Llywodraeth Cymru
Welsh Government

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Shared Services Partnership
Specialist Estates Services

WHBN 04-02

Welsh Health Building Note

Critical Care Units

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Published by NHS Wales Shared Services Partnership – Specialist Estates Services

This guidance is based on Health Building Note 04-02 *Critical care units* published by the Department of Health in 2013.

It replaces HBN 57 *Facilities for Critical Care* 2003

This publication can be accessed from the NHS Wales Shared Services Partnership – Specialist Estates Services website **www.wales.nhs.uk/ses**

Welsh Health Building Note 04-02 - Critical care units

Overview

This Welsh Health Building Note provides guidance on critical care units that admit patients whose dependency levels are classified as level 2 or 3 as defined by Department of Health *Comprehensive critical care* (2000). It does not, however, distinguish between the different requirements for level 2 and 3 patients and it excludes facilities for the high-security isolation of patients, dedicated centres for burns patients and areas within the hospital where level 2 or 3 patients are managed on a time-limited basis.

It replaces HBN 57 *Facilities for Critical Care* 2003.

Acknowledgements

WHBN 04-02 *Critical care units* is based on Health Building Note 04-02 Critical care units published by the Department of Health in 2013. NHS Wales Shared Services Partnership – Specialist Estates Services is grateful to the Department of Health for its permission to adapt the original guidance for application in Wales.

The contents of the original document were reviewed by NHS Wales Shared Services Partnership – Specialist Estates Services.

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Chapter 1

Policy context

Together for health

1.1 *Together for health – a delivery plan for the critically ill* (Welsh Government 2013) is a delivery plan for the critically ill and provides a framework for action by local health boards. It sets out the Welsh Government's expectations of the NHS in Wales in delivering high quality critical care ensuring the right patient has the right care at the right time. It therefore focuses on maximising efficiency and effectiveness, tackling variation in access and reducing inequalities in service provision. The plan is split into five themes:

- delivery theme 1: delivering appropriate, effective ward based care - The Right Patient;
- delivery theme 2: timely admissions to critical care – The Right Patient receiving the Right Care at the Right Time;
- delivery theme 3: effective critical care provision and utilisation – The Right Care;
- delivery theme 4: timely discharge from critical care - The Right Patient receiving the Right Care at the Right Time;
- delivery theme 5: improving information and research.

For each theme it sets out:

- delivery expectations to ensure the right patient, in the right care and the right time,
- specific priorities for the future,
- responsibility to develop and deliver actions,
- assurance measures that will be used to ensure that the plan is delivered and effective outcomes achieved.

Impact of *Designed for life: Creating world class health and social care for Wales in the 21st century* on inpatient accommodation

1.2 *Designed for life: Creating world class health and social care for Wales in the 21st century* (Welsh Assembly Government 2005) set out the Welsh Government's 10-year vision for the provision of healthcare in Wales. It clearly identified the need to strengthen the care provided at home and in the community and also recognised the crucial role played by hospitals, both in local and acute settings. Inpatient accommodation remains largely in acute settings, particularly for complex cases or where major surgery requiring general anaesthesia is required. However, inpatient accommodation may also be provided in community settings for those patients with less complex conditions. Planning teams will need to consider the number of inpatient beds required and where they may be most appropriately located.

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Patient expectations and choice

1.3 Patients have high expectations of the environment in which they are to be treated. A key element that should be addressed in all patient accommodation is that of privacy and dignity. *Fundamentals of care: Guidance for health and social care staff* (Welsh Assembly Government 2003) states that the principle of basic human rights to dignity, privacy and informed choice must be protected at all times, and the care provided must take account of the individual's needs, abilities and wishes. The document identifies 12 specific practice indicators and gives a number of practical examples.

1.4 The Department of Health document *Essence of Care 2010*, although not applicable in Wales, also identifies several benchmarks of good practice, focusing on the issue of respect for the individual.

Privacy and dignity: Same-sex accommodation

1.5 The need to deliver the highest standards of privacy and dignity applies equally to all areas of a hospital and in general the Welsh Government has a commitment to abolish mixed-sex ward accommodation however, critical care units covered by this guideline fall under the policy exceptions.

Policy exceptions

1.6 The Empowering Ward Sisters/Charge Nurse Ministerial Task and Finish Group took forward the implementation of this recommendation in a report known as Free to lead, free to care and specified that:

'*The ward sister/charge nurse should have the authority to decide on the placing of patients on the ward. Any ward that is mixed gender should be divided geographically and separate bathing/toilet facilities provided. The mixing of men and women in bays should not happen with the exception of:*

- *paediatric wards*
- *all intensive care units*
- *coronary care units*
- *high dependency units*
- *theatre recovery units*' (Welsh Assembly Government 2008).

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Chapter 2

Scope of guidance

2.1 This Welsh Health Building Note describes spaces that are unique to a critical care unit. It also describes any variations to common hospital spaces and clarifies requirements for these spaces, where necessary.

2.2 For a full list of space requirements see the example schedules of accommodation for an 8-bed, 12- bed and 16-bed critical care unit in **Appendix 2**. The example schedules provide a basis for sizing facilities at initial planning stages but exact requirements should be determined locally based on the number and case mix of patients, hospital policy for the provision of supplies and waste disposal, and the layout of the unit.

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Chapter 3

Whole unit planning and design considerations

Departmental relationships

3.1 A critical care unit should be centrally located within an acute hospital development. It should be adjacent to and/or have easy access to (and be easily accessible from) imaging facilities and operating theatres. The emergency department should be adjacent, and/or have easy access, to the critical care unit.

3.2 The critical care unit requires close links to the main hospital pharmacy and microbiology laboratory; where a pneumatic tube system is used to transport specimens and computers are used for transmitting test results and placing prescription orders, physical proximity is less important.

Bed spaces

3.3 Each bed space should include the following:

- an electric bed capable of attaining chair and Trendelenberg positions, and fitted with a pressure-relieving mattress;
- a high-backed chair with foot elevation and tilting facility for the patient;
- a ceiling-mounted twin-armed pendant to accommodate a range of equipment and for the provision of medical gases and electrical and data connectivity;
- a clinical wash-hand basin;
- enclosed storage for a small quantity of consumables;
- drugs storage (wall-mounted drugs cabinet or within the patient's bedside locker);
- a ceiling-mounted hoist for lifting patients.

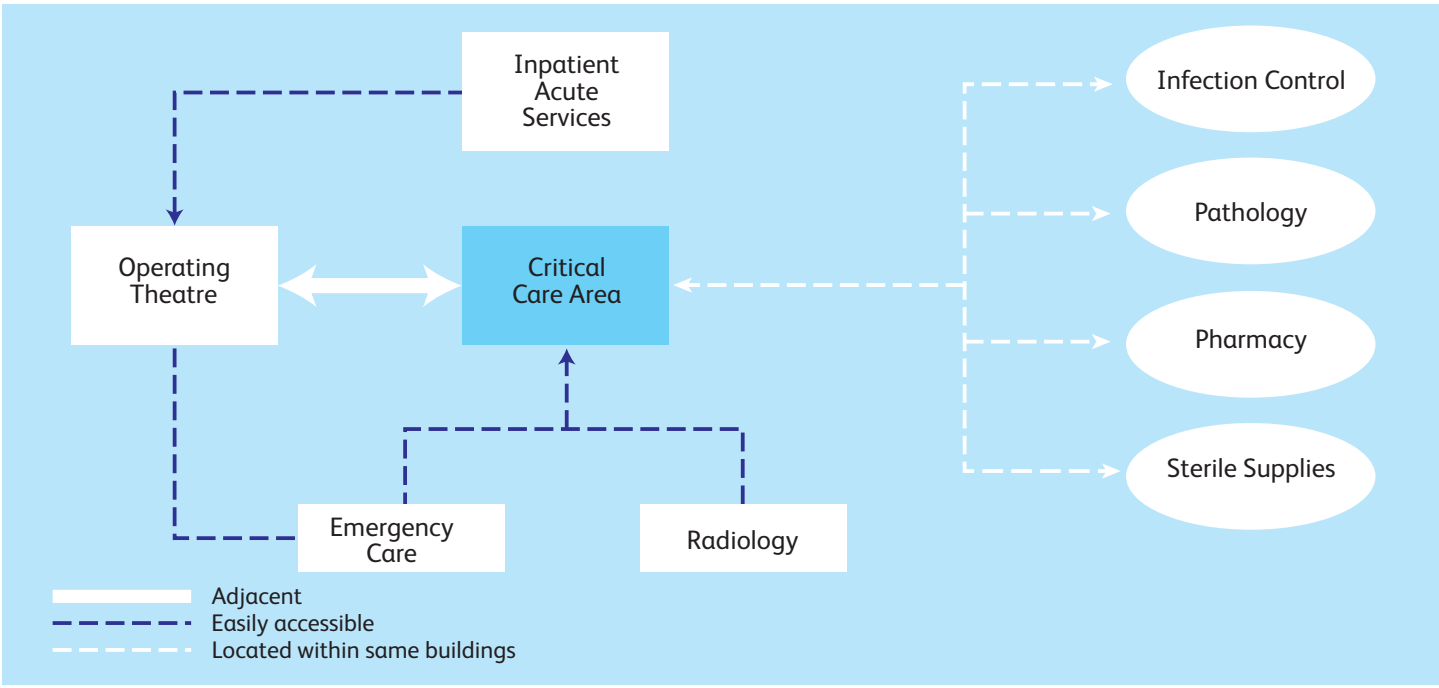

Figure 1 Department relationships for a critical care unit

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3.4 Storage of patients' clothes and personal effects should be dealt with in accordance with whole-hospital policy. 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.

3.5 The following outlets should be located on the pendant:
- at least 28 unswitched single socket-outlets;
- up to four data outlets, one of which should be networked to the hospital's patient record system;
- 3–4 oxygen outlets;
- two 4-bar air outlets;
- one 7-bar air outlet (where surgical equipment is used), clearly labelled with the appropriate warning;
- 2–4 medical vacuum outlets;
- anaesthetic gas scavenging points, if anaesthetic inhalation gases and/ or inhalation antibiotics are used;
- patient/staff and staff emergency call systems, including a separate switch for crash call;
- telephone outlet for internal and external calls;
- TV outlet.

3.6 The following equipment should be located on the pendant:
- computer with flat-screen monitor;
- multi-parameter patient monitoring equipment;
- 3–6 infusion pumps;
- 4–10 syringe pumps;
- blood warmer;
- feeding pump;
- ventilation and humidification equipment.

3.7 Ceiling-mounted rather than floor-mounted pendants are recommended since they avoid the need to trail cables across the floor, thereby providing better access to the patient and improved safety for staff and visitors. They are also easier to keep clean. Powered ceiling-mounted pendants enable staff of all heights to operate them easily. Care should be taken in the positioning of the pendants to ensure convenient access by staff.

3.8 Since patients in a CCU are extremely vulnerable, and as the area falls under group 2 medical locations as defined in BS7671:2008 section 710, isolated power systems (IPS) shall be used for final circuits supplying medical equipment and systems intended for life support. The IPS system will consist of an uninterrupted power supply (UPS) and isolation transformer complete with insulation monitoring devices. The extent of this provision is discussed further in the IET Wiring Regulations BS7671:2008 section 710 and Guidance Note 7 on 'Special locations'. IPS sockets should be coloured blue to differentiate them. Additional switched and shuttered sockets, connected to ring circuits, may be provided at the bedhead for portable non-medical equipment. These should be labeled 'non-medical equipment use only' and be on the same phase for each patient location.

3.9 The temperature within bed spaces is usually controlled by the ventilation system rather than radiators. Facilities for temperature and humidity adjustment should be provided, to parameters agreed with clinical representatives on the project team. Children should only be placed in bed spaces that provide local temperature control (due to the need to elevate the room temperature for this patient group).

3.10 The ventilation system should include mechanical cooling and provide for a range of temperatures that can be adjusted by staff, taking particular care to establish and accommodate the unusually high heat gains that may be anticipated from medical equipment. The position of ventilation grilles should minimise the risk of patients experiencing discomfort through down draughts.

3.11 The following equipment may be required at the bedside on an intermittent or continuous basis:

- mobile X-ray machine;
- haemodialysis machine;
- haemofiltration machine;
- peritoneal dialysis machine;
- EEG machines;
- electrocardiography machines;
- echocardiography machines;
- invasive cardiac output monitoring devices;
- ultrasound machines;
- endoscopes (fibre-optic light source);
- defibrillators;
- non-invasive respiratory equipment (continuous positive airway pressure (CPAP)/bi-level positive airway pressure (BIPAP)): this may be mounted on the pendant;
- vacuum dressings.

3.12 A wall-mounted renal dialysis panel with water supply and drainage may be provided at some bed spaces to facilitate haemodialysis. Alternatively, it may be more economical to supply potable water to small water treatment units at the bed space. The specification for the water quality should be agreed with the project team. For specification of water quality, please refer to WHBN 07-02:2016.

3.13 A clock with an elapsed time control should be clearly visible from each bed space.

3.14 The bed space should be a minimum of 26 m^2 in order to accommodate the above equipment/ furniture. This will also allow:

- staff access to the patient from all sides of the bed;
- staff to manoeuvre the patient, themselves and equipment safely;
- five members of staff to attend to the patient in an emergency situation;
- two visitors to sit at the bedside.

3

3.15 All bed spaces should be capable of providing visual privacy and reasonable auditory privacy, when required. All bed spaces should have natural daylight with outside views wherever possible. Artificial lighting should be dimmable and of sufficient strength to enable surgical interventions and response to life-threatening situations at the bedside. Lighting may be provided as part of the pendant system.

3.16 Glass walls (in the case of single-bed rooms) or partitions (in the case of multi-bed areas), which can be obscured for privacy when appropriate, aid observation of patients.

3.17 A ceiling height of 3 m in bed areas is recommended in order to accommodate pendants and ceiling-mounted hoists. The position of overhead equipment requires careful consideration. The construction of the ceiling should take account of weight-bearing requirements.

3.18 Consideration should be given to providing clinical systems access via wireless networks; this may involve the provision of multiple wireless access points, requiring both power and IT cabling. It is recommended that early engagement with the local IT department is made to determine the local requirements.

3.19 In addition to 3.18 for clinical systems it may also be necessary to provide access to a wireless network for patients' and visitors' services. This will be determined in conjunction with the local IT department and should form the requirements explored under 3.18.

Bariatric patients

3.20 Health boards and Trusts should have policies and procedures in place for the treatment and manual handling of bariatric patients. These should ensure privacy and dignity and comply with the *Equality Act 2010*.

3.21 The physical environment should be considered by health boards and Trusts when making provision for bariatric patients. This will depend upon local circumstances. Bariatric patients will require additional facilities over and above normal provision including: corridor widths, door widths, room sizes, sanitary facilities, manual handling equipment, bed and trolley sizes, diagnostic imaging equipment etc.

3.22 The location of rooms to accommodate bariatric patients should be carefully considered to keep horizontal and vertical circulation for the patient to a minimum.

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Chapter 4

Public spaces

Entrances

4.1 One preferred option is a single entrance to a CCU 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.

4.2 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.

4.3 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.

4.4 The waiting area should be warm, welcoming and well-lit. Further information regarding the enhancement of this area is described in **paragraphs 4.6 – 4.7**. See also *Improving the patient experience: welcoming entrances and reception areas* (NHS Estates 2004). On occasion, children may visit a patient in critical care. Strategies for making the waiting area more child-friendly are described in detail in *Improving the patient experience: friendly healthcare environments for children and young people* (NHS Estates 2004).

Reception desk

4.5 The entry system for the visitors' entrance, CCTV monitor, if provided, and a telephone for internal and external calls should be located here. The reception desk should have natural surveillance of the visitors' entrance and/or point of entry to clinical areas.

Visitors' waiting area and associated facilities

4.6 On arrival, visitors will be admitted immediately to the appropriate clinical area or asked to wait in the waiting area. There should be a door between the waiting area and clinical areas, controlled by staff, to prevent visitors wandering into clinical areas. Beverage-making facilities and WCs should be available nearby. The waiting area may include a TV. A separate visitors' sitting room may be of value for those spending long periods of time within the vicinity of the critical care unit.

4

Visitors' overnight accommodation

4.7 Overnight accommodation for visitors may be provided within the hospital, or the hospital may have an arrangement with a nearby hotel. Where children are being treated, overnight accommodation for parents should be provided. Enlarged single bedrooms provide the option of adding an extra bed for parents to stay overnight.

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Chapter 5

Clinical spaces

Staff communication base(s)

5.1 Ideally, staff at the base(s) should be able to see all multi-bed spaces under their control and the entry point to clinical areas. Control of the visitors' entry system will be transferred from the reception desk to the communication base(s) at night.

5.2 Alarms to signify the failure of medical gas and power outlets within the bed spaces should be located here. Central consoles for multi-parameter patient monitoring equipment should also be located here.

5.3 A telephone for internal and external calls will be required. Task lighting should be provided for use at night to prevent disturbing patients. Each base should be partially enclosed to control noise transfer.

Critical care single bedrooms

5.4 Alarms to signify the failure of medical gas and power outlets within the bed spaces should be located here. Central consoles for multi-parameter patient monitoring equipment should also be located here.

5.5 Clinicians and project teams should assess the number of individual bedrooms required for each scheme.

5.6 Single-bed rooms 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. Provision of access via a gowning lobby is considered preferable for each single bedroom. See the single bedroom plans in **Appendix 1** and WHBN 04-01 Supplement 1:2014 regarding 'Segregation rooms for non – airborne diseases'.

Isolation rooms (Positive Pressure Vented Lobbies - PPVLs)

5.7 In addition to single bedrooms, isolation rooms with lobbies are required for the isolation of patients to control the spread of infection or for the protection of immuno-suppressed patients.

5.8 Single-bed rooms 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.

5.9 The ventilation system should be designed to provide simultaneous source and protective isolation. A balanced supply and extract ventilation to each isolation room is, therefore, required. The lobby, which functions as an airlock, requires a relatively high supply air change rate to be effective against airborne organisms moving between circulation areas and isolation rooms. Reference should be made to WHBN 04-01 supplement 1:2014 *Isolation facilities for infectious patients in acute settings.*

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5.10 Ceilings and windows should be sealed. Doors should be tight-fitting, with seals to minimise air transfer.

5.11 Isolation rooms should have local temperature controls that are accessible to nursing staff and may require humidity within the range 40–60 % Rh, depending on the specialty.

5.12 The precise number of isolation rooms will depend on the case mix of the critical care unit. For example, units that routinely admit neutropenic haematology patients may require up to 50 % of their beds to be provided as isolation rooms with lobbies. No unit should, however, have less than 20 % of their beds as isolation rooms.

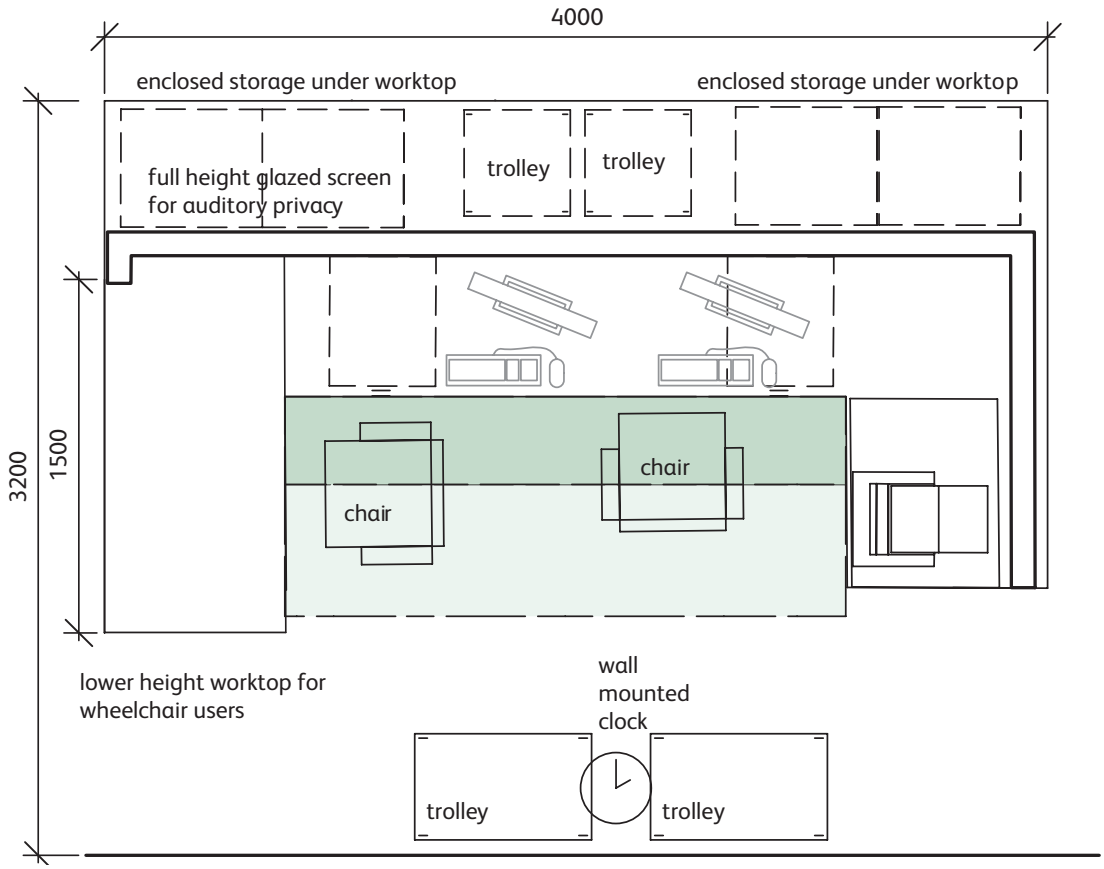

Figure 2 Critical care 2-place staff communication base

Multi-bed areas

5.13 A 2.5 m-wide unobstructed circulation space should be provided at the foot of each bed space. It is imperative to maintain the required bed separation for infection control reasons and to aid positioning of equipment.

5.14 The temperature in the multi-bed areas should be centrally controlled.

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5.15 Requirements for scrub troughs should be determined locally based on patient case mix.

5.16 Project teams should select a curtain system that meets the following criteria:

- 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;
- 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;
- the curtains should be easily movable and disposable.

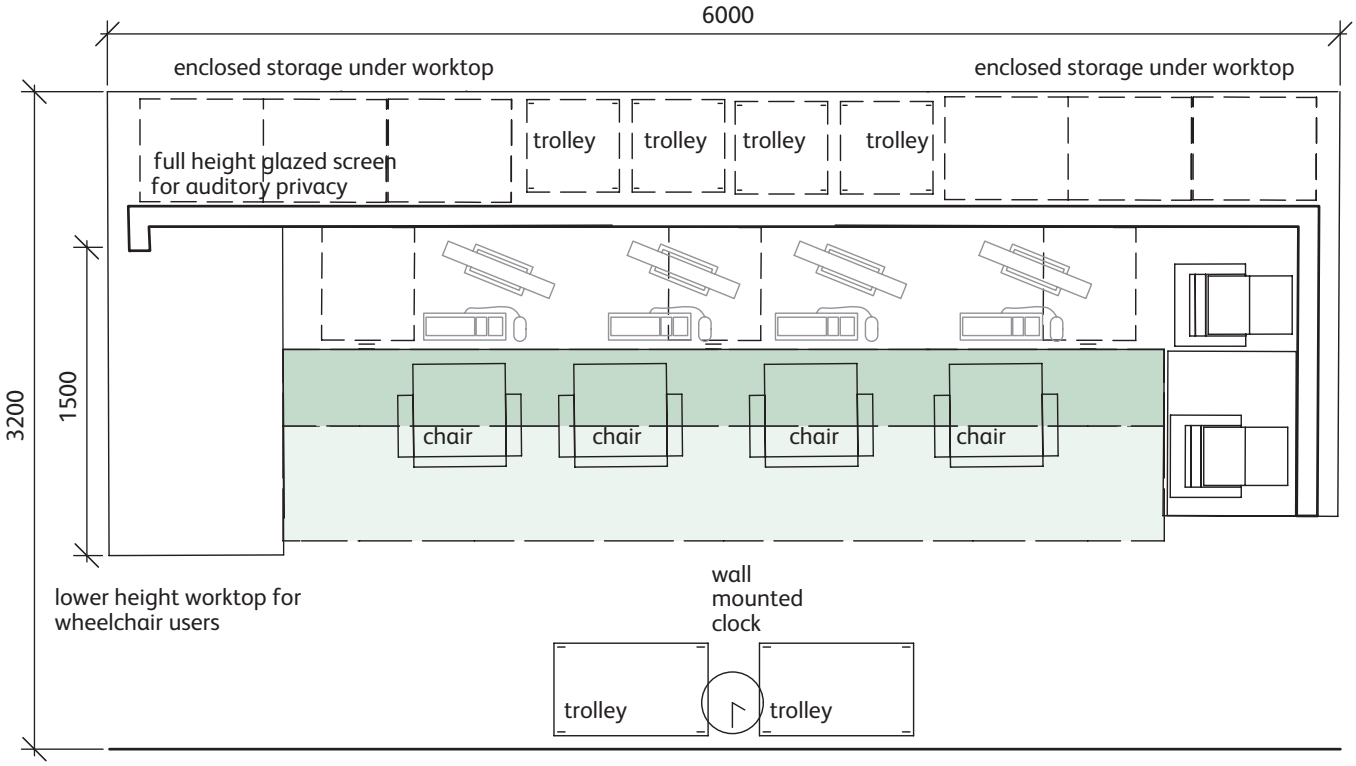

Figure 3 Critical care 4-place staff communication base

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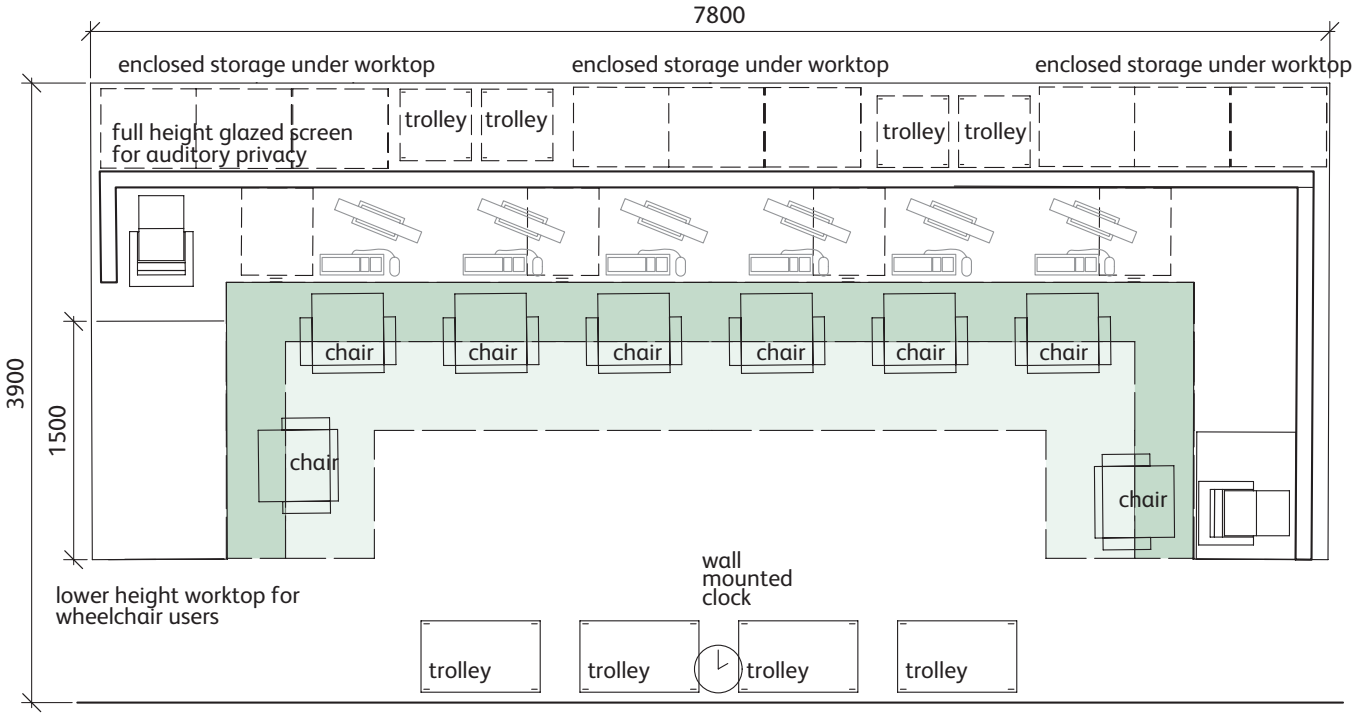

Figure 4 Critical care 8-place staff communication base

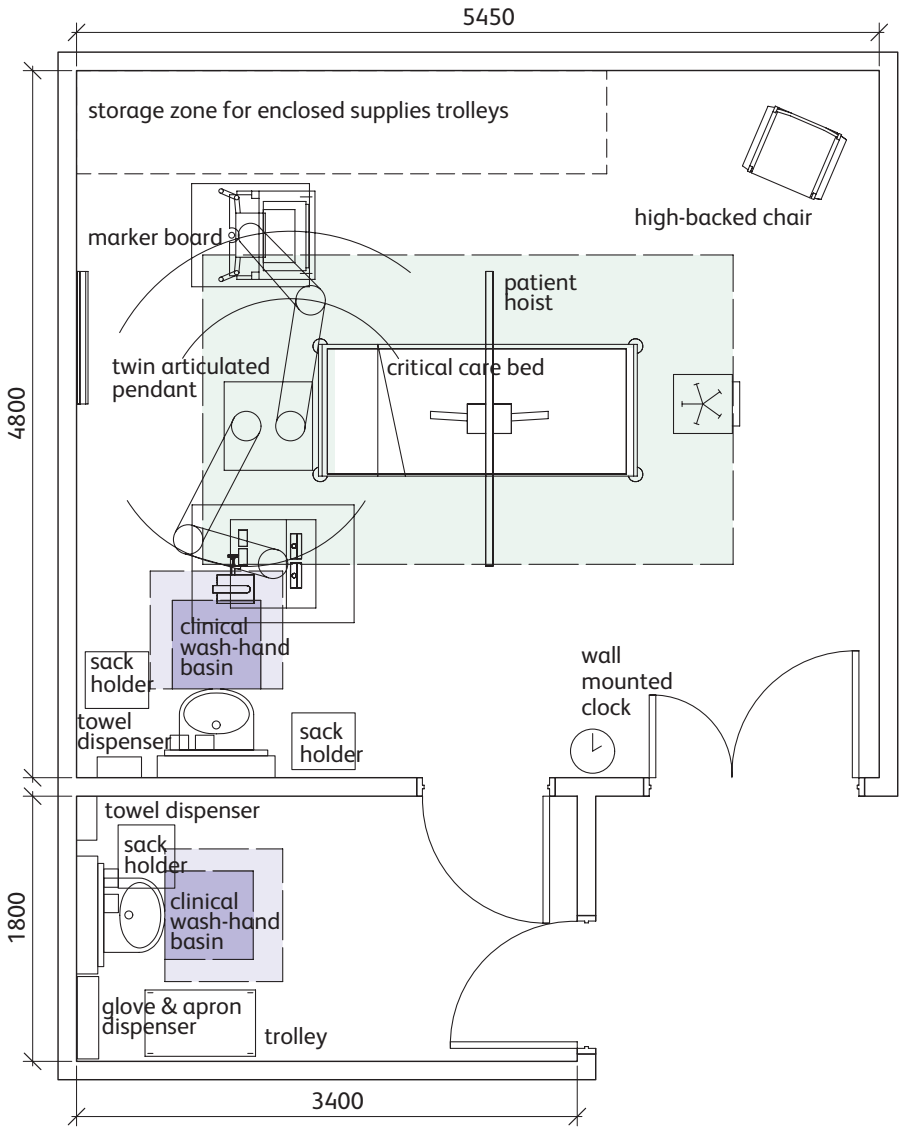

Figure 5 Critical care isolation room and lobby

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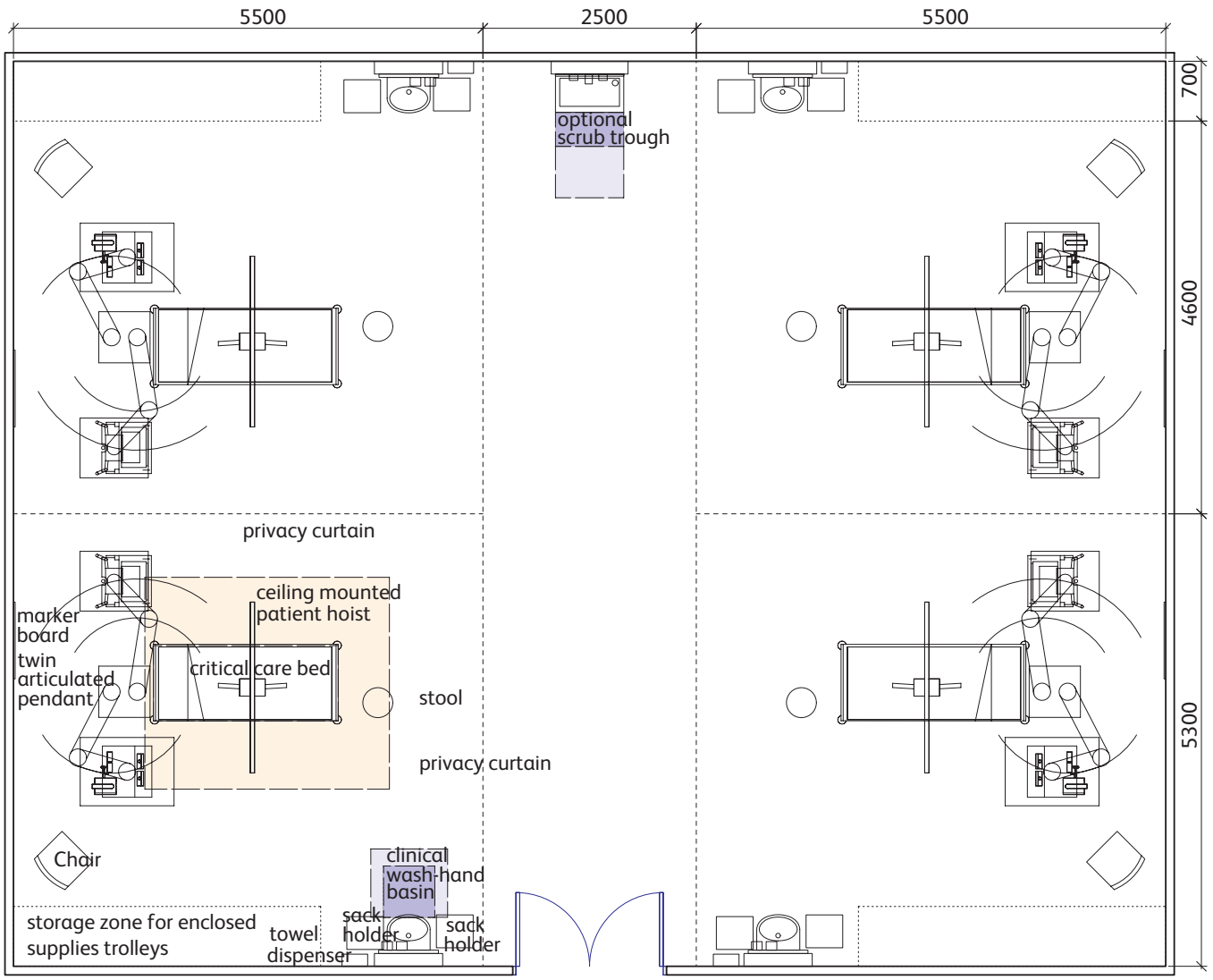

Figure 6 Critical care 4-bed bay

Interview rooms

5.17 Interview rooms should be provided within the vicinity of the bed spaces to enable staff to speak to visitors in privacy. The rooms should be in a quiet location.

6

Chapter 6

Clinical support spaces

Storage for bulky consumables, medical gas cylinders, linen and furniture

6.1 The example schedules include a combined storage allowance for bulky consumables, medical gas cylinders, linen and furniture. However, these four categories of item should be stored separately (it is assumed that non-bulky sterile supplies and consumables are held in the clean utility rooms).

6.2 The project team should ensure that the provision of standby medical gases reflects the emergency procedures and contingency plans for the unit. The medical gas cylinder store(s) should be easily accessible from clinical areas and enclosed in fire-resisting construction.

6.3 Reference should be made to HTM 02-01Part B:2006, paragraph 8.26 '*These cylinders should be kept in a specially designated room. This should comply as far as possible with the requirements for manifold rooms, but in any case should be well-ventilated and, where practicable, have at least one external wall to facilitate natural ventilation*'.

6.4 The furniture store(s) will need to accommodate bulky equipment, including mattresses, when not in use, chairs, bariatric equipment and cots.

Clinical equipment store(s)

6.5 A dedicated area should be provided for the storage and charging of transfer equipment (transport trolley, monitors, syringes, ventilators, suction pumps). Dedicated ventilation may be required to remove gases and heat from chargers. An area for hanging endoscopes and transoesophageal echocardiography probes is also required. The clinical equipment store(s) should be within easy access of the bed areas.

Clinical equipment decontamination room

6.6 Clinical equipment should be cleaned following use prior to transfer to the clinical equipment store(s) or, if the equipment requires maintenance, to the equipment servicing room. A clinical equipment decontamination room should be provided for this purpose. This room should be adjacent to the clinical equipment store(s).

Imaging equipment bay

6.7 A bay should be provided close to the clinical equipment store(s) for the storage of imaging equipment and protective lead aprons. A socket-outlet should be provided for charging equipment. An IT outlet, normally RJ45, should be provided to allow for image downloads to the local PACS.

6

6.8 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 also accommodate a mobile X-ray machine, a minimum of one ultrasound machine, and a transoesophageal echocardiography machine. A larger bay is required if mobile image intensifiers are used.

6.9 Regulations pertaining to the use of ionising radiation, such as IR(ME)R 2000 and IRR99 *(Health and Safety. The Ionising Radiations Regulations 1999, SI 1999/3232)*, must be complied with. Early engagement with the local Radiation Protection Advisor [RPA] and the Imaging department should be sought.

Resuscitation trolley bays

6.10 It is essential that adequate provision is made for siting resuscitation trolleys within the critical care unit. The precise equipment positioned on these trolleys should be determined locally.

Blood refrigerator bay (optional)

6.11 A blood refrigerator will only be required if a blood store is not available nearby. If provided, the fridge should be located in a designated bay and should be networked to the central system to permit traceability of blood. The use of blood refrigerators is governed by national and local blood transfusion service regulations.

Clinical equipment service room (optional)

6.12 Facilities are required for equipment servicing as defined in equipment manufacturers' user manuals, supplemented by any formally agreed local instructions. A dedicated room should be provided in the critical care unit for this purpose if an existing biomedical engineering workshop is not located nearby. When provided as part of the critical care unit, this room should be adjacent to the clinical equipment decontamination room.

6

Electrical switch room

6.13 The departmental electrical switch room, which houses the main isolators and distribution switchgear, UPS/IPS provision should be:

- sited within or close to 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.

6.14 Care should be taken to ensure that safety is not compromised during maintenance from passing traffic or the opening of adjacent doors.

7

Chapter 7

Staff spaces

1- person offices

7.1 The clinical director, lead nurse and faculty of intensive care medicine tutor require dedicated 1-person offices.

Admin areas

7.2 The following staff may require access to a workstation, but these may be provided in an open- plan office environment:

- clinical staff (doctors, nurses, allied health professions),
- outreach staff,
- audit clerk,
- technician,
- secretarial staff,
- IM&T staff,
- organ donation staff,
- research staff.

7.3 Workstations for clinical staff should provide quick and easy access to the patient bed areas in case of an emergency.

Seminar room

7.4 Access to a seminar room within the vicinity of the critical care unit must be provided. An intercom system should be installed between the seminar room and the clinical areas to recall staff in an emergency. The seminar room may double up as a skills laboratory, for example for training in resuscitation, using mannikins, defibrillators, and simulated body parts for venepuncture or suture practice.

Rest rooms

7.5 Staff rest rooms 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 in case of an emergency. Rest rooms require call systems to recall staff to the clinical areas in case of an emergency.

Changing areas

7.6 Space is required within the changing areas for the storage and disposal of scrub suits and footwear.

8

Chapter 8

Engineering services

8.1 This chapter describes the engineering services contained within CCUs 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.

8.2 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.

Engineering design considerations

8.3 General engineering guidance relevant to CCUs is contained in Welsh Health Technical Memoranda (WHTMs). General engineering design considerations are detailed in Chapter 4 of WHTM 00:2014 which the principle engineering design should follow. Specific references are provided throughout the text.

Maximum demands

8.4 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.

Environmental requirements

8.5 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.

8

Space for plant and services

8.6 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.

8.7 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls, within access panels 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.

8.8 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

8.9 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 facilities staff, complete with operating and maintenance instructions that enable the safe management of the service.

Activity data

8.10 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 is 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.

8

Safety

8.11 The *Ionising Radiation (Medical Exposure) Regulations 2000* and the associated Codes of Practice place strict requirements upon engineering aspects of design and operational practices. Over and above this, there are additional requirements from the *Radioactive Substances Act 1993* 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

8.12 It is essential that project teams familiarise themselves with the guidance contained in the Firecode suite of documents (the WHTM 05 series), which contains 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 WHTM 05-02:2014 *Fire Safety in the Design of Healthcare Premises.*

8.13 It is important to establish during the design stage, those aspects of fire safety strategy that affect the design, configuration and structure of a CCU. 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 including the organisation's Fire Management Team are fully acquainted with the fire safety strategy for the design in terms of operation (staff responsibilities, evacuation strategy, equipment provision and building and engineering layouts).

8.14 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.

Location of electrical and medical gas outlets

8.15 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.

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Mechanical services

Heating

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

8.17 Patients are often lightly clad in the CCU, 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.

8.18 Clinical areas should have a selectable range of temperatures from 18°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.

8.19 Spaces heated by low pressure hot water systems should use radiators of the low surface temperature type.

Ventilation

General

8.20 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.

Multi-bed/Single-bed rooms

8.21 Bed spaces and surrounding areas should be air conditioned to ensure consistency of environmental conditions. The extent of air change within these areas is defined in HTM 03-01 (Parts A&B) *Specialised ventilation for healthcare premises.*

Ventilation controls

8.22 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. Facilities for temperature adjustment should be provided to parameters agreed with clinical representatives on the project team.

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Hot, cold and drinking water services

8.23 Guidance on the design and installation of hot and cold water supply and distribution systems, plus the requirements for the control of *legionellae* and other water borne pathogens is contained in HTM 04-01 (Parts A&B) *The control of Legionella, hygiene, 'safe' hot water, cold water and drinking water systems.*

8.24 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. This risk assessment should be co-ordinated with the water safety group.

8.25 This risk assessment should identify any special measures required in the physical infrastructure and operational policies necessary to minimise the risk of *legionellae* and other water borne pathogens. A method statement should be produced from the risk assessment to clearly state how the new, and if applicable the existing water systems will be installed and maintained to ensure that water quality is not compromised during the works. Refer to HTM 04-01 (Parts A&B) for further information.

8.26 The design of the pipework systems and associated equipment together with the specification of water outlets etc, should enable the maintenance of the water systems in accordance with WHTM and HSE requirements with a minimal adverse effect upon patient care, as agreed with the project team and water safety group. 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 CCUs. When specifying water outlets, consideration should be given to their suitability for connecting point of use filtration should the need arise for them to be fitted. Refer to HTM 04-01 (Parts A&B) for further information.

8.27 All hot and cold water pipework, valves and fittings should be fitted with a high standard of insulation complete with an insulated support system, where provided by the manufacturer, and vapour-sealed to ensure as much protection as possible against frost, surface condensation, heat loss and heat gain. In addition, hot and cold water pipework should be run separate where practicable. If this is not possible, clear separation both vertically and horizontally must be demonstrated to minimize heat gain further. Refer to HTM 04-01 (Parts A&B) for further information.

8.28 The domestic hot water supply should be taken from the general hospital calorifier installation at a minimum outflow temperature of 60°C and distributed to all outlets so that the return connections at their locations is not less than 55°C and the final return temperature at the calorifier is not less than 50°C. See HTM 04-01 (Parts A&B), ACoP L8 (HSE 2013) and its associated technical guidance HSG 274 part 2 (HSE 2014).

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Dialysis

8.29 If local policy dictates that haemodialysis is undertaken in a CCU, 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 information provided in WHBN 07-01:2016.

8.30 As there are a small number of dialysis machines in a CCU, it is more economical to supply potable water to small water treatment units at the bed space. It is important to ensure that consideration is given to the risk of stagnation in the water supply due to infrequent usage and therefore insufficient throughput of water within the supply pipework. These risks should be assessed to ensure they are controlled. A robust and safe flushing regime will be necessary in most cases.

8.31 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

8.32 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 02-01 (Parts A&B) *Medical gas pipeline systems.*

8.33 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.

8.34 For medical oxygen systems, NHS organisations may wish to consider the use of a local backup automatic manifold, installed downstream of the department AVSU, in accordance with HTM 02-01 (Parts A&B). This should constitute part of the emergency and contingency planning process.

Pneumatic tube transport

8.35 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.

8.36 The total capital and revenue cost of each option should be determined and evaluated. Further guidance on pneumatic conveyor systems are contained in HTM 2009:1995 *Pneumatic air tube transport systems.*

8.37 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

8.38 Electrical installation should comply in all respects with BS 7671:2008+A3:2015 *Requirements for Electrical Installations. IET Wiring Regulations;* HTM 06-01 (Parts A&B) *Electrical services supply and distribution; Guidance Note 7: Special locations* (IET 2015).

8.39 The point of entry for the electrical supply is an electrical switch room 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.

8.40 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.

8.41 Supplementary bonding shall be provided in the CCU in accordance with BS7671:2008 section 710. ERBs will be required in each room to facilitate bonding.

Lighting

8.42 Practical methods of lighting the various functional spaces are contained in *Lighting Guide 2: Hospitals and Health Care Buildings* (CIBSE 2008). Colour finishes and lighting throughout circulation areas should be co-ordinated to create a calm and welcoming atmosphere.

8.43 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 CCU. 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.

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

8.45 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.

8.46 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 and for all rooms of clinical risk 3 and above be provided with at least two lighting circuits. These proposals should be agreed with the project team and estates manager to ensure that the design properly reflects local maintenance and operational policies. Where lighting control systems are installed, the installation should be such that a failure of a lighting controller, or associated switch or sensor, does not affect both lighting circuits (where installed). In addition, when normal mains power is lost and restored the luminares (and associated controls) should return to the state they were in prior to the outage.

8.47 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. Consideration should be given to the use of LED luminaires where possible. 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.

8.48 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 WHBN 00-04:2014 *Circulation and communication spaces.*

8.49 Emergency lighting should be provided in accordance with HTM 06-01 (Parts A&B) *Electrical services supply and distribution* and the *BS 5266 Emergency lighting* series.

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

Controlled drugs cupboard

8.51 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.

8.52 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.

Socket-outlets and power connections

8.53 An assessment shall be made to determine the classification and group of each medical location in accordance with section 710 of BS7671:2008. It is envisaged that most clinical areas within CCU will be classed as Group 2 and will require provision of a medical IPS system consisting of isolation transformers IPS and UPS arrangement.

8.54 Socket-outlets in each bed space should be unswitched and attached to the medical supply unit. The use of UPS systems may be necessary in some areas, particularly medical locations group 2 (further guidance is given in section 710 of BS7671:2008). The electrical distribution in Group 2 locations will primarily be supported by a class 15 medium break automatic supply, available within 15 seconds (IEC 60364-5-55:2011 Ed 2). Where IPS/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.

8.55 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.

8.56 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.

8.57 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 the 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.

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8.58 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.

8.59 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.

8.60 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.

Socket-outlets for minor scheduled servicing of medical equipment

8.61 Socket-outlets for user servicing of medical equipment – see *Managing Medical Devices: Guidance for healthcare and social services organizations* (MHRA 2015) – 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 in this area should be covered with a rubber mat.

8.62 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 61008-1:2012+A11:2015. In addition, a master emergency trip should be provided outside the entrance to the room and a shrouded earth terminal should 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.

8.63 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

8.64 The electrical supply connections to all medical electrical equipment should comply with BS EN 60601-1-2:2015. Advice on the power supply and requirements for fixed and mobile radiodiagnostic equipment is contained in HTM 06-01 (Parts A&B) *Electrical services supply and distribution*. Individual project requirements should be discussed at an early stage with manufacturers and suppliers of equipment.

8.65 The earth connection at the power termination should be suitable for the functional earth requirements specified by the radiology equipment manufacturer, and should be arranged to receive a direct connection from the earth reference terminal 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 06-01 (Parts A&B) and BS7671:2008.

Emergency electrical supplies

8.66 Guidance on emergency electricity supplies is contained in HTM 06-01 (Parts A&B) *Electrical services supply and distribution*. Requirements for connection of individual circuits and items of equipment to UPS and/or standby generation systems should be discussed with users and equipment suppliers and must comply with BS7671:2008. Designers 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.

8.67 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

8.68 Given the nature of the care provided in CCUs, 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.

8.69 This information should be collated into a comprehensive document outlining the communication strategy for the CCU, 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

8.70 A door security intercommunication system is required between the communications base and entrance to the ward to prevent unauthorised entry, whilst permitting the free movement of staff. The system should enable verbal communication with the reception/clerical office from which an electromagnetically operated door lock can be activated.

8.71 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. An emergency break glass override should also be provided adjacent to the final exit door or any other electronically locked door in accordance with BS 7273-4:2015. Electronic locks should be interfaced with the fire alarm system and detailed in the Cause & Effect matrix. 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

8.72 Local security policies should determine at the planning stage whether or not staff should 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

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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 CCU is minimised.

8.73 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 whilst in the department that their transmitter is fully operational.

8.74 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

8.75 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

8.76 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 08-03:2011 *Bedhead services*. 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

8.77 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 CCU's electrical switch room and should be hard-wired to the paging system decoder(s) located in the telephone operator's room.

Telephone wiring

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

8.79 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.

8.80 Outlets and acoustic hoods should be provided for fixed payphones for the use of staff and visitors, located to meet the requirements of the *Equality Act 2010*. The handset of payphones should be fitted with an inductive coupler to assist people using a hearing aid.

8.81 Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, should be contained within each health board/Trust's IT strategy document.

Data and equipment links

8.82 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

8.83 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

8.84 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

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

Music and television

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

Lightning protection

8.87 Protection of the building against lightning should be provided in accordance with HTM 06-01 (Parts A&B) and the BS EN 62305 *Protection against lighting* series.

Operational considerations

8.88 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.

9

Chapter 9

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 activities should be carefully considered so that, where appropriate, space can be shared for similar activities that 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, Specialist Estates Services guidance provides a synopsis of accommodation for health buildings which the NHS Wales recommends for the provision of a given service.

Departmental cost allowance guides

9.2 The costing methodology for strategic outline case (SOC) and outline business case (OBC) stages in Wales remain based upon departmental cost allowances (DCA) updated by Welsh Health Estates Notification 10/14 *Measures to update 2002/2003 DCAGs for changes in specification (i.e. changes not covered by MIPS), to 8th July 2010*. Updating of departmental cost allowances guides (DCAGs) for inflation is by BCIS PUBSEC. The BCIS (previously BIS) PUBSEC indices are available from the BCIS (there is a subscription charge for this service). The indices, reporting level and location factor are advised quarterly by NHS Wales Shared Services Partnership – Specialist Estates Services (NWSSP-SES), to NHS Wales Trusts and health boards and their framework cost advisors. This quarterly advice is based upon the quarterly NHS Capital Planning Newsletter issued by the RICS to user group members (Health Service Index Focus Group).

9.3 The DCAGs for this WHBN reflect the total building and engineering requirements and accommodation that the CCU 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. The DCAGs most applicable relate to the now superseded HBN 27:1992, although the indicative departmental functional size has changed the costs/m2 (when updated for indices), remain applicable when adjusted as instructed herein. Contact NWSSP-SES for further guidance if required.

9.4 DCAGs are exclusive of VAT, building and planning fees and all local authority charges, and are based on a location factor of 1.00.

On-costs

9.5 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. ‘Abnormals’ also include additional costs brought about by changes in statutory regulations and design standards brought in after 8 July 2010 (ie after publication of WHEN 10/14).

9.6 Project teams should assess at the earliest opportunity all the likely on-cost implications of individual sites and schemes.

9.7 Costing by DCAG and on-costs may not be appropriate on works of alteration or refurbishment, or to works which are not adequately covered by WHBNs. The best process for costing should then be discussed with NWSSP-SES. Providing sufficient information is available to the cost advisors it is recommended that costs produced using DCAGs and on-costs are supported by separate elemental estimates and an analysis made of any cost difference prior to submission of costs for funding approval.

Location factors

9.8 Location factor adjustments should be applied to works costs (that is, DCAGs plus established on-costs) to take account of local market conditions. It should be noted that the location factor to be used in Wales may vary from the PUBSEC location factor for Wales. If so, the rationale will be explained in the monthly advice from NWSSP-SES to health boards, Trusts and framework cost advisors.

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 CCUs. The areas given are for guide purposes only and will alter depending on the design solution.

Note
Published DCAGs have been calculated using 6, 8 and 10 bed units and care must be taken in adapting costs to match the size of the unit.

Dimensions and areas

9.11 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 **Appendix 1** (taken from HBN 57:2003 *Facilities for Critical Care*).

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9.12 Planning teams should have data available that 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 in **Appendix 2.**

9.13 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.

9.14 Efficient planning of the building 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

9.15 All internal corridors, small vertical ducts, spaces occupied by partitions/walls and other space for circulation, are costed in the DCAGs. Provision is also made for 5 % planning zone and 3 % engineering zone adjacent to the external walls.

9.16 Circulation figures included in the DCAGs are those anticipated for new-build facilities. Where constraints are encountered, for example in refurbishment/conversion of older types of property, this figure may increase.

Communications

9.17 Hospital 'streets', staircases and lifts (linking spaces) are not included in the *DCAGs*. Costs related to these elements, along with a suitable space allowance, should be made in the on-costs.

Land costs

9.18 DCAGs are exclusive of all land costs and associated fees. However, costs associated with land costs should be included in business case submissions, and may therefore have an important impact on the overall cost viability of a scheme.

Engineering services

9.19 Engineering services listed below are included in the cost allowances (see **Appendix 2** and Activity DataBase for further information). Primary engineering services are assumed to be conveniently available at the boundary of the department.

9

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.

A1

Appendix 1

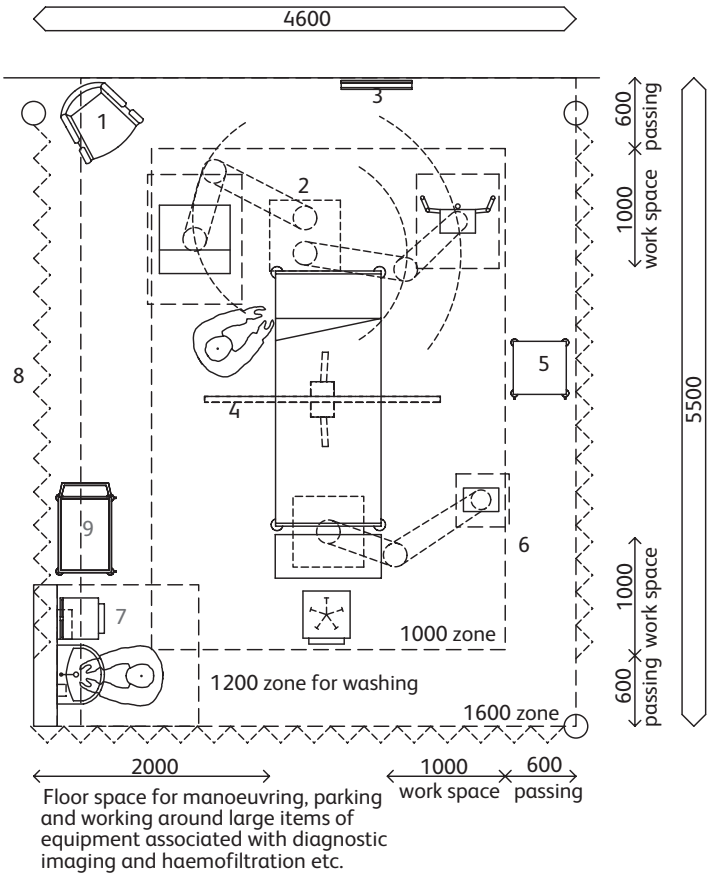
Ergonomic diagrams

(Taken from HBN 57: *2003 Facilities for Critical Care*)

Bed space

(alternative 1)
Sheet 1

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. 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 ± 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.

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.

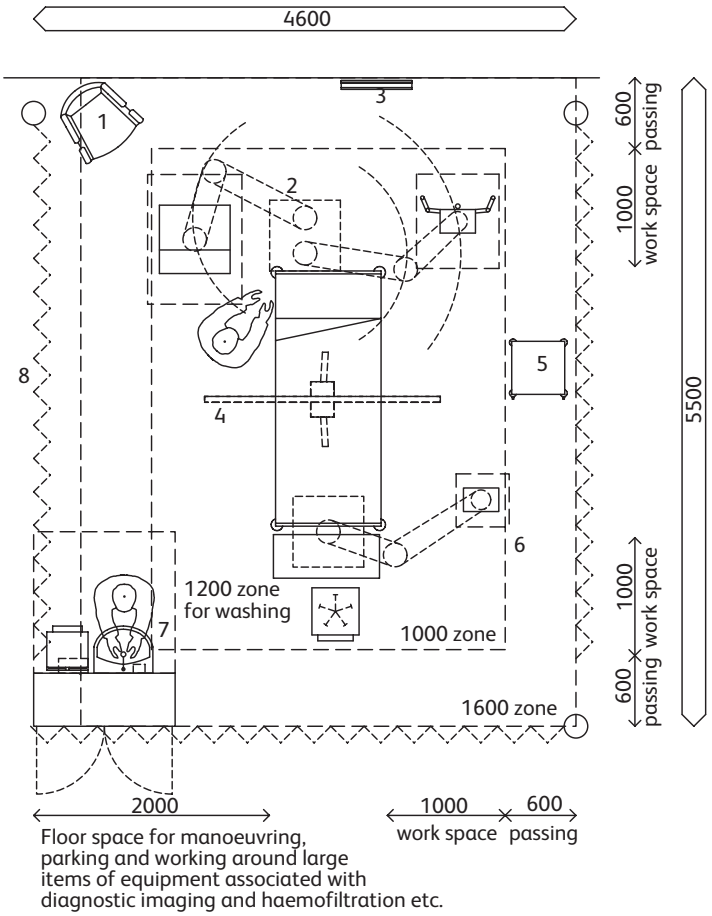
All bed spaces should have suitable daylight provison via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.

A1

Bed space

(alternative 2)
Sheet 2

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 (see note below)
7. Clinical wash-hand facilities with hands-free taps and storage unit
8. Lead/uPVC protective curtain

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.

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 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.

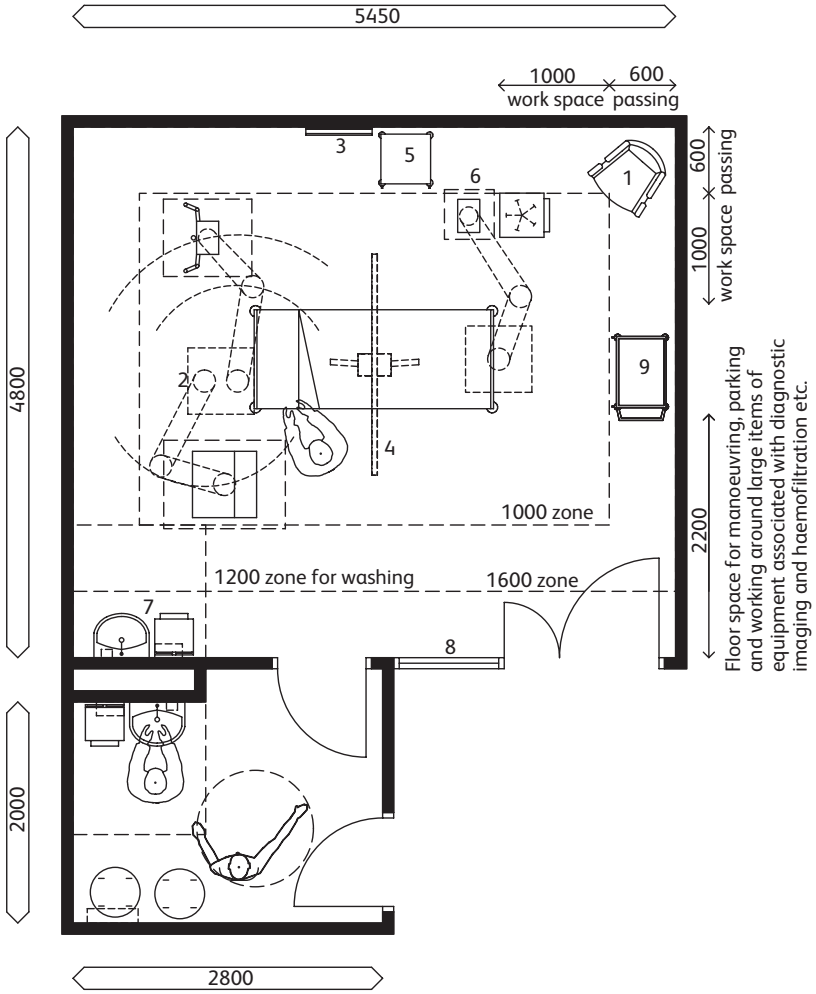
All bed spaces should have suitable daylight provison via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.

A1

Single bedroom

(including airlock)
Sheet 3

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. Glazed partition with venetian blind
9. Supplies trolley

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 ± 20 for the computer are required for staff who work at the bed space for long periods.

Airlock 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.

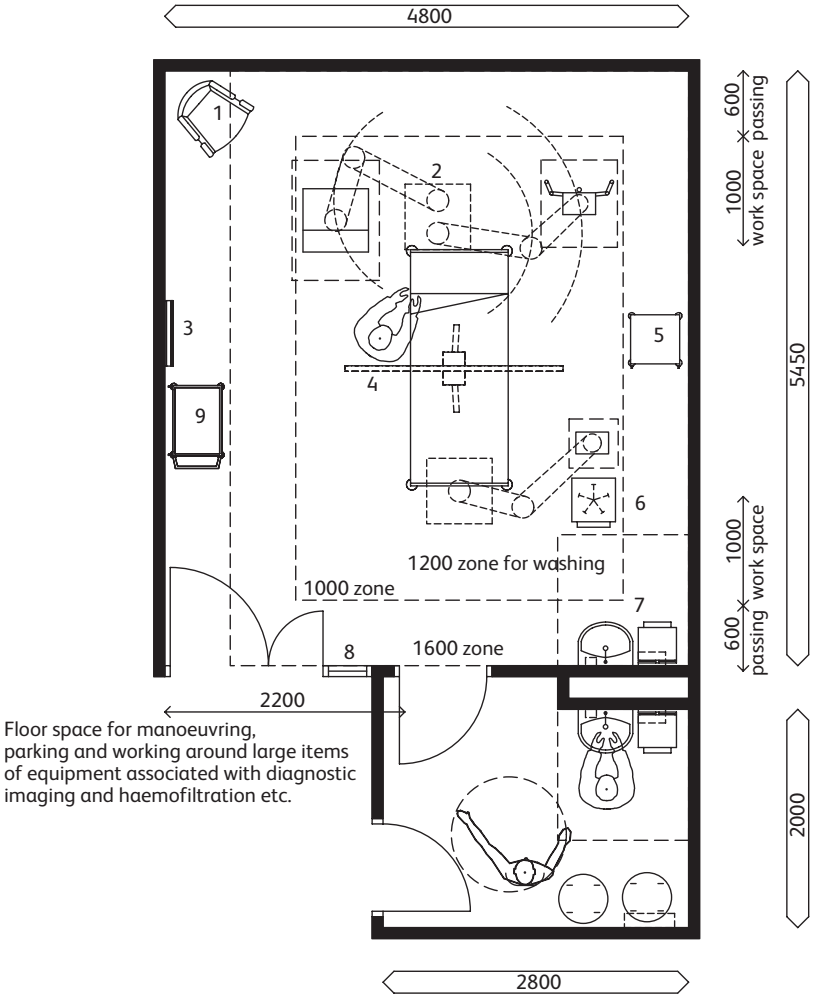
An unobstructed 1000 is required around the bed to carry out procedures and park equipment.
A further unobstructed 600 is required for passing around staff and equipment in the 1000 zone.

A1

Single bedroom

(including airlock)
Sheet 4

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. Glazed partition with venetian blind
9. 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.

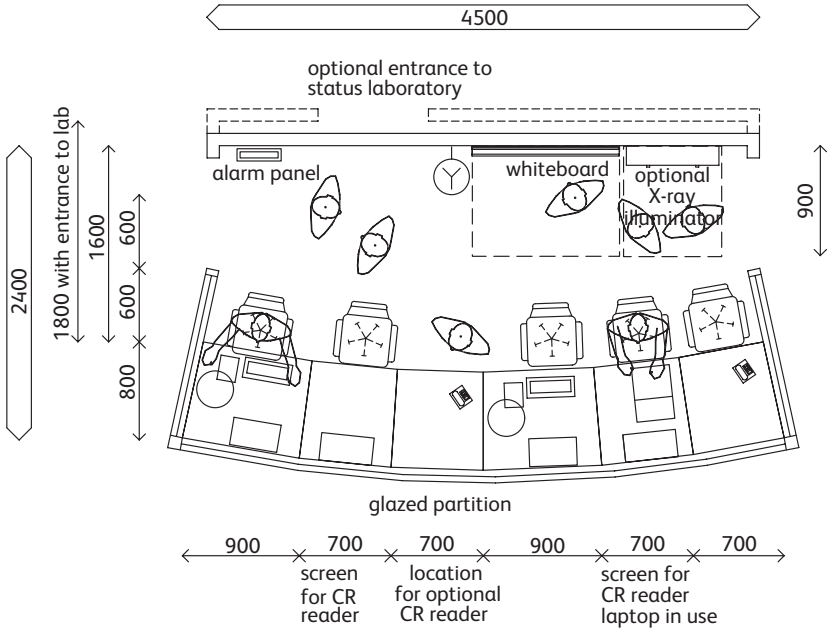
All bed spaces should have suitable daylight provision via full-height windows or rooflights. It is also important to provide variable artificial lighting over each bed space.

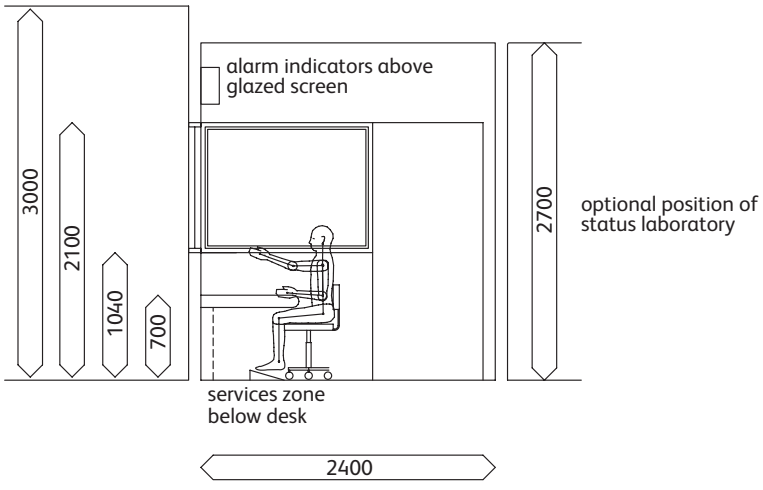
A1

Communications base

Sheet 5

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.



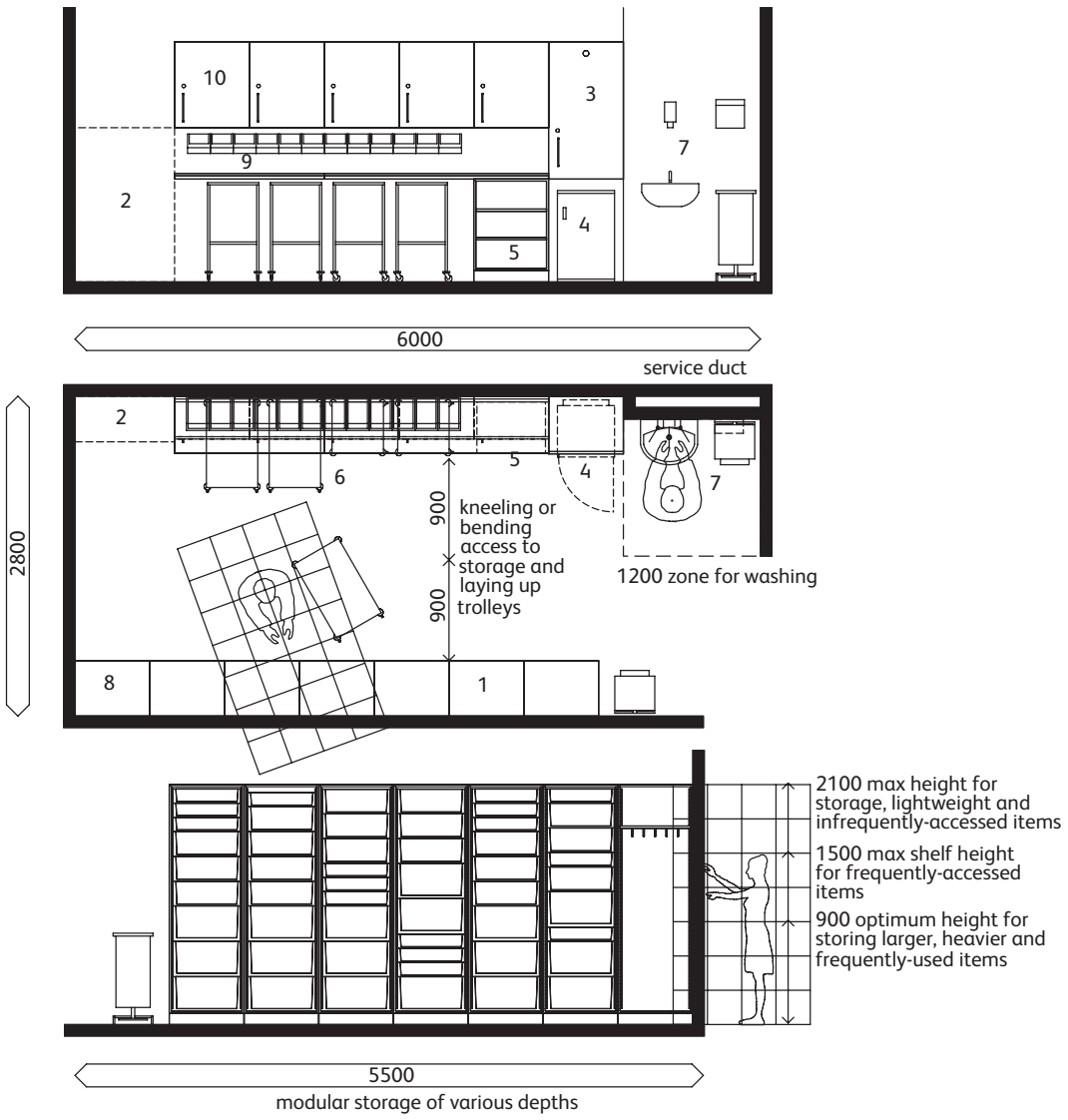


A1

Clean utility

Sheet 6

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).



1. Modular storage system
2. Optional blood bank – ventilation required
3. Controlled Drugs cupboard
4. Lockable refrigerator, 84 litres
5. Under-worktop storage unit
6. 4 no dressing trolleys parked under preparation worktop
7. Clinical wash-hand facilities with hands-free taps
8. Catheter cupboard can be supplied with door if required
9. Tote boxes
10. Storage cupboards

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.

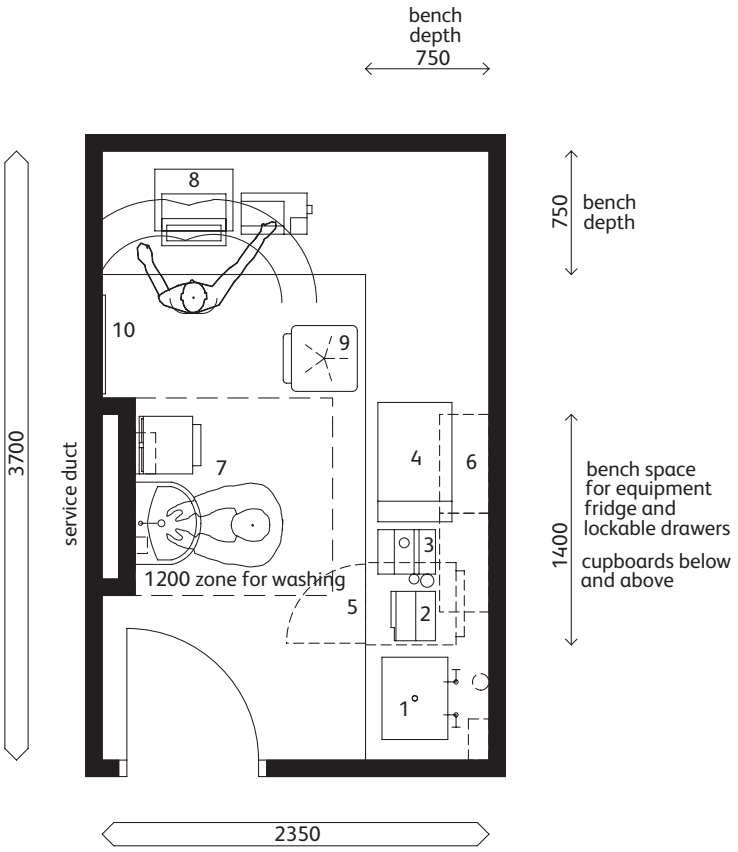
The clean utiltiy should be adjacent to the communications base in order to ensure staff surveillance against unauthorised entry. An opening without doors is preferred for ease of access and surveillance

A1

Laboratory

Sheet 7

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.

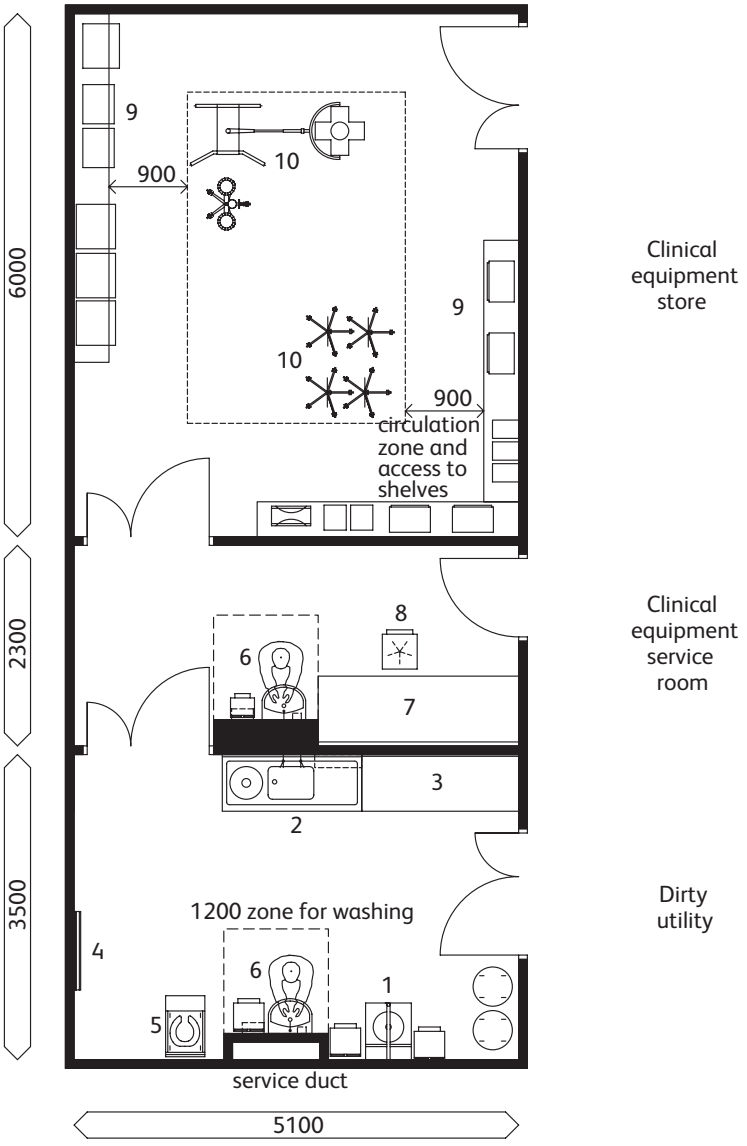
The laboratory should be adjacent to the communications base and if required can have direct access to the base

A1

Dirty utility/clinical equipment service room and store

Sheet 8

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. Macerator disposal unit
2. Sink and hopper disposal unit
3. Storage unit and shelving
4. Whiteboard
5. Sani chair
6. Clinical wash-hand facilities with hands-free taps
7. Workbench with suitable electrical and medical gas outlets
8. Stool
9. Adjustable shelving for storage and charging equipment
10. 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.

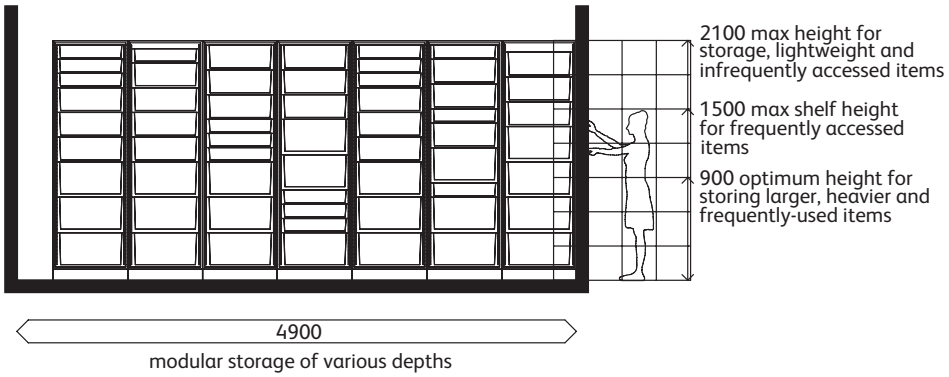
Clean, calibrated and tested ventilators and associated consumables should be stored together for convenience and efficiency.

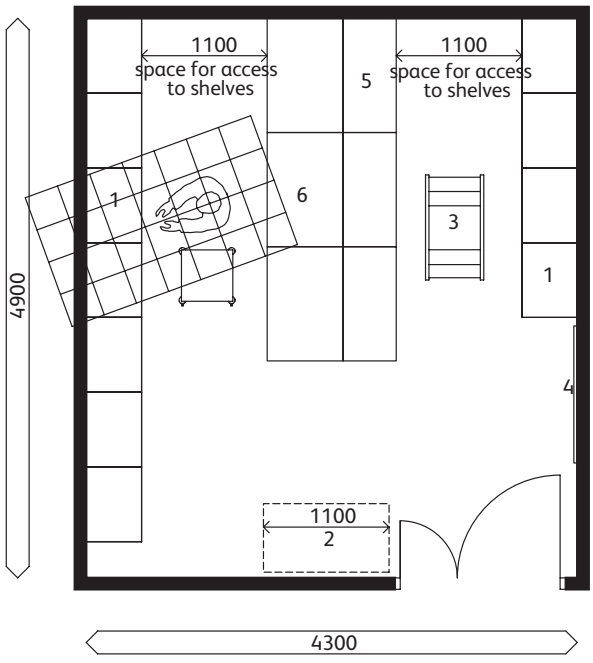
A1

Bulk store

Sheet 8

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
2. Shelf-free area for storage of large and heavy floor stored boxes
3. 3-tread step ladder
4. Noticeboard
5. Shelving racks 1000 x 465
6. 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.

A2

Appendix 2

Critical care example schedules

Activity space	8 bed area Quantity	Area	Total Area	12 bed area Quantity	Area	Total Area	16 bed area Quantity	Area	Total Area
ENTRANCE/RECEPTION/ ADMINISTRATION FACILITIES									
Entrance Combined	1			1			1		
Visitors' foyer	1			1			1		
Reception desk/office: 4 place	1	5.5	5.5	1	5.5	5.5	1	5.5	5.5
Visitors' waiting area:10 Place	1	22.5	22.5						
Visitors' waiting area:13 Place				1	28.0	28.0			
Visitors' waiting area:16 Place							1	33.0	33.0
Mini kitchen	1	5.0	5.0	1	5	5.0	1	5	5.0
WC: independent wheelchair	1	4.5	4.5	1	4.5	4.5	1	4.5	4.5
CLINICAL SPACES									
Communications base: enclosed; 2 place	1	13.0	13.0						
Communications base: enclosed; 4 place				1	16.0	16.0			
Communications base: enclosed; 4 place							1	19.0	19.0
Isolation room, critical care	4	26.0	104.0	4	26.0	104.0	4	26.0	104.0
Gowning lobby: single bedroom	4	6.0	24.0	4	6.0	24.0	4	6.0	24.0
Bed area: multi-bay; 4 bays	1	143.0	143.0	2	143.0	286	3	143.0	429.0
Interview room 7 places	1	12	12.0	1.5	12	18.0	2	12	24.0
Shower room assisted	1	8	8.0	1	8	8.0	1	8.0	8.0
CLINICAL SUPPORT FACILITIES									
Clean utility	1	16.0	16.0	1.5	16.0	24.0	2	16.0	32.0
Near patient testing room	1	8.0	8.0	1	8.0	8.0	1	8.0	8.0
Dirty utility room for bedpan processing	1	12	12.0	1	12	12.0	1	12.0	12.0
Pantry/refreshment room	1	12.0	12.0	1	12.0	12.0	1	12.0	12.0
Storage: bulky consumables, medical gas cylinders, linen and furniture	8	4.0	32.0	6	8.0	48.0	4	16.0	64.0
Store, clinical equipment	1	24.0	24.0	1	24.0	24.0	1	24.0	24.0
Decontamination room, clinical equipment	1	16.0	16.0	1	16.0	16.0	1	16.0	16.0
Parking bay: imaging equipment	1	6.0	6.0	1	6.0	6.0	1	6.0	6.0
Parking bay: resuscitation trolley	1	2.0	2.0	2	2.0	4.0	2	2.0	4.0
Disposal hold	1	8.0	8.0	1	10.0	10.0	1	12.0	12.0
Cleaner's room	1	8.0	8.0	1	8.0	8.0	1	8.0	8.0

A2

	8 bed area			12 bed area			16 bed area		
Activity space	Quantity	Area	Total Area	Quantity	Area	Total Area	Quantity	Area	Total Area
STAFF SPACES									
Office: 1 person	3	8.0	24.0	3	8.0	24.0	3	8.0	24.0
Admin area - shared use (size based on number of workstations)	5	6.6	33.0	9	6.6	59.4	13	6.6	85.8
Meeting room	1	16.0	16.0	1	16.0	16.0	1	16.0	16.0
Seminar room	1	17.0	17.0	1	21.5	21.5	1	26.0	26.0
Rest room with mini kitchen (size based on number of seats)	8	1.9	15.2	12	1.9	22.8	16	1.9	30.4
Changing area staff (size based on number of lockers)	35	1.4	49.0	56	1.4	78.4	77	1.4	107.8
Changing room: semi-ambulant	1	2.0	2.0	1	2.0	2.0	1	2.0	2.0
Shower room: ambulant	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5
WC: ambulant	4	2	8.0	5	2	10.0	5	2	10.0
Net allowance			652.2			907.6			1,158.5
5 % planning allowance			32.6			50			64.0
Total			684.8			1,044.5			1,345.0
3 % engineering allowance			20.5			31.5			40.5
30 % circulation allowance			205.4			313.5			403.5
Total allowance			**910.8**			**1,389.5**			**1,789.0**
OPTIONAL ACCOMMODATION									
Blood refrigerator bay	1	2.0	2.0	1	2.0	2.0	1	2.0	2.0
Service room: clinical equipment	1	12.0	12.0	1	12.0	12.0	1	12.0	12.0
Parking bay: mobile image intensifier	1	2.0	2.0	1	2.0	2.0	1	2.0	2.0
Vending machine	1	3.0	3.0	1	3.0	3.0	1	3.0	3.0
Sitting room	1	12.0	12.0	1	12.0	12.0	1	12.0	12.0
Relative's overnight stay	1	17.0	17.0	1	17.0	17.0	1	17.0	17.0
Shower room: semi ambulant standing use	2	5.0	10.0	2	5.0	10.0	2	5.0	10.0
Net allowance			58.0			58.0			58.0
5 % planning allowance			2.9			2.9			2.9
Total			60.9			60.9			60.9
3 % engineering allowance			1.8			1.8			1.8
30 % circulation allowance			18.3			18.3			18.3
Total allowance			**81.0**			**81.0**			**81.0**

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Radioactive Substances Act 1993 **http://www.legislation.gov.uk/ukpga/1993/12/contents**

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BS 7671:2008+A3:2015 *Requirements for electrical installations. IET Wiring Regulations.*

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NHS Wales Shared Services Partnership - Specialist Estates Services

Health Technical Memoranda (HTMs) and Health Building Notes (HBNs) issued by the Department of Health in England are being superseded by specific Welsh editions which will be titled Welsh Health Technical Memoranda (WHTMs) and Welsh Health Building Notes (WHBNs) and which will use the same numerical coding. The guidelines referenced below were the most recent at time of publication; however, *the latest version should always be used, provided that it continues to address the relevant requirements of these recommendations.* All are available from the NHS Wales Shared Services Partnership – Specialist Estates Services websites:

Intranet: **http://howis.wales.nhs.uk/sites3/page.cfm?orgid=254&pid=39106**
Internet: **http://www.wales.nhs.uk/sites3/page.cfm?orgid=254&pid=6142**

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WHBN 00-04:2014 *Circulation and communication spaces*

WHBN 04-01 supplement 1:2014 *Isolation facilities for infectious patients in acute settings*

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