services to sustain a complete equipotential bonding arrangement.

Electrical interference

8.78 Care should be taken to avoid mains-borne interference, electrical radio frequency and telephone interference affecting physiological monitoring equipment, computers and other electronic equipment used in the CCA or elsewhere on the hospital site.

8.79 Electrical products, systems and installations should not cause, or be unduly affected by, electromagnetic interference. This requirement is in the form of an EC Directive on Electromagnetic Compatibility (89/336/EEC as amended by 91/263/EEC.

8.80 Fluorescent luminaires should comply with BS EN 55015.

Lighting

8.81 Practical methods of lighting the various functional spaces are contained in the CIBSE Lighting Guide LG2 – ‘Hospitals and Health Care Buildings’ (1989; under review). Colour finishes and lighting throughout circulation areas should be co-ordinated to create a calm and welcoming atmosphere.

8.82 The selection of luminaires with appropriate colour-rendering lamps is crucial to the appropriate diagnosis of patients. If a particular colour temperature has been standardised in critical departments, including theatres, consideration should be given to continuing this strategy within the CCA. This avoids perceptions of changing patient status under differing colour temperature lamps. If the existing colour temperature does not ensure accurate patient monitoring, the most appropriate temperature lamps should be selected.

8.83 Given the extensive use of electronic equipment within CCAs, low-glare lighting solutions are important, including the use of uplighters and luminaires with glare control features.

8.84 Lighting solutions should meet the Health and Safety (Display Screen Equipment) Regulations 1992, which came into force on 1 January 1993. The Regulations implement a European directive No 90/270/EEC of 29 May 1990 on minimum safety and health requirements for work and display screen equipment. Further guidance is contained in the Chartered Institution of Building Services Engineers (CIBSE) Lighting Guide LG03, 1996.

8.85 Architects and engineers should collaborate with artists and landscape designers to ensure that decorative finishes are compatible with the colour-rendering properties of the lamp and the spectral distribution of the light source is not adversely affected.

8.86 Luminaires should be manufactured and tested in accordance with the requirements specified in the relevant sections of BS 4533. Their location should afford ready access for lamp-changing and maintenance, but with the overriding requirement that the recommended standard of illumination is provided to the task area. Wherever possible, luminaires should incorporate a fused terminal block that permits safe isolation of the luminaires for lamp-changing and maintenance activities, without the need for prolonged loss of light owing to the isolation of a complete lighting circuit.

8.87 Each bed space should be illuminated by luminaires located above and behind the bedhead to achieve the appropriate levels of illumination for task activities, patient comfort and safe use of circulation spaces. The luminaires should be controlled by dimmer switches capable of providing appropriate illumination at all times. The extent of dimming required by users, combined with the need to control the effects of electromagnetic interference, will affect the choice of control gear arrangements. Additional luminaires should be provided within the general circulation space of the multi-bed area, and these should also be controlled by dimmer switches. Local luminaires, controlled by dimmer switches, should be provided at the communications base.

8.88 Generally, energy-efficient luminaires should be used whenever possible. Intermittently and infrequently used luminaires may be fitted with compact source fluorescent or incandescent lamps.

8.89 The number and location of luminaires connected to a circuit and the number of switches and circuits provided should allow flexibility in the general and local level of illumination, particularly in areas away from windows where daylight can vary significantly. Some areas that may be unoccupied for long periods may also be suited to automatic or presence switching. In the design of lighting circuits, designers should consider the impact that isolation of individual lighting circuits will have upon an operational area. These proposals should be agreed with the project team and estates manager to ensure that the design properly reflects local maintenance and operational policies.

8.90 Mobile examination luminaires, where provided, should operate at extra low voltage (normally fed from an in-built step-down transformer), be totally enclosed and be equipped with a heat filter. The temperature of external surfaces should be such as to avoid injury to patients and staff. Given the extent of services for equipment provided in these key clinical areas, designers need to ensure that the introduction of these luminaires will not adversely affect the ability of users to provide appropriate patient care.

8.91 The lighting of corridors, stairways and other circulation areas (which generally are areas not covered by Activity Database sheets) should be in accordance with the guidance contained in HBN 40 ‘Common activity spaces, Volume 4’ (NHS Estates, 1995).

8.92 Safety lighting should be provided on primary escape routes in accordance with HTM 2011 ‘Emergency electrical services’ (NHS Estates, 1993) and
BS 5266. Emergency lighting of control rooms should be arranged in accordance with the requirements of users and the guidance in HTM 2011.

8.93 The planning and design team should ensure that the provision of emergency lighting and alternative equipment (torches etc) reflects the emergency procedures and contingency planning processes developed for the CCA, to enable the provision of a safe level of care at all times.

**Controlled Drugs cupboard**

8.94 A red indicating lamp should be provided on each controlled drugs cupboard and, where appropriate, outside the doorway to the room in which the cupboard is located and at the corresponding communications base. The lamps should be interlocked with the cupboard and alarm system to give visual and audible indication at the communications base of unauthorised entry. There should be a mute facility provided at the communications base to accept the audible indication. This facility should be automatically reset once the cupboard door is closed.

8.95 Wherever possible, this warning and indication system should operate at extra low voltage and form part of the nurse call communication system operating within the area.

8.96 An indicating lamp denoting that the circuit is energised should be fitted to each cupboard. The cupboards should comply with BS 2881. Further information is contained in HTM 63 “Fitted storage systems” (NHS Estates, 1989).

**Socket-outlets and power connections**

8.97 Socket-outlets in each bed space should be unswitched and attached to the medical supply unit. The use of UPS systems should be considered, mainly to safeguard the data facilities on medical equipment. These systems are usually available as part of the EME design specification on the equipment. Primarily, the electrical distribution in Group 2 locations will be supported by a class 15 medium break automatic supply, available within 15 seconds (IEC 60364-555). Where UPS socket-outlet supplies are used, they should be clearly marked at the source and outlets to differentiate them from those used for non-medical purposes. Waterproof floor sockets may be used underneath the bed space where necessary following appropriate risk assessment.

8.98 Sufficient 13-amp switched and shuttered socket-outlets, connected to ring circuits, should be provided to supply all portable appliances, other than medical equipment, likely to be used simultaneously. Designers should ensure that they have access to a complete schedule of the equipment that requires electrical supplies and a clear understanding of the operational policies regarding the use of this equipment. In particular, information regarding the provision of monitoring, life-support equipment and that needed for near-patient testing equipment should be available. The installation of twin outlets should be considered where activities occur in juxtaposition planning.

8.99 Switched socket-outlets should be provided in corridors and in individual rooms to enable domestic cleaning appliances with flexible leads (9 m long) to operate over the whole facility.

8.100 Appliances requiring a three-phase supply, or those rated in excess of 13-amp single phase, should be permanently connected to separate fused sub-circuits. The sub-circuits should be fed from the distribution board and terminate at a local isolator. Designers should agree with the project team on the location, type (flush or surface-mounted), form of indication, internal power rating, construction, type of cable outlet, facilities for locking of isolator in off position) and labelling of such isolators. Fixed appliances, less than 13-amp rating, should be permanently connected to a double-pole switched 13-amp fused connection unit. The fused connection unit should contain an indicating light, where appropriate, and a suitable fuse.

8.101 The selection of faceplate material (metal or plastic) and manufacturer should be discussed with the estates manager to reflect the whole-hospital policy on electrical outlet provision.

8.102 Heating appliances and automatic equipment should have indicator lights to show when they are energised. Indicators should be incorporated in the control panel of the apparatus, in the control switch or in the socket-outlet from which the apparatus derives its supply.

8.103 The electrical supply connections to electro-medical equipment should comply with BS 5724 and the relevant HTMs. Depending on local circumstances, consideration may need to be given to the quality of the electrical supply to computer and other equipment. Much equipment has over-voltage and surge protection built in, but susceptibility to harmonics and other supply distortion should be discussed with the manufacturer to establish the parameters required. Additional power-factor correction should be built in as required.

8.104 Socket-outlets in areas for consultation, examination or treatment and areas where imaging films are processed, reported on or stored, should be connected so that within each area a supply from at least two separately fused circuits of the same phase is available.
8.105 Socket-outlets should be connected to essential circuits in accordance with the guidance contained in HTM 2011 ‘Emergency electrical services’ (NHS Estates, 1993).

8.106 Isolation switches should be provided adjacent to all engineering plant and equipment for use by maintenance staff. The location, type and facilities provided for the isolation of switches should be agreed with the senior authorised person (low voltage) to ensure that the fixed installation enables whole-hospital policies on low-voltage operations (HTM 2020 ‘Electrical safety code for low voltage systems’; NHS Estates, 1998) to be maintained in the CCA.

**Socket-outlets for minor scheduled servicing of medical equipment**

8.107 Socket-outlets for user servicing of medical equipment (see MDA DB 9801) within a designated area of the equipment service room may also be used by a visiting EME technician to carry out minor scheduled servicing. The layout within the designated area should therefore ensure that no adventitiously earthed metallic structure, such as radiators or pipes, is within easy reach of the operator sitting at the bench. The floor within this area should be covered with a rubber mat.

8.108 Shuttered socket-outlets should be connected via an emergency trip. This circuit should be protected by a core balance earth leakage protective device with a nominal tripping current not exceeding 15 mA and complying with the requirements of BS EN 61008. In addition, a master emergency trip should be provided outside the entrance to the room. A shrouded earth terminal should also be provided at one end of the bench. The socket-outlets should be mounted in plastic trunking and all metallic fixings should be isolated from earth.

8.109 A plastic chain and stanchion or equivalent should be available to enclose the designated area when the visiting technician is carrying out “live working procedures”. Socket-outlets outside this area should have a notice warning that earth leakage protection is not provided.

**Electrical supplies to diagnostic equipment**

8.110 The electrical supply connections to all medical electrical equipment should comply with BS EN 60 601-1-2. Advice on the power supply and requirements for fixed and mobile radiodiagnostic equipment is contained in HTM 2007 ‘Electrical services: supply and distribution’ (NHS Estates, 1993). Individual project requirements should be discussed at an early stage with manufacturers and suppliers of equipment.

8.111 The earth connection at the power termination should be suitable for the functional earth requirements specified by the radiology equipment manufacturer, and be arranged to receive a direct connection from the earth reference terminal, which should be provided or designated in every radiodiagnostic room. Further guidance on the purpose, characteristics and performance criteria of an earth reference terminal is given in HTM 2007.

**Emergency electrical supplies**

8.112 Guidance on emergency electricity supplies is contained in HTM 2011 ‘Emergency electrical services’ (NHS Estates, 1993). Requirements for connection of individual circuits and items of equipment to UPS and/or standby generation systems should be discussed with users and with equipment suppliers. Designs should undertake a risk assessment with the project team to identify the operational impact. The risk assessment should identify how risk will be mitigated using the fixed installation, business continuity and contingency planning elements of the agreed operational policies.

8.113 Socket-outlets connected to “essential circuits” include those on the medical supply units and at the communications base. The supply to the controlled drugs cupboard should also be from an essential circuit. All critical infrastructure including security, communication, clock and alarm systems should be supplied from essential circuits.

**Specialist security, alarm and communication systems**

8.114 Given the nature of the care provided in CCAs, these areas contain a number of specialist security, alarm and communication systems. In developing the scope for each system, designers should work closely with the project team to identify the operational philosophy of each system and how it will interact or impact upon other systems. Designers should agree with the project team how these systems will operate in special circumstances, including mains failure and fire alarm conditions.

8.115 This information should be collated into a comprehensive document outlining the communication strategy for the CCA, to ensure that the fixed installation and operational policies and procedures for staff support the delivery of effective patient care. The following information is provided on individual systems that may form part of this overall communication strategy.

**Entrance door security system**

8.116 A door security intercommunication system is required between the communications base and entrance to the ward to prevent unauthorised entry, while permitting the free movement of staff. The system should enable verbal communication with the reception/
certain clerical office. An electromagnetically operated door lock should be also controlled from this area.

8.117 An override, located inside the entrance, is required to provide staff with a convenient exit route for normal work or in the event of fire. As a back-up, an emergency break glass override should also be provided adjacent to the final exit door or any other electronically locked door. Consideration should be given to the integration of this facility with the whole-site security systems, including security passes with proximity card facilities. A separate locking device is required.

**Personal alarm transmitters**

8.118 Local security policies should determine at the planning stage whether or not staff are to be issued with personal alarm transmitters. If personal alarm transmitters are not “self-contained”, conduits and accommodation for transmitting and receiving equipment and propagating devices, such as induction loops and/or aerials, are required to suit the selected system. The design of the system should be agreed with the project team to ensure that the risk of inappropriate operation (missed or false calls) and adverse interaction with other equipment systems in the CCA is minimised.

8.119 The location of warning indication should be agreed with the project team and reflect whole-site security policy. Facilities for the off-line testing of transmitters should be provided to enable staff to check while in the department that their transmitter is fully operational.

8.120 Where operational policies require the transmitters to remain within the department, facilities should be provided for their safe storage under constant monitoring and for the provision of sufficient spare devices to enable maintenance of units to be undertaken without prejudice to staff security.

**Security alarms**

8.121 It may be necessary to install a security alarm-actuating switch or button unobtrusively at the reception desk and communications base. It should be connected to a continuously staffed area such as the hospital telephone switchboard or the porter’s room. Guidance should be sought from the project team and end-users on the location, operation and function of this facility.

**Staff/staff call systems**

8.122 A visual and audible indication of operation should be provided to give responding staff unambiguous identification of the call source. Further guidance on staff/staff call systems is contained in HTM 2015 ‘Bedhead services’ (NHS Estates, 1994). The type of call system should be agreed with the project team.

Selection of equipment should reflect whole-site policy on call systems and it should be possible to integrate the service with bedside patient entertainment/information systems.

**Staff location and emergency systems**

8.123 A separate pull–push switch should be located at each medical supply unit to initiate special emergency (CRASH) group call arrangements to predetermined receivers. These pull–push switches should form part of the staff/staff call system and should override existing calls on the system. The emergency group call system should interface with the paging system to ensure automatic paging of predetermined receivers without involving the telephone operator. The interface module (emergency call to the paging system) should be located in the CCA’s switchcupboard and should be hard-wired to the paging system decoder(s) located in the telephone operator’s room. Further guidance on staff location and emergency systems is contained in HBN 48 ‘Telephone services’ (NHS Estates, 1997).

**Telephone wiring**

8.124 Central telephone facilities for internal and external calls are normally available and should be extended to serve the CCA. Telephones are normally of the desk pattern, except for those located on medical supply units. They should be fitted with muting switches and visual indicators.

8.125 At least one ex-directory line should connect directly with the local ambulance services control centre, depending on local policy. It should be located in the communications base and have a visual indicator.

8.126 Outlets and acoustic hoods should be provided for fixed payphones for the use of staff and visitors, located to meet the requirements of the Disability Discrimination Act 1995. The handset of payphones should be fitted with an inductive coupler to assist people using a hearing aid.

8.127 Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is contained HBN 48 ‘Telephone services’ (NHS Estates, 1997) and HTM 2055 ‘Telecommunications (telephone exchanges)’ (NHS Estates, 1994).

**Data and equipment links**

8.128 Conduits are required for cables to interconnect electronic equipment. The extent to which these conduits should link all workstations in this facility and the main hospital system or elsewhere depends on the local policy for automatic data-processing. Conduits may also be required to link CCTV between the control areas and treatment areas/offices.
CCTV

8.129 Security CCTV may be required to interface to the whole hospital system. The interference to which such equipment may be subject should be taken into account when it is specified, to ensure acceptable electromagnetic compatibility. Care should be taken in the positioning of monitors in order to preserve patient privacy.

Physiological monitoring equipment

8.130 Conduits for automated physiological monitoring should be provided at each bed space and communications base. A separate conduit/trunking network is required to avoid electrical interference.

Clocks

8.131 Clocks may be of impulse, synchronous or battery/quartz type, except in any bed space areas where they should display "real time", "elapsed time" and have a sweep second hand.

Music and television

8.132 Conduits for television/video and background music system outlets should be provided to public areas and bedheads.

Lightning protection

8.133 Protection of the building against lightning should be provided in accordance with HTM 2007 ‘Electrical services supply and distribution’ (NHS Estates, 1993) and BS 6651.

INTERNAL DRAINAGE

8.134 The primary objective is to provide an internal drainage system that:

- uses the minimum of pipework;
- remains watertight and airtight at joints and connectors; and
- is sufficiently ventilated to retain the integrity of water seals.

8.135 The design of internal drainage should comply with the relevant British Standards and Codes of Practice, including BS EN 12056-2, and the current building regulations. Recommendations for spatial and access requirements for public health engineering services are contained in HTM 2023 (NHS Estates, 1995) and CIBSE Guide G, ‘Public health engineering’ by the Chartered Institute of Building Services Engineers (1995).

8.136 The gradient of branch drains should be uniform, and adequate to convey the maximum discharge to the stack without blockage. Practical considerations, such as available angles of bends, junctions and their assembly, as well as space considerations, usually limit the minimum gradient to about 1:50 (20 mm/m). For larger pipes, for example those with a 100 mm diameter, the gradient may be less, but this requires workmanship of a high standard if an adequate self-cleaning flow is to be maintained. It is not envisaged that pipes with a diameter greater than 100 mm will be required within inter-floor or ground floor systems serving this facility.

8.137 Provision for inspection, rodding and maintenance should ensure “full bore” access and be located to minimise disruption or possible contamination – where possible, outside clinical areas. Manholes should not be located within this facility.

Operational considerations

8.138 Maintenance problems may arise as a result of misuse of the system, for example disposal of paper towels down WCs. Appropriate disposal facilities should therefore be provided.

TRANSFER OF EQUIPMENT TO INSTALLATION SITE

8.139 The method used to bring diagnostic equipment into a department may need to be carefully considered. Although the majority of diagnostic imaging equipment is broken down into modules for transportation and then re-assembled on site, these modules can be large and in some cases have masses that exceed 1–2 tonnes. The equipment is usually transferred in wooden crates, which has the effect of increasing the overall dimensions. Architects and estates managers should therefore consider at an early stage how the equipment will be transferred to the proposed site. Care needs to be taken over the width and height of doors, loading specifications for floors and the turning circles of equipment.
9.0 Cost information

9.1 For all types of health building, it is important that building costs and revenue expenditure are kept as low as possible and consistent with acceptable standards. In applying the guidance in this document to determine a detailed design, the need for economy should always be of prime concern, and the activities should be carefully considered so that, where appropriate, space can be shared for similar activities which are programmed to take place at different times. The solution should not be detrimental to the proper functioning of the spaces involved nor to the needs of the users. Within this general context, NHS Estates’ guidance provides a synopsis of accommodation for health buildings which the Department of Health recommends for the provision of a given service.

DEPARTMENTAL COST ALLOWANCE GUIDES

9.2 Departmental Cost Allowance Guides (DCAGs) related to this HBN are officially notified in ‘Quarterly Briefing’, published by NHS Estates. A full listing of all DCAGs is published in the ‘Healthcare Capital Investment’ document, a hard copy of which can be obtained from NHS Estates; copies can also be downloaded from http://www.nhsestates.gov.uk. Further information on this can be obtained from NHS Estates; telephone 0113 254 7000.

9.3 The attention of the project team is drawn to guidance given in the Capital Investment Manual (Business Case Guide) published by The Stationery Office. This publication seeks to reflect the important changes that have taken place over recent years, both with the introduction of the NHS reforms and with the changing patterns of healthcare delivery. This new process is intended to reduce unnecessary and often expensive planning work that may subsequently prove to be abortive, and emphasises the necessity for a sound business case in support of both the capital and the revenue expenditure involved. The Capital Investment Manual also states that the capital works estimate of the intended scheme should be based, wherever applicable, on industry norms such as the DCAGs plus a percentage to cover for on-costs.

9.4 The DCAGs for this HBN reflect the total building and engineering requirements and accommodation that the CCA will require when incorporated into an acute general hospital where the common use of services will be available. Costs are based on a typical two-storey new-build unit, on a greenfield site with no planning constraints.

9.5 DCAGs are exclusive of VAT, building and planning fees and all Local Authority charges, and are based on a Location Factor of 1.

ON-COSTS

9.6 It is important to bear in mind that an allowance for on-costs should be added to the DCAGs for all units, this element being for external works, external engineering services and abnormals etc. The abnormals will largely be determined by the characteristics of the site, such as an inner-city location or poor ground conditions, or the condition and type of the existing building if refurbishment is the only option.

9.7 It is important that project teams should assess at the earliest opportunity all the likely on-cost implications of individual sites and schemes.

LOCATIONAL FACTORS

9.8 Locational factor adjustments may be applied to the works costs (that is, the total of the DCAGs plus established on-costs) to take into account the local market conditions. For further information regarding these, please refer to the latest regional location factors in ‘Quarterly Briefing’, published by NHS Estates.

SCHEDULES OF ACCOMMODATION

9.9 The schedules of accommodation listed at the end of this section have adopted a modular approach to the planning of appropriate units to enable project teams to “pick and mix” those facilities that are required.

9.10 Using this modular approach, examples have been built up for 8-, 12- and 16-bed CCAs. The areas given are for guide purposes only and will alter depending on the design solution. DCAGs have been calculated using the example units as a cost base.

9.11 The schedules are split into three distinct elements: schedules of space types; schedules of suites/modules; and departmental examples.
Schedules of space types

9.12 This lists all space types and major options covered by the document, giving a range of provision, when appropriate, together with a nominal area. These are grouped by the functional use of the spaces. Further details of these spaces will be available in an updated version of Activity Database.

Schedules of suites/modules

9.13 This lists functional groupings of spaces. These form complete suites/modules of accommodation and can be provided either separately or as grouped accommodation with shared supporting accommodation. Suites/modules are functional associations and not physical groupings.

9.14 Accommodation solely related to a particular suite/module is listed under the core requirement for that suite/module while accommodation that can either be provided for a particular suite/module or shared between two or more suites/modules is listed under essential complementary/shared accommodation (ECA). The area allowance given may form part of a larger activity area. Where there is an option to include accommodation within a suite/module or a major option on how that accommodation is provided, it is listed under optional accommodation. These schedules include the appropriate nominal area taken from the schedule of room/space types above, together with a suggestion for the number of spaces required.

9.15 Percentage allowances covering planning, engineering and circulation are also included in the totals. These percentage increases to the nominal areas are included in the ECA and optional gross area allowances.

9.16 The functional groups used for this document are as follows:

- basic 8-bed cluster clinical accommodation and support accommodation;
- additional 4-bed clinical accommodation and support accommodation;
- visitors’ accommodation;
- relatives’ overnight stay accommodation: single suite;
- relatives’ overnight stay accommodation: family suite.

9.17 The modules for coronary care units are set out in HBN 28 ‘Facilities for Cardiac Services’ (NHS Estates, 2001).

Departmental examples

9.18 These schedules show example notional whole department accommodation to highlight the scope for sharing accommodation. The examples are not to be taken as ideal provision for any particular project.

9.19 The examples included are as follows:

- 8-bed CCA;
- 12-bed CCA;
- 16-bed CCA.

DIMENSIONS AND AREAS

9.20 In determining spatial requirements, the essential factor is not the total area provided but the critical dimensions, that is, those dimensions critical to the efficient functioning of the activities which are to be carried out. To assist project teams in preparing detailed design solutions for the rooms and spaces, studies have been carried out to establish dimensional requirements in the form of critical dimensions. The results of these studies appear as ergonomic diagrams in HBN 40 Volumes 1–4 (NHS Estates, 1995).

9.21 For development planning and at the earliest stage of a design, it may be convenient for designers to have data available which will enable them to make an approximate assessment of the sizes involved. For this reason, the areas prepared for the purpose of establishing the cost allowances are listed in the schedules of accommodation at the end of this chapter.

9.22 It is emphasised that the areas published do not represent recommended sizes, nor are they to be regarded in any way as specific individual entitlements.

9.23 Planning of the building efficiently may also necessitate variation of areas. For instance, in the refurbishment or conversion of older property:

a. rooms tend to be larger than the recommended area;
b. some rooms may be too small or in the wrong location for efficient use;
c. circulation space tends to form a larger than normal proportion of the total area.

CIRCULATION

9.24 Space for circulation, that is, all internal corridors, small vertical ducts and spaces occupied by partitions and walls, is included.

9.25 Provision is also made for a 5% planning zone and a 3% addition for an engineering zone adjacent to the external walls. These areas are all included and therefore costed in the DCAGs.

9.26 It is also important to remember that the circulation figures included in the DCAGs for this type of
accommodation are those anticipated for new purpose-built premises with no constraints. Where constraints are encountered, for example in refurbishment or conversion of older types of property, this circulation figure would be likely to increase accordingly, and therefore some adjustment may be necessary to the circulation figure.

COMMUNICATIONS

9.27 Staircases and lifts are not included in the DCAGs relevant to the CCA. Costs related to these elements, along with a suitable space allowance, should be made in the on-costs.

LAND COSTS

9.28 As is the norm for DCAGs, costs are exclusive of all land costs and associated fees. However, the project team’s attention is drawn to the fact that costs associated with these should be included in the business case submission, all as detailed in the Capital Investment Manual, and could therefore be an important part of the overall cost viability of the scheme.

ENGINEERING SERVICES

9.29 The following engineering services, as described in Chapter 8 and exemplified in the Activity Data, are included in the cost allowances. Primary engineering services are assumed to be conveniently available at the boundary of the department.

Mechanical services

a. heating – low-pressure hot water system;
b. ventilation – mechanical supply and extract to all clinical areas and areas requiring extract owing to type of room, that is, WCs, showers etc;
c. a share of the ventilation plant and central refrigeration is included in the cost allowance;
d. cold water service – centrally supplied to service points including drinking water. Storage tanks are excluded;
e. hot water service – supplied from a central system; storage and generation is excluded;
f. piped medical gases and scavenging to each bed;
g. water for dialysis and nitric oxide are not included in the costs.

Electrical services

a. departmental distribution boards;
b. general lighting as required by task;
c. emergency luminaires as appropriate;
d. socket-outlets and other power outlets for fixed and portable equipment;
e. UPS supplies and equipment;
f. fire alarm system;
g. television/radio wireways only;
h. staff/staff and patient/staff call system;
j. telephone internal cabling distribution and outlets – handsets are excluded;
k. data wireways only included.

Equipment (Group 1)

a. water boiler;
b. service beams with articulated medical supply units at each bed which incorporate medical gas and vacuum outlets together with electrical sockets and nurse call.
## CRITICAL CARE ROOM/SPACE TYPE SCHEDULE

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## CRITICAL CARE SUITE/MODULE TYPE SCHEDULES

### BASIC 8-BED CLUSTER CLINICAL ACCOMMODATION AND SUPPORT ACCOMMODATION

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### OPTIONAL ACCOMMODATION

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#### CORE REQUIREMENT

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<td>Paragraph 7.22</td>
</tr>
<tr>
<td>Gowning lobby: single bedroom</td>
<td>2</td>
<td>6.0</td>
<td>12.0</td>
<td>Paragraph 7.24</td>
<td>Paragraph 7.24</td>
</tr>
<tr>
<td>Bed area: single bay module</td>
<td>2</td>
<td>25.5</td>
<td>51.0</td>
<td>Paragraph 7.17</td>
<td>Paragraph 7.17</td>
</tr>
<tr>
<td>Communications base: enclosed; 1 additional place</td>
<td>1</td>
<td>4.0</td>
<td>4.0</td>
<td>Paragraph 7.13</td>
<td>Paragraph 7.13</td>
</tr>
<tr>
<td><strong>UTILITY/CLINICAL AREA SUPPORT FACILITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean utility (including blood bank area)</td>
<td>1</td>
<td>8.0</td>
<td>8.0</td>
<td>Paragraph 7.33</td>
<td>Additional area</td>
</tr>
<tr>
<td>Dirty utility/urine testing area/equipment cleaning</td>
<td>1</td>
<td>9.0</td>
<td>9.0</td>
<td>Paragraph 7.35</td>
<td>Additional area</td>
</tr>
<tr>
<td>Disposal hold</td>
<td>1</td>
<td>5.0</td>
<td>5.0</td>
<td>Paragraph 7.39</td>
<td>Additional area</td>
</tr>
<tr>
<td><strong>STORAGE/HOLDING FACILITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Store: Bulk supplies</td>
<td>1</td>
<td>6.0</td>
<td>6.0</td>
<td>Paragraph 7.40</td>
<td>Additional area</td>
</tr>
<tr>
<td>Store: Clinical equipment</td>
<td>1</td>
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<td>9.0</td>
<td>Paragraph 7.46</td>
<td>Additional area</td>
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<tr>
<td>Equipment service room</td>
<td>1</td>
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<td>Paragraph 7.47</td>
<td>Additional area</td>
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<td>Store: Furniture</td>
<td>1</td>
<td>9.0</td>
<td>9.0</td>
<td>Paragraph 7.45</td>
<td>Additional area</td>
</tr>
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<td><strong>STAFF FACILITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office: 2 place; clinical staff/IT resource room</td>
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<td>13.0</td>
<td>Paragraph 7.66</td>
<td>Additional places</td>
</tr>
<tr>
<td>Staff restroom/dining: 10 place</td>
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<td>10.0</td>
<td>10.0</td>
<td>Paragraph 7.55</td>
<td>Additional places</td>
</tr>
<tr>
<td>Staff changing: 20 place</td>
<td>2</td>
<td>9.0</td>
<td>18.0</td>
<td>Paragraph 7.51</td>
<td>Additional places</td>
</tr>
<tr>
<td>Staff WC.</td>
<td>2</td>
<td>2.0</td>
<td>4.0</td>
<td>Paragraph 7.51</td>
<td>Additional places</td>
</tr>
<tr>
<td><strong>Net allowance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5% planning allowance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3% engineering allowance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33% circulation allowance</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total allowance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net allowance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
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<td><strong>Total allowance</strong></td>
<td></td>
<td></td>
<td></td>
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<td>313.0</td>
</tr>
</tbody>
</table>

#### ESSENTIAL COMPLEMENTARY/SHARED ACCOMMODATION

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Gross area</th>
<th>Paragraph reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
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#### OPTIONAL ACCOMMODATION

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Gross area</th>
<th>Paragraph reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### VISITORS’ ACCOMMODATION

#### CORE REQUIREMENT

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Total area</th>
<th>Paragraph reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors’ foyer</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Circulation allowance</td>
</tr>
<tr>
<td>Reception desk/office: 4 place</td>
<td>1</td>
<td>20.0</td>
<td>20.0</td>
<td>Paragraph 7.12</td>
<td></td>
</tr>
<tr>
<td>Visitors’ waiting area: 10 place, incl. 1 wheelchair place</td>
<td>1</td>
<td>16.5</td>
<td>16.5</td>
<td>Paragraph 7.10</td>
<td></td>
</tr>
<tr>
<td>Visitors’ WC: disabled/wheelchair user</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
<td>Paragraph 7.10</td>
<td></td>
</tr>
<tr>
<td>Telephone area: single booth, low height</td>
<td>1</td>
<td>2.0</td>
<td>2.0</td>
<td>Paragraph 7.10</td>
<td></td>
</tr>
<tr>
<td>Relatives’ interview room</td>
<td>1</td>
<td>9.0</td>
<td>9.0</td>
<td>Paragraph 7.59</td>
<td></td>
</tr>
<tr>
<td>Relatives’ en-suite WC (disabled/wheelchair)</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
<td>Paragraph 7.59</td>
<td></td>
</tr>
<tr>
<td>Relatives’ sitting room: 10 place</td>
<td>1</td>
<td>13.5</td>
<td>13.5</td>
<td>Paragraph 7.60</td>
<td></td>
</tr>
<tr>
<td>Relatives’ pantry/beverage facilities</td>
<td>1</td>
<td>6.0</td>
<td>6.0</td>
<td>Paragraph 7.61</td>
<td></td>
</tr>
</tbody>
</table>

Net allowance: 76.0

5% planning allowance: 4.0

Total: 80.0

3% engineering allowance: 2.5

30% circulation allowance: 24.0

Total allowance: 106.5

#### ESSENTIAL COMPLEMENTARY/SHARED ACCOMMODATION

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Gross area</th>
<th>Paragraph reference</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Entrance: Combined</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>Paragraph 7.8</td>
<td>Circulation allowance</td>
</tr>
</tbody>
</table>

#### OPTIONAL ACCOMMODATION

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Gross area</th>
<th>Paragraph reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrance: Visitors</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Paragraph 7.8</td>
<td>Circulation allowance</td>
</tr>
<tr>
<td>Supplementary waiting area</td>
<td>1</td>
<td>9.0</td>
<td>13.0</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Relatives’ sitting room: 15 place</td>
<td>1</td>
<td>20.0</td>
<td>27.0</td>
<td>Paragraph 7.60</td>
<td></td>
</tr>
<tr>
<td>Vending machine bay</td>
<td>1</td>
<td>3.0</td>
<td>4.0</td>
<td>–</td>
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</tbody>
</table>
### RELATIVES’ OVERTNIGHT STAY ACCOMMODATION: SINGLE SUITE

#### CORE REQUIREMENT

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Total area</th>
<th>Paragraph reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatives’ overnight stay: Single bedroom</td>
<td>1</td>
<td>11.0</td>
<td>11.0</td>
<td>Paragraph 7.58</td>
<td></td>
</tr>
<tr>
<td>Relatives’ overnight stay: En-suite shower/WC/wash</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
<td>Paragraph 7.58</td>
<td></td>
</tr>
</tbody>
</table>

Net allowance 15.5

5% planning allowance 1.0
Total 16.5
3% engineering allowance 0.5
27.5% circulation allowance 4.5

Total allowance 21.5

#### ESSENTIAL COMPLEMENTARY/SHARED ACCOMMODATION

None

#### OPTIONAL ACCOMMODATION

None

### RELATIVES’ OVERTNIGHT STAY ACCOMMODATION: FAMILY SUITE

#### CORE REQUIREMENT

<table>
<thead>
<tr>
<th>Activity space</th>
<th>Quantity</th>
<th>Area</th>
<th>Total area</th>
<th>Paragraph reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatives’ overnight stay: Family sitting room</td>
<td>1</td>
<td>10.0</td>
<td>10.0</td>
<td>Paragraph 7.58</td>
<td></td>
</tr>
<tr>
<td>Relatives’ overnight stay: Family bedroom</td>
<td>1</td>
<td>12.0</td>
<td>12.0</td>
<td>Paragraph 7.58</td>
<td></td>
</tr>
<tr>
<td>Relatives’ overnight stay: En-suite shower/WC/wash</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
<td>Paragraph 7.58</td>
<td></td>
</tr>
</tbody>
</table>

Net allowance 26.5

5% planning allowance 1.5
Total 28.0
3% engineering allowance 1.0
27.5% circulation allowance 7.5

Total allowance 36.5

#### ESSENTIAL COMPLEMENTARY/SHARED ACCOMMODATION

None

#### OPTIONAL ACCOMMODATION

None
### CRITICAL CARE AREA EXAMPLE SCHEDULES

<table>
<thead>
<tr>
<th>Activity space</th>
<th>8-bed area</th>
<th>12-bed area</th>
<th>16-bed area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENTRANCE/RECEPTION/ADMINISTRATION FACILITIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrance: Combined</td>
<td>1</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Visitors’ foyer</td>
<td>1</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Visitors’ waiting area: 10 place</td>
<td>1</td>
<td>16.5</td>
<td>1</td>
</tr>
<tr>
<td>Visitors’ waiting area: 15 place</td>
<td>1</td>
<td>25.5</td>
<td>3</td>
</tr>
<tr>
<td>Visitors’ WC: disabled/wheelchair user</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Telephone area: single booth, low height</td>
<td>1</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Reception desk/office: 4 place</td>
<td>1</td>
<td>20.0</td>
<td>20.0</td>
</tr>
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<td><strong>FAMILY AND FRIENDS’ FACILITIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relatives’ interview room</td>
<td>1</td>
<td>9.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Relatives’ en-suite WC (disabled/wheelchair)</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Relatives’ sitting room: 10 place</td>
<td>1</td>
<td>13.5</td>
<td>2</td>
</tr>
<tr>
<td>Relatives’ sitting room: 15 place</td>
<td>1</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Relatives’ pantry/beverage facilities</td>
<td>1</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>CLINICAL AREAS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bed area: single room; access via gowning lobby</td>
<td>4</td>
<td>26.0</td>
<td>104.0</td>
</tr>
<tr>
<td>Gowning lobby: single bedroom</td>
<td>4</td>
<td>6.0</td>
<td>24.0</td>
</tr>
<tr>
<td>Bed area: multi-bay; 4 bays</td>
<td>1</td>
<td>140.0</td>
<td>140.0</td>
</tr>
<tr>
<td>Bed area: multi-bay; 6 bays</td>
<td>1</td>
<td>200.0</td>
<td>200.0</td>
</tr>
<tr>
<td>Communications base: enclosed; 2 place</td>
<td>1</td>
<td>11.0</td>
<td>2</td>
</tr>
<tr>
<td>Communications base: enclosed; 3 place</td>
<td>1</td>
<td>15.0</td>
<td>2</td>
</tr>
<tr>
<td><strong>UTILITY/CLINICAL AREA SUPPORT FACILITIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean utility (including blood bank area)</td>
<td>1</td>
<td>17.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Laboratory: Status</td>
<td>1</td>
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</tr>
<tr>
<td>Dirty utility/urine testing area</td>
<td>1</td>
<td>18.0</td>
<td>18.0</td>
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<tr>
<td>Disposal hold</td>
<td>1</td>
<td>10.0</td>
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</tr>
<tr>
<td>Housekeeper’s (cleaner’s) room</td>
<td>1</td>
<td>7.0</td>
<td>7.0</td>
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<tr>
<td>Patients’ pantry (cook–chill)</td>
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<td>12.0</td>
<td>12.0</td>
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<tr>
<td>Assisted bathroom/WC</td>
<td>1</td>
<td>14.0</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>STORAGE/HOLDING FACILITIES</strong></td>
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<td></td>
</tr>
<tr>
<td>Store: Bulk supplies</td>
<td>1</td>
<td>21.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Store: Clinical equipment</td>
<td>1</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Equipment service room</td>
<td>1</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Linen bay/store</td>
<td>1</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Store: Furniture</td>
<td>1</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Mobile imaging equipment bay (X-ray and ultrasound)</td>
<td>1</td>
<td>8.0</td>
<td>8.0</td>
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<tr>
<td>with image intensifiers</td>
<td>2</td>
<td>1.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Note**: The total area for each facility is calculated by multiplying the quantity by the area. The total area for each facility is the sum of the quantities of all activities within that facility.
### STAFF FACILITIES

**Office: Clinical director**  
- Quantity: 1  
- Area: 10.5 m²  
- Total area: 10.5 m²

**Office: Manager**  
- Quantity: 1  
- Area: 10.5 m²  
- Total area: 10.5 m²

**Office: 4 place; clinical staff**  
- Quantity: 2  
- Area: 24.0 m²  
- Total area: 24.0 m²

**Office: 6 place; clinical staff**  
- Quantity: 1  
- Area: 36.0 m²  
- Total area: 36.0 m²

**Office: 2 place; Outreach**  
- Quantity: 1  
- Area: 13.0 m²  
- Total area: 13.0 m²

**Office: 2 place; teaching and research staff**  
- Quantity: 1  
- Area: 13.0 m²  
- Total area: 13.0 m²

**Meeting/interview room (6 person)**  
- Quantity: 1  
- Area: 14.0 m²  
- Total area: 14.0 m²

**Staff restroom/dining: 15 place**  
- Quantity: 1  
- Area: 20.0 m²  
- Total area: 20.0 m²

**Staff restroom/dining: 25 place**  
- Quantity: 1  
- Area: 30.0 m²  
- Total area: 30.0 m²

**Staff pantry/beverage area**  
- Quantity: 1  
- Area: 6.0 m²  
- Total area: 6.0 m²

**Staff changing: 20 place**  
- Quantity: 1  
- Area: 16.0 m²  
- Total area: 16.0 m²

**Staff changing: 30 place**  
- Quantity: 1  
- Area: 20.0 m²  
- Total area: 20.0 m²

**Staff changing: 40 place**  
- Quantity: 1  
- Area: 25.0 m²  
- Total area: 25.0 m²

**Staff changing: 50 place**  
- Quantity: 1  
- Area: 30.0 m²  
- Total area: 30.0 m²

**Staff changing: 60 place**  
- Quantity: 1  
- Area: 35.0 m²  
- Total area: 35.0 m²

**Staff shower**  
- Quantity: 4  
- Area: 2.5 m²  
- Total area: 10.0 m²

**Staff WC**  
- Quantity: 6  
- Area: 2.0 m²  
- Total area: 12.0 m²

**Seminar/training room: 20 place**  
- Quantity: 1  
- Area: 37.5 m²  
- Total area: 37.5 m²

**Seminar/training room: 30 place**  
- Quantity: 1  
- Area: 52.5 m²  
- Total area: 52.5 m²

**On-call room: Office/bedroom**  
- Quantity: 1  
- Area: 13.0 m²  
- Total area: 13.0 m²

**On-call room: En-suite shower/WC/wash**  
- Quantity: 1  
- Area: 5.0 m²  
- Total area: 5.0 m²

### ENGINEERING FACILITIES

**Switchcupboard**  
- Quantity: 1  
- Area: 2.0 m²  
- Total area: 2.0 m²

**Battery/UPS room**  
- Quantity: 1  
- Area: 9.0 m²  
- Total area: 9.0 m²

**Net allowance**  
- Total: 760.5 m²

**5% planning allowance**  
- Total: 38.0 m²

**Total**  
- Total: 798.5 m²

**3% engineering allowance**  
- Total: 24.0 m²

**30% circulation allowance**  
- Total: 239.5 m²

**Total allowance**  
- Total: 1062.0 m²
Appendix 1  Consumerism

This information is reproduced from “Quarterly Briefing” Volume 11 Number 3 02/2002.

NEW HEALTHCARE CAPITAL INVESTMENT DEPARTMENT COST ALLOWANCE GUIDE

Version 2.0 of the Healthcare Capital Investment (HCI) document was released in November 2001 with revised Departmental Cost Allowance Guides (DCAGs) which take into account the principles of “consumerism” in order to produce a better patient environment.

What is “consumerism”?

Consumerism is the overarching concept of looking after the needs and desires of patients and visitors in NHS hospitals and clinics. It is about providing a service which recognises and meets the expectations of the individual, rather than a generic group. Consumerism is about anticipating needs and delivering consistently high levels of service which satisfy those needs.

Why is it such a key issue for the NHS?

Modernisation is a key element of the Government’s approach to public service. The Government’s plans for the NHS were outlined in the landmark NHS Plan, which was published in July 2000.

The NHS Plan is the response to the views expressed by patients, visitors and staff on how hospitals could be improved. The Plan sets out a major programme for investment and reform. It puts the patient experience at the heart of delivering healthcare. Patients consulted as part of the NHS Plan made it clear that they expected their care to be delivered in a warm, clean and welcoming environment.

Why review DCAGs?

This consumerism-focused DCAG review identifies the capital costs associated with patient expectations and updates the DCAGs in the “Healthcare Capital Investment Version 1.0” (HCI) document published as a supplement to ‘Quarterly Briefing’ Volume 7 No 1 1997/98.

This updating is necessary, as the Version 1.0 HCI document was published in 1997 and does not provide an adequate reflection of the costs of Government initiatives to meet these patient expectations. The overall effect on the capital costs of schemes will vary depending on the type of facility. As an example, the increase in overall capital cost of an acute hospital could be in the range of 12–13%.

Precisely which criteria are covered in this review?

What is included?

After careful consideration by a multidisciplinary team drawn from both the public and private sectors, ten headline consumerism criteria (itemised A to J below) based on 36 patient “needs and desires” were ultimately identified and assessed in relation to existing Health Building Notes (HBNs).

These consumerism criteria are described below.

A Privacy and Dignity

A1 Greater assurance of privacy and dignity

A2 Women-only Day Rooms

B Quality of Environment

B3 Higher specifications of fabric, finishes and service installations to reduce risk of backlog maintenance, thereby encouraging perception of quality facilities and care in ownership

B4 Natural light

B5 Natural ventilation

B6 Zero discomfort from solar gain

B7 Clean Wards/Recovery Bays

B8 All medical equipment, consumables and linen discreetly stored

B9 All clinical waste safely and discreetly stored

B10 Interiors that instil a sense of quality, care, restfulness and cheerfulness and that work to create a healing environment

B11 Artwork installed as an essential characteristic of the healing environment; including enhancements to building fabric and specialist commissions (for example decorative lighting, stained glass, murals)
C Patient Accommodation

C12 Rationalisation of bed space configurations to a ratio of 50% or greater of single beds to multi-bed bay ward accommodation

C13 Single-sex washing and toilet facilities

C14 Adequate shower/bathing facilities in In-Patient Departments where full en-suite facilities are not a design objective

C15 Improved relatives’/patients’ overnight stay facilities and increased supply to meet demand

C16 Increased relatives’ overnight stay facilities adjacent to Critical Care Wards

C17 More space around beds to accommodate visitors in comfort without instilling sense of crowding and to engender the patients’ sense of spatial volume/airiness

D Entrances, Reception and Waiting

D18 Improved Waiting Areas

D19 Ward foyers as focal point for arrival for visitors

D20 Improved Main Entrances, Departmental Entrances and Reception points

E Security and Safety

E21 Safe and accessible storage of belongings and cash

E22 Immediate access by patients to call points for summoning assistance

E23 Secure facilities that instil a sense of safety and security of possessions

F Barrier Free Access

F24 No physical or operational barriers to the disabled

F25 Clear multi-cultural signage/wayfinding that is non-institutional in character

G Patient Control of Environment

G26 Patient control of personal ambient environmental temperature

G27 Task lighting at the bedhead/bedside conducive to reading and close work

G28 Controllable lighting levels delivered from high-quality non-institutional style luminaires

H Catering

H29 Easy access to vending machines

H30 Better food, prepared and served in adherence to a clear hospital food, nutrition and health policy

I Patient Advocacy

I31 Inclusion of Patient Advocate’s Room

J Information and Communication

J32 Meeting the requirements of “Patient Power” by accommodating integrated bedside communication and entertainment systems

J33 Easy access to (public) telephones

J34 Fully informed patients, relatives and visitors

J35 Access to multi-lingual reading material for relaxation, including special needs material in large print or Braille

J36 Access to personal health records

Exclusions

The new DCAGs reflect consumerism and exclude other developments such as changes in clinical practice. They are based at a Median Index of Public Sector Building Tender Prices (MIPS) Fixed Price Index Level of 325.

There is an ongoing publications programme which will encompass these and other developments in future reviews of both existing guidance and the production of new guidance. In particular, revised schedules of accommodation are being produced concurrently with this consumerism review to clarify further its impact on each affected Health Building Note (HBN). The HCI document contains a matrix detailing which HBNs and which areas are most affected.

What is the overall cost effect of the Consumerism DCAG review?

The overall cost effect will vary according to a variety of factors, including the type of facility, its functional content and departmental mix/proportions.

The increase in DCAGs will also reduce historical benchmark values of On-Costs as a percentage of Departmental Costs (for example typically 70% in relation to an acute hospital).

Version 2.0 of the Healthcare Capital Investment (HCI) document is available in downloadable format from our website on http://www.nhsestates.gov.uk

Important note

Additions and changes to the HCI document will be highlighted in future issues of ‘Quarterly Briefing’. The website version will be changed accordingly. It is therefore the responsibility of users of the HCI document to ensure that they make reference to the latest version.
For general information on DCAGs please contact either:

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There are substantial differences between this guidance and its predecessor HBN 27. These are listed below and are based on evidence from a series of visits to CCAs made by the Working Group, the responses obtained from a postal survey of existing ICUs and HDUs, the views of the Reference Group, the strategy outlined in the NHS Plan and the experiences of critically ill patients, their families and friends.

1. ‘Comprehensive Critical Care’ (DoH, 2000) does not differentiate between the terms “intensive care units”, “intensive therapy units” and “high-dependency units”. The generic terms “critical care areas” and “critical care facilities” may be used to describe such units. Descriptive terms “high-dependency” and “intensive care” used to describe severity of illness have been superseded by a system describing comparable levels of patient dependency – level 2 and level 3 (level 1 equates to ward care). See Appendix 3 for the classification of critical care patients. This guidance has adopted this nomenclature.

2. In a new building, all bespoke critical care facilities should be co-located with the support facilities such as operating theatres, A&E departments, laboratories and imaging suites. In the refurbishment of an existing building, the same principles of co-location should be followed wherever possible.

3. The guidance focuses on developing a template for an eight-bed module, but a flexible approach has been taken in order to enable decisions about the total number of bed spaces to be left to local providers. The guidance differs from HBN 27 in that the support facilities required to accommodate staff and equipment have increased on a pro-rata basis.

4. HBN 27 produced guidance based on the assumption that the average unit occupancy was 65% and the average length of stay for each patient was “up to 48 hours”. Both these assumptions have proved subsequently to be under-estimates.

5. This new guidance does not differentiate between the facilities required for HDUs and ICUs. Every CCA should be built and equipped to accommodate both level 2 and level 3 patients because a patient’s level of dependency may vary during an episode of critical illness. In ‘Comprehensive Critical Care’, level 3 patients are described as those “requiring advanced respiratory support alone, or basic respiratory support together with support of at least two organ systems”. Level 2 patients are less dependent than those classified as level 3 but “require more detailed observation or intervention, including support for a single failing organ system or post-operative care” (see Appendix 3). Although these definitions of level 2 and level 3 patients have not yet finally been agreed between the experts, this does not pose any difficulty, as the facilities required for both groups are exactly the same.

The differentiation between CCAs in a teaching hospital and a district general hospital has been abolished in this guidance. The rationale for this decision is based on the finding that the case mix, severity of illness and the staff establishment (including the transient student population) are similar in both types of hospital.
Appendix 3  Classification of critical care patients

11. Critical care is provided within the continuum of primary, secondary and tertiary care, with the majority of services delivered in the secondary care setting. We recommend that the existing division into high-dependency and intensive care based on beds be replaced by a classification that focuses on the level of care that individual patients need, regardless of location. This is an important addition to existing methods that classify patients by the level of organ support received or simply the type of bed they occupy. This approach should enhance our understanding of the provision of critical care in the NHS.

12. A supplementary classification is proposed in order to identify those patients requiring specialist investigation and treatment such as is usually provided at tertiary referral hospitals. Where patients are cared for by specialist services, one additional letter (reflecting the most significant disorder) should be applied to a patient's level of acuity as follows:

- N patients requiring neurosurgical care;
- C patients requiring cardiac surgical care;
- T patients requiring thoracic surgical care;
- B patients requiring burns or plastic surgery care;
- S patients requiring spinal unit care;
- R patients requiring renal care;
- L patients requiring liver care;
- A patients requiring other specialist care.

13. The extent to which any individual hospital provides increasing levels of care, or supplementary specialist care, depends on the skills, expertise, specialties and facilities available within the hospital. Services provided should be based on the principle of moving upwards from level 0, to the level which is appropriate to the complexity of patient care needs. For some patients it is necessary to be transferred to another hospital where more complex clinical needs can be met.

14. All acute hospitals carrying out elective surgery must be able to provide level 2 care. They should either have level 3 care available on site or they should have protocols in place to arrange transfer to a suitable unit. Hospitals admitting emergencies should normally have all levels of care available, although in a limited number of cases, protocols may be agreed for safe transfer to an adjacent hospital for level 3 care.

3. These definitions of levels of care are expanded upon in the forthcoming ICS publication ‘Levels of critical care for adult patients: Standards and guidelines’ (2002)
Accommodation for a patient requiring medical and nursing care using multi-parameter monitoring and life-support systems. Sufficient space is required around the bed for six members of staff to circulate to carry out procedures and for equipment such as mobile X-ray and haemofiltration equipment to be manoeuvred and parked and worked around.

1. Relatives’ comfortable stacking chairs that can be easily cleaned. These should be stored at the bedside but outside the 1600 zone.
2. Pendant
3. Whiteboard
4. Overhead hoist
5. Dressing trolley
6. Data pendant
7. Clinical wash-hand facilities with hands-free taps
8. Lead/uPVC protective curtain
9. HTM 71 supplies trolley

For frequent and prolonged use of a computer, staff must be able to sit to work on a standard-height, comfortable, high-backed office chair. The keyboard should be on a surface between 700 x 20 and the centre of the computer screen must be positioned at 1000 x 20 above the floor. For infrequent and brief use of a computer it is permissible for staff to stand. The keyboard should be on a surface between 1200 x 20 and the centre of the computer screen must be positioned at 1500 x 20 above the floor. Overhead pendants should be located where they are not a hazard. Head clearance for tall men is 1800; however, the maximum reach for short women is 1775, so a safe compromise on location must be reached.

Ceiling height in the clinical area is crucial. The minimum standard to underside of finished ceiling must be 3 m. An unobstructed 1000 is required around the bed to carry out procedures and park equipment. A further unobstructed 600 is required for passing around staff and equipment in the 1000 zone.

A clinical wash-hand basin with hands-free taps must be located at the front of each bed space, behind the curtain line, but so as not to cause an obstacle to the movement of equipment and staff.

The lead/uPVC curtain provides protection from radiation when taking diagnostic images and also provides adequate sound reduction and visual privacy between bays.

All bed spaces should have suitable daylight provision via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.
Accommodation for a patient requiring medical and nursing care using multi-parameter monitoring and life-support systems. Sufficient space is required around the bed for six members of staff to circulate to carry out procedures and for equipment such as mobile X-ray and haemofiltration equipment to be manoeuvred and parked and worked around.

For frequent and prolonged use of a computer staff must be able to sit to work on a standard height, comfortable, high-backed office chair. The keyboard should be on a surface between 700 ± 20 and the centre of the computer screen must be positioned at 1000 ± 20 above the floor. For infrequent and brief use of a computer it is permissible for staff to stand. The keyboard should be on a surface between 1200 ± 20 and the centre of the computer screen must be positioned at 1500 ± 20 above the floor. Overhead pendants should be located where they are not a hazard. Head clearance for tall men is 1800; however, the maximum reach for short women is 1775, so a safe compromise on location must be reached.

Ceiling height in the clinical area is crucial. The minimum standard to underside of finished ceiling must be 3 m. An unobstructed 1000 is required around the bed to carry out procedures and park equipment. A further unobstructed 600 is required for passing around staff and equipment in the 1000 zone.

An clinical wash-hand basin with hands-free taps must be located at the front of each bed space, behind the curtain line, but so as not to cause an obstacle to the movement of equipment and staff. The wash-hand basin is combined with a 1200 x 450 storage unit that can house a trolley and medical/surgical supplies for each patient. The cupboard should be locked at all times.

The lead/uPVC curtain provides protection from radiation when taking diagnostic images and will provides adequate sound reduction and visual privacy between bays.

All bed spaces should have suitable daylight provision via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.
Accommodation for a patient requiring medical and nursing care using multi-parameter monitoring and life-support systems.

Sufficient space is required around the bed for six members of staff to circulate to carry out procedures and for equipment such as mobile X-ray and haemofiltration equipment to be manoeuvred and parked and worked around.

All bed spaces should have suitable daylight provision via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.

A comfortable, high-backed, office chair and work surface of 700 x 20 for the computer are required for staff who work at the bed space for long periods.

Air lock to provide positive/negative pressure for infection control. Space to allow two people to gown up and clinical hand-wash facilities including bin for waste and soiled products.

Ceiling height in the clinical area is crucial. The minimum standard to underside of finished ceiling must be 3 m.

An unobstructed 1000 is required around the bed to carry out procedures and park equipment. A further unobstructed 600 is required for passing around staff and equipment in the 1000 zone.
Accommodation for a patient requiring medical and nursing care using multi-parameter monitoring and life-support systems. Sufficient space is required around the bed for six members of staff to circulate to carry out procedures and for equipment such as mobile X-ray and haemofiltration equipment to be manoeuvred and parked and worked around.

Single bedroom
(including air-lock)
Sheet 4

Floor space for manoeuvring, parking and working around large items of equipment associated with diagnostic imaging and haemofiltration etc.

1. Relatives’ comfortable stacking chairs that can be easily cleaned. These should be stored at the bedside but outside the 1600 zone
2. Pendant
3. Whiteboard
4. Overhead hoist
5. Dressing trolley
6. Data pendant
7. Clinical wash-hand facilities with hands-free taps
8. Glazed partition with venetian blind
9. HTM 71 supplies trolley

A comfortable, high-backed office chair and work surface of 700 ± 20 for the computer are required for staff who work at the bed space for long periods.

Air lock to provide positive/negative pressure for infection control.

Space to allow two people to gown up and clinical hand-wash facilities including bin for waste and soiled products.

Ceiling height in the clinical area is crucial. The minimum standard to underside of finished ceiling must be 3 m. An unobstructed 1000 is required around the bed to carry out procedures and park equipment.

A further unobstructed 600 is required for passing around staff and equipment in the 1000 zone.

All bed spaces should have suitable daylight provision via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.
Communications centre for up to eight beds, used intermittently by up to two staff simultaneously. Seating for five staff for occasional larger discussions. Activities include: confidential discussions, report-writing using fixed and laptop computers, use of telephones, viewing X-rays. All bed spaces to be clearly visible while seated to carry out tasks.

Communications base

Sheet 5
Facilities for holding and preparing clean and sterile materials used in the treatment of patients. Safekeeping of drugs, medicines, lotions, etc. Optional storage of blood bank if required (local policy).

Clean utility

The facilities shown are optimum for an 8-bed unit for a period of 4–5 days. Adjustable modular storage is recommended for flexibility and ease of finding items. Cupboards should be provided where security is required for drugs etc.

The clean utility should be adjacent to the communications base in order to ensure staff surveillance against unauthorised entry. An opening without doors is preferred for ease of access and surveillance.
Facilities for performing analysis of blood samples using technical equipment by up to two staff. Occasional use of computer.

Provision for hand-washing.
Facilities for storage of reagents and containers.

1. Laboratory sink
2. Electrolyte analyser
3. Glucose analyser
4. Blood gas analyser
5. Lockable medical refrigerator, 142 litres
6. Storage cupboards
7. Clinical wash-hand facilities with hands-free taps
8. Computer terminal with printer
9. Draughtsman’s chairs
10. Noticeboard

The height of the bench for carrying out tasks at equipment when standing should be 900 mm. A bench height of 900 mm is satisfactory when using a computer for short periods and an adjustable draughtsman’s type chair is provided.

The laboratory should be adjacent to the communications base and if required can have direct access to the base.
Facilities for disposal of liquid waste and cleaning of equipment, workshop facilities for maintaining, calibrating and testing equipment and facilities for storing floor and shelf-mounted equipment and for charging electrical equipment.

Dirty utility/clinical equipment service room and store

- Macerator disposal unit
- Sink and hopper disposal unit
- Storage unit and shelving
- Whiteboard
- Sani chair
- Clinical wash-hand facilities with hands-free taps
- Workbench with suitable electrical and medical gas outlets
- Stool
- Adjustable shelving for storage and charging equipment
- Storage for floor-standing equipment

It is important that broken equipment is kept separately from equipment that is clean and in working order. The design should ensure that clean and serviceable equipment is physically separated from broken and contaminated equipment. Equipment awaiting maintenance should be held in dirty utility until taken through to the service room.

Adjustable shelving should be provided between 300, 600, 1000 and 1300 max to ensure that items can be placed and retrieved easily and safely. Heavier objects should be placed at waist height.

Items that require charging should be grouped together. Sockets should be provided at 900 for floor-standing equipment and at 450, 800 and 1200 for shelf-stored items.

Clean, calibrated and tested ventilators and associated consumables should be stored together for convenience and efficiency.
Bulk store

Facilities to store items that are too large to store in the clean utility and those that are greater than a 5-day supply. It is envisaged that the just-in-time storage will be employed and therefore supplies of items not obtained from central stores should be held in bulk here.

1. Modular storage system HTM 71
2. Shelf-free area for storage of large and heavy floor stored boxes
3. 3-tread step ladder
4. Noticeboard
5. HTM 71 shelving racks 1000 x 465
6. HTM 71 shelving racks 1000 x 665

Small light items may be stored below 900 since some bending is necessary. Larger, bulkier and heavier items should be stored at approximately 900 to enable items to be retrieved and stored safely and easily.

Only light, single items should be stored above 1500 to enable them to be reached safely and easily.

Storage heights are given for guidance; however, utilising the modular storage system, adjustable storage can be provided.

1100 is required between storage units to allow safe storage and retrieval and the manoeuvring of trolleys.

4900 modular storage of various depths

2100 max height for storage, lightweight and infrequently accessed items
1500 max shelf height for frequently accessed items
900 optimum height for storing larger, heavier and frequently-used items
LEGISLATION


EC Directive 90/270/EEC on the minimum safety and health requirements for work with display screen equipment.

Conservation of fuel and power in dwellings (Approved document L1).

Conservation of fuel and power in buildings other than dwellings (Approved document L2).

DEPARTMENT OF HEALTH PUBLICATIONS


Technical requirements for the supply and installation of equipment for diagnostic imaging and radiotherapy (TRS 89). Medical Devices Agency, Department of Health, 1989.

NHS ESTATES PUBLICATIONS

Firecode


Other documents


National Health Service Model Engineering Specifications. NHS Estates, The Stationery Office, 1997 (available in Mechanical and Electrical volumes or as separate parts).


Health Building Notes (HBNs)


HBN 40 Common activity spaces


Health Technical Memoranda (HTMs)


HTM 2005 Building management systems

HTM 2007 Electrical services supply and distribution

HTM 2009 Pneumatic air tube transport systems.

HTM 2011 Emergency electrical services

HTM 2014 Abatement of electrical interference

HTM 2015 Bedhead services

HTM 2020 Electrical safety code for low voltage systems

HTM 2022 Medical gas pipeline systems

HTM 2023 Access and accommodation for engineering services

HTM 2025 Ventilation in healthcare premises.

HTM 2027 Hot and cold water supply, storage and mains services

HTM 2040 The control of legionellae in healthcare premises – a code of practice.

Validation and verification. NHS Estates, The Stationery Office, 1994

HTM 2045 Acoustics.


HTM 2055 Telecommunications (telephone exchanges)

BRITISH STANDARDS


BS 4533 Luminaires (produced in various sections). Some sections replaced by BS EN 60598. British Standards Institution.


BS 5724 Medical electrical equipment (produced in various sections). British Standards Institution.


BS EN 737 Medical gas pipeline systems. British Standards Institution.


BS EN 60601-1-2: 2002 Medical electrical equipment. General requirements for safety.


OTHER PUBLICATIONS
Costa AX, Ridley SA, Shahani AK et al (2003), Mathematical modelling and simulation for planning critical care capacity, Anaesthesia, in press.


Standards for Intensive Care Units. ICS, 1997.

Holden, J (2001, in progress) Exploring the nature of interactions of nurses working in intensive care units with the families of patients.


Quinn, S, Redmond, K and Begley, C (1996), The needs of relatives visiting adult critical care units as perceived by relatives and nurses. Part 2, Intensive and Critical Care Nursing, Vol 12, No 4, pp 239–245.

Rubin, HR and Owens, AJ (1996), Progress report: an investigation to determine whether the built environment affects patients’ medical outcomes. The Center for Health Design.


Air distribution systems (CCA). The Chartered Institution of Building Services Engineers (CIBSE), 1996.

The Disability Discrimination Act: access to goods, facilities and services (DL 80). Department of Social Security, 1996.


Occupational exposure limits (EH40). Health and Safety Executive, HSE Books, issued annually.

Public health engineering (GVC). The Chartered Institution of Building Services Engineers (CIBSE), 1999.

The visual environment for display screen use (LG03). The Chartered Institution of Building Services Engineers (CIBSE), 1996.
**Water distribution systems (CCW).** The Chartered Institution of Building Services Engineers (CIBSE), 1994.

**DB 9801 Medical device and equipment management for hospital and community-based organisations.** Medical Devices Agency, 1998.

http://www.haznet.org.uk
http://www.doh.gov.uk/hlc.htm
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Figures 8, 11, 18 and 22 courtesy of Wexham Park Hospital, Slough

Figure 12 courtesy of Wardray

Figure 13 courtesy of Bradford Royal Infirmary

Figures 17 and 19 courtesy of Darent Valley Hospital, Dartford
About NHS Estates guidance and publications

The Agency has a dynamic fund of knowledge which it has acquired over 40 years of working in the field. Our unique access to estates and facilities data, policy and information is shared in guidance delivered in four principal areas:

**Design & Briefing**

These documents look at the issues involved in planning, briefing and designing facilities that reflect the latest developments and policy around service delivery. They provide current thinking on the best use of space, design and functionality for specific clinical services or non-clinical activity areas. They may contain schedules of accommodation. Guidance published under the headings Health Building Notes (HBNs) and Design Guides are found in this category.

Examples include:

- HBN 54, Facilities for cancer care centres
- HBN 28, Facilities for cardiac services
- Diagnostic and Treatment Centres: ACAD, Central Middlesex Hospital – an evaluation
- Infection control in the built environment: design and planning

**Operational (Engineering, Facilities Management, Fire, Health & Safety and Environment)**

These documents provide guidance on the design, installation and running of specialised building service systems and also policy guidance and instruction on Fire, Health & Safety and Environment issues. Health Technical Memoranda (HTMs) and Health Guidance Notes (HGNs) are included in this category.

Examples include:

- HTM 2007, Electrical services supply and distribution
- HTM 2010, Sterilization: operational management with testing and validation protocols
- HTM 2040, The control of legionellae in healthcare premises – a code of practice
- HTM 82, Fire safety – alarm and detection systems

**Strategic**

These are documents which deal with areas of broad strategic concern and planning issues, including capital and procurement.

Examples of titles published under this heading are:

- Estatecode
- How to Cost a Hospital
- Developing an Estate Strategy
- Sustainable Development in the NHS

**NHS Estates Policy Initiatives**

In response to some of the key tasks of the NHS Plan and the Modernisation Agenda, NHS Estates has implemented, project-managed and monitored several programmes for reform to improve the overall patient experience. These publications document the project outcomes and share best practice and data with the field.

Examples include:

- National standards of cleanliness for the NHS
- NHS Menu and Recipe Books
- Sold on Health

The majority of publications are available in hard copy from The Stationery Office Ltd (TSO):

The Stationery Office Publications Centre
PO Box 276
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SW8 5DT
Telephone: 0870 600 5522
Fax: 0870 600 5533
http://www.tso-nhse.co.uk

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