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Welsh Health Building Note

Cardiac facilities

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Welsh Health Building Note 01-01: Cardiac facilities

Overview

This Welsh Health Building Note provides guidance on minor cardiac procedures and cardiac operating theatre suites for inclusion in acute settings, and also guidance that describes spaces that are unique to a catheter laboratory suite.

Acknowledgements

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Chapter 1

Policy context

1.1 The *Heart Conditions Delivery Plan* (Welsh Government 2017) outlines the Welsh Government's commitment to minimising the incidence of preventable heart disease and ensuring that those affected by a heart condition have timely access to high quality pathways of care. It recognises improvements made in the care of people with a heart condition in Wales and the steady decline in the rate of people hospitalised for cardiovascular and coronary heart disease made since the previous 2013 plan and highlighting ways in which the Welsh Government will build on these successes.

1.2 Priorities identified by the plan include: developing treatment pathways for common cardiac conditions; piloting component and diagnostic waiting times; developing and implementing an out-of-hospital cardiac arrest plan; further improving cardiac rehabilitation and physiology services; implementing the all-Wales accelerated cardiac informatics project; and developing cardiac peer review across Wales.

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Chapter 2

Service context

Background

2.1 Cardiac networks provide localised support and facilitation for the delivery of integrated care across primary, secondary and tertiary service organisations. Networks have increasingly provided support and advice to service commissioners, and can offer access to expert advice on clinical innovations and specialist service provision.

2.2 Some cardiac services may be provided from a general hospital while others require specialist provision. The range of specialist cardiac facility provision will depend on the particular circumstances of the hospital or unit concerned. Table 1 illustrates some of the possible configurations.

	Secondary unit	**Tertiary unit**
Outpatient consultation	Sessional use of main outpatient department	Dedicated consulting/examination facilities if justified by activity levels
Cardiac non-invasive investigation facilities	Sessional use of some rooms within outpatients; others will be dedicated	Normally a dedicated suite of rooms within outpatients
Catheter laboratory suite	May be a self-contained suite or part of a day intervention unit	May be a self-contained suite, part of a day intervention unit or co-located with cardiac theatres
Minor cardiac procedures suite	If required, usually co-located with catheter laboratory suite to maximise current and future flexibility	If required, usually co-located with catheter laboratory suite to maximise current and future flexibility
Day case admissions and recovery area	Usually shared access to central day case recovery area	Usually shared access to central day case recovery area
Cardiac operating theatres	N/A	Either a dedicated cardiac theatre suite or specific theatre allocation within a larger general operating theatre suite
Cardiac critical care	N/A	Either a dedicated cardiac critical care unit or a bed allocation within a larger general critical care unit
Coronary care unit	A general acute ward with additional telemetry; usually adjacent to other general medical/cardiology wards	A general acute ward with additional telemetry; may be adjacent to other general medical wards or within a specialist cardiac facility

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Cardiology/medical wards	Cardiology beds often provided as part of general medical bed allocation	May be adjacent to other general medical wards or dedicated cardiology ward as part of a specialist cardiac facility
Cardiac surgery wards	N/A	Dedicated cardiac surgery ward
Children's cardiac wards	N/A	Dedicated children's cardiac ward

Table 1

Outpatient consultations

2.3 Outpatient consultations for cardiac patients do not require specialist facilities. The need for dedicated facilities will depend on activity levels. If facilities are dedicated, co-location with non-invasive cardiac investigations is advantageous to enable one-stop clinics to operate.

Diagnostic services

2.4 Most non-invasive cardiac investigations procedures, including ECGs, echocardiographs, and pacemaker monitoring and adjustment, may be carried out in an outpatient environment.

2.5 Coronary angiography and electrophysiology studies will usually be undertaken in a catheter laboratory.

2.6 Other diagnostic imaging services (including cardiac magnetic resonance imaging (cardiac MRI) and nuclear cardiology) will usually be provided from a central diagnostic imaging facility.

2.7 Where congenital cardiac disorders are treated, consideration may be given to locating cardiac MRI facilities alongside other cardiac facilities rather than in the main imaging unit.

2.8 Where investigations involve an element of recovery, patients may be admitted to a day case unit.

Treatment services

2.9 Aside from surgery, invasive cardiac treatments will be undertaken either in a catheter laboratory or in a minor cardiac procedures room.

2.10 Cardiac surgery is undertaken in designated operating theatres.

2

Inpatient services

2.11 Inpatient accommodation for cardiac patients does not differ from inpatient accommodation for other patient groups.

2.12 Coronary care units (CCUs) are inpatient areas for the continuous monitoring of patients suffering from cardiac abnormalities or acute cardiac emergencies, such as acute myocardial infarction (AMI).

2.13 A CCU may also accommodate patients not stable enough to return to a general ward after an invasive procedure and/or patients requiring an initial assessment.

2.14 The functional requirements for a CCU are essentially the same as those of a general acute ward, with the addition of the necessary telemetry equipment. The staff base must be designed to allow central monitoring of all CCU patients, and careful attention should be paid to ensuring clear sight lines to all beds.

2.15 Ideally, emergency referrals of patients with confirmed or strongly suspected AMI will be made directly to a CCU and associated catheter laboratories. Direct ambulance access should be provided where feasible. If the CCU is not at ground level, dedicated lift access is recommended.

2.16 In hospitals that do not carry out primary percutaneous coronary interventions (PCIs), there may be few, if any, AMI admissions. In such places a distinct CCU may not be required.

2.17 Consideration should be given to the provision of a number of designated monitored/telemetry beds in the general cardiology wards to support the monitoring of cardiac patients who do not require admission to a CCU. These may include inpatients who have undergone procedures in the catheter laboratory; monitoring may typically be required for up to four hours post-procedure.

2.18 Critical care beds for cardiac surgery patients do not differ from critical care beds for other patient groups. There should be direct access to cardiac operating theatres.

2.19 See also WHBN 04-01:2014 *Adult in-patient accommodation* and WHBN 04-02:2016 *Critical care units*.

Rehabilitation services

2.20 Cardiac patients may require access to a group room or gymnasium for the purpose of rehabilitation. This will usually be provided from a central rehabilitation facility. Access to an outdoor walking circuit is desirable. See HBN 8: 2004 *Facilities for rehabilitation services.*

2

Bariatric services

2.21 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*.

2.22 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.

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

3

Chapter 3

Scope of guidance

3.1 This WHBN describes spaces that are unique to a catheter laboratory suite. It also describes any variations to common hospital spaces and clarifies requirements for these spaces, where necessary.

3.2 For a full list of space requirements see the example schedules of accommodation for a 2-lab and 4-lab suite in **Appendix 1**. 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.

4

Chapter 4

Whole unit planning and design considerations

Procedures undertaken in catheter laboratories

4.1 Catheter laboratories can be used for a range of invasive cardiac investigations and treatments including:

- coronary angiography;
- percutaneous coronary interventions (PCIs);
- transoesophageal electrocardiograms (TOEs);
- electrophysiology studies (EPS);
- radiofrequency ablations (RFAs);
- closure of atrial septal defects (ASDs) and ventricular septal defects (VSDs);
- transcatheter aortic valve implantations (TAVIs);
- mitral valvuloplasty;
- implantable cardioverter defibrillators (ICDs);
- insertion of implantable devices (including complex devices).

4.2 They may also be required to undertake non-cardiac procedures such as:

- neurovascular angiography;
- endovascular coiling.

Departmental relationships

4.3 The catheter laboratory suite should be as close as possible to a day case admissions and recovery area to provide immediate access to stage two recovery facilities. This area will also be used for stage three recovery and pre-procedure paperwork and clinical checks. One option is to include the catheter laboratory suite as part of a day intervention unit, together with other similar facilities such as day surgery, endoscopy and interventional radiology.

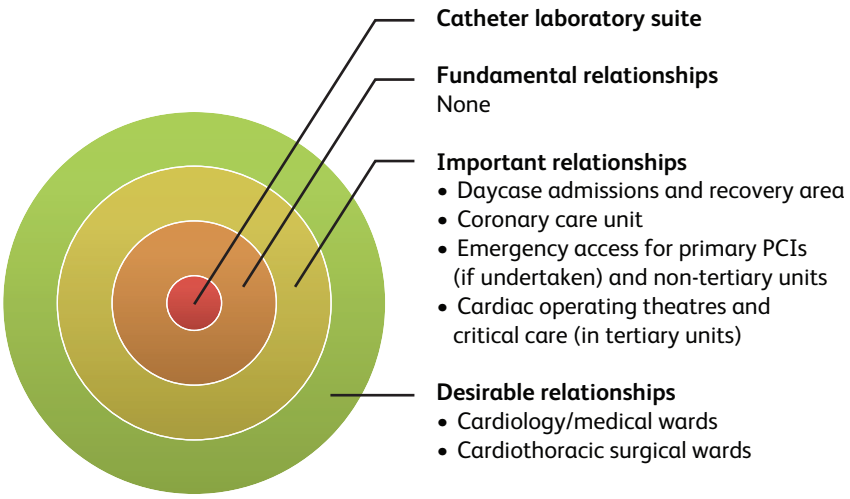
4.4 The catheter laboratory suite should also be close to the CCU.

4

4.5 If primary PCIs are undertaken in the catheter laboratories, the emergency access route should be given priority. This may mean siting the catheter laboratory suite close to the hospital's emergency department or providing direct ambulance access. The emergency access route is also important in non-tertiary units to allow for immediate patient transfer to a tertiary unit, when required.

4.6 In tertiary units, careful consideration should be given to the location of the catheter laboratories in relation to the cardiac operating theatres. It must be possible to transfer a patient to theatre immediately, when required. In rare cases, the theatre team may need to perform emergency surgery in the catheter laboratory.

4.7 There should be good access to and from the cardiology/medical wards and, in tertiary units, cardiothoracic surgical wards.



Fundamental relationships = immediately adjacent – same level, no public corridors or other departments to traverse

Important relationships = nearby – immediately across a public or main communication corridor, or one floor difference and immediately accessible, or less than 20 metres along a corridor

Desirable relationships = less than four floors or less than 40 metres horizontal travel, or combination of these

Figure 1 Departmental relationships for a catheter laboratory suite

Radiation protection

4.8 Appropriate radiation shielding is mandatory in the catheter laboratories. The design of the laboratories and associated facilities must comply with all relevant regulations, notably the *Ionising Radiations Regulations 1999* and the *Health and Safety at Work etc Act 1974*.

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Chapter 5

Clinical spaces

Catheter laboratories

5.1 See **Figure 2.** Each catheter laboratory should accommodate the following equipment:

- A multi-angular digital angiographic X-ray system (single or biplane) comprising a C-arm (X-ray source and detector), a fully-adjustable patient table and ceiling-mounted flat panel monitors for angiography work, PCIs, EPS and RFAs (up to eight, if EPS and RFAs are undertaken); consideration should be given to a table that can tilt.
- Computer workstations will be required. The clinical team MUST be fully consulted as to the number and functions of each workstation.
- A scrub trough and associated facilities for scrub-up and gowning (alternatively, a separate scrub-up and gowning room may be provided).
- A worktop for drugs preparation and documentation (alternatively, a separate preparation room may be provided).
- Enclosed storage for equipment and consumables, including a rack for catheters.
- A controlled drugs cupboard.
- A heated lotion cabinet for the preparation of contrast media.
- A powered injector for use during the procedure – this may be floor or ceiling mounted.
- Where EPS and RFAs are undertaken, stimulators, ablators and mapping systems should be mounted on trolleys or within specially designed shelving units that can be moved to be near the patient.

5.2 A minimum size of 50 m^2 is recommended in order to accommodate the above equipment and up to eight members of staff (needed if EPS and RFAs are undertaken).

5.3 Most angiographic X-ray systems are floor-mounted, although ceiling-mounted options are available. Where ceiling-mounted systems are used, additional reinforcement of supporting structures may be required. Floor-mounted components are normally fixed to the floor by secure heavy-duty fixing devices, capable of retaining a moving mass weighing up to 3 metric tons with high residual torque.

5.4 Biplane equipment is needed to support treatments of congenital cardiac disorders, for EPS, TAVIs and, if undertaken, neurovascular angiography and endovascular coiling. Where biplane equipment is to be installed, consideration should be given to making the room longer along the table axis to allow for the movement of the second C-arm.

5

5.5 The patient table should be capable of multi-directional movement and operating in conjunction with an isocentre positioned at or near the patient's heart. The position of the table should allow for movement of the C-arm and provide operator access to both sides. Tilting tables are available that allow tilting along both axes; the use of such tables may put an additional strain on floor structures, therefore expert advice should be sought. Consideration may need to be given to the treatment of overweight patients. Some patient tables have low weight limits.

5.6 Monitors display real-time, digitally recorded angiographic images and basic physiological data (or advanced data in the case of monitors for EPS and RFAs).

5.7 The current monitor systems allow for very large devices to be used. Consideration should be given during the design phase to ensure that the monitor can be correctly located for all procedures, both to the left and the right of the patient table.

5.8 A leaded apron rack is required, ideally located at the entrance to the catheter laboratory, outside the control area. Wall-mounted racks may require reinforcements to wall structures due to the weight of the aprons. Alternatively, floor-mounted racks may be installed.

5.9 Key engineering considerations include:

- Each laboratory should be equipped with a ceiling-mounted minor operating light selected to meet the clinical function of the particular catheter laboratory.
- The general lighting should be coordinated with the patient table and tube stand to ensure that imaging perception is not adversely affected. Locally controlled variable lighting levels should be provided to avoid reflection on monitoring screens. Consideration should be given to the use of low energy LED lighting.
- Medical oxygen, medical compressed air and medical vacuum, together with nitrous oxide and active anaesthetic gas scavenging, may be required. Input from the clinical team should be sought at the earliest stages so that the design can accommodate all necessary features.
- Illuminated safety signs and/or warning lamps are required outside the main doors into each catheter laboratory and also at the entrance to each laboratory from the respective control area. The warning lamps must give a clear indication in red when they are energised and the illuminated signs should incorporate legends as determined by the local RPA, visible only when illuminated. Warning lamps may have incandescent filaments, or more preferably be LEDs, and be correctly energised in line with the local requirements of the RPA. In general this is a permanently energised 'room in use' section when the x-ray system is capable of operating, and a red 'do not enter' section when the radiation is being emitted.
- All alarms should be visual as well as audible.

5

- It is essential to establish the range of procedures to be undertaken to determine ventilation requirements. Many simple procedures of short duration, such as inserting temporary pacemakers and simple implantable devices, only require ventilation to treatment room standards. Lengthy procedures, however, including PCIs, RFAs, closure of ASDs and VSDs will require ventilation to operating theatre standards.

- It is recommended that removal of a catheter under X-ray control be possible in the event of mains power failure. This requirement should be discussed with all parties, including the clinical team, and the Authority engineering teams

Control rooms

5.10 See **Figures 3** and **4.** Each laboratory should be served by an X-ray system control room. It is possible that one control room may serve up to two laboratories. If shared between laboratories, the control room should be large enough to enable two teams with their monitoring equipment to operate independently and maintain unimpeded access to the appropriate laboratory.

5.11 The control room should provide a viewing window into the respective laboratory. This should provide a clear view of the patient table in the laboratory.

5.12 The control room requires radiation protection and good voice contact with the laboratory.

5.13 Consideration should be given to the design to allow direct access to the control room without entering the laboratory.

5.14 Key equipment consideration:

- Computer workstations are required; full design requirements MUST take into account the needs to the clinical team and their respective clinical systems access.

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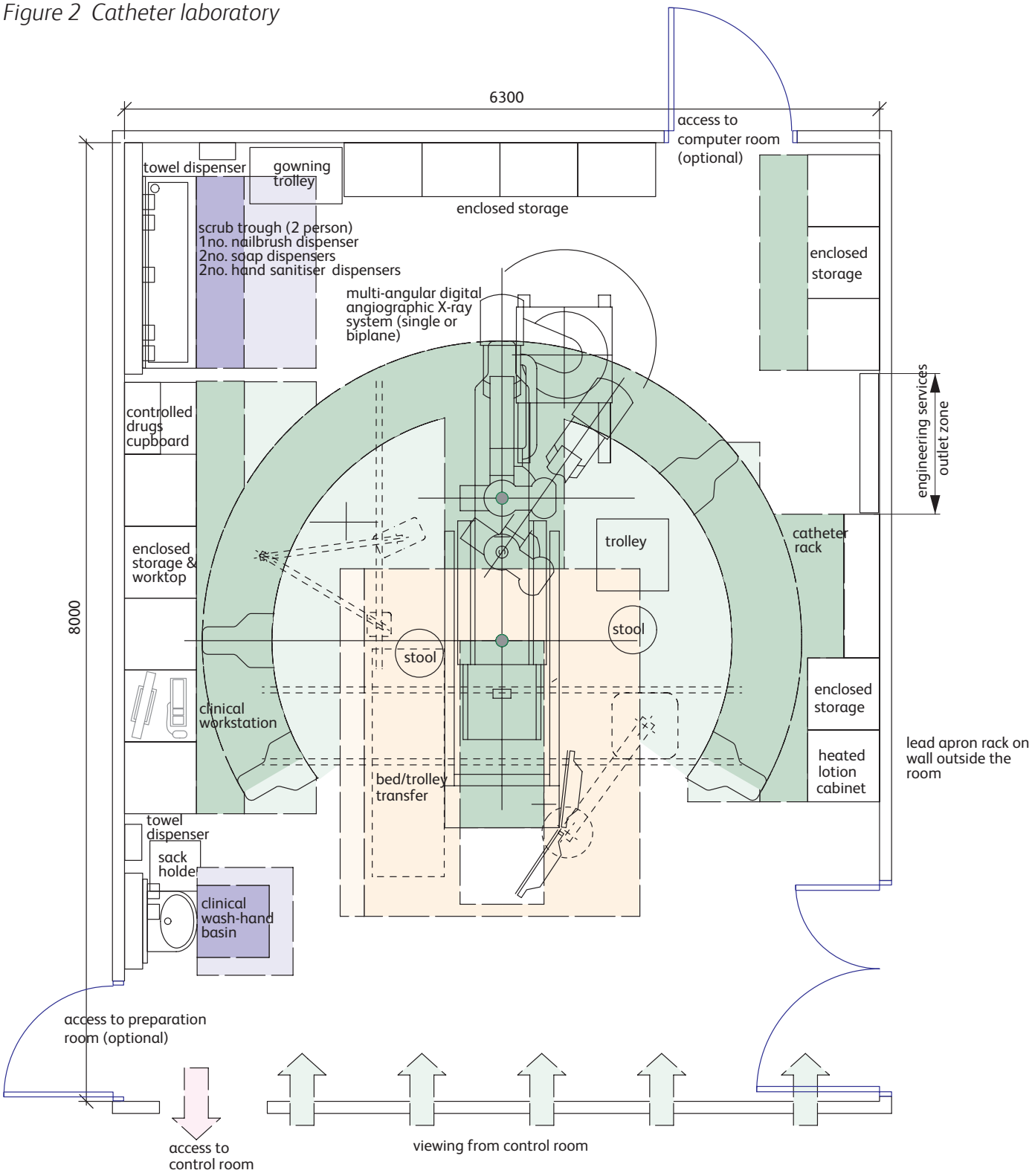
Figure 2 Catheter laboratory



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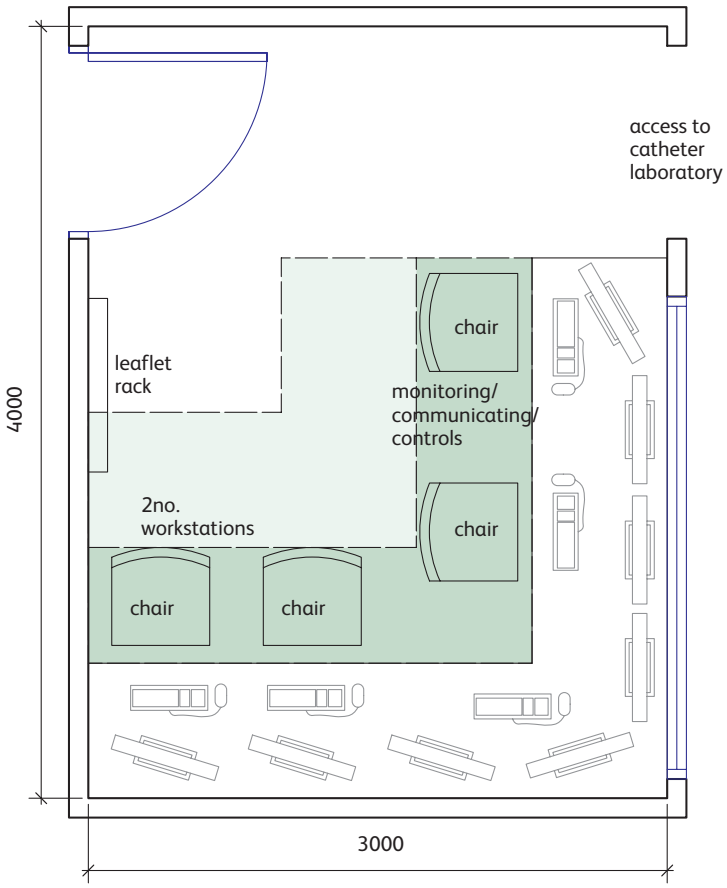

Figure 3 Control room serving single catheter laboratory

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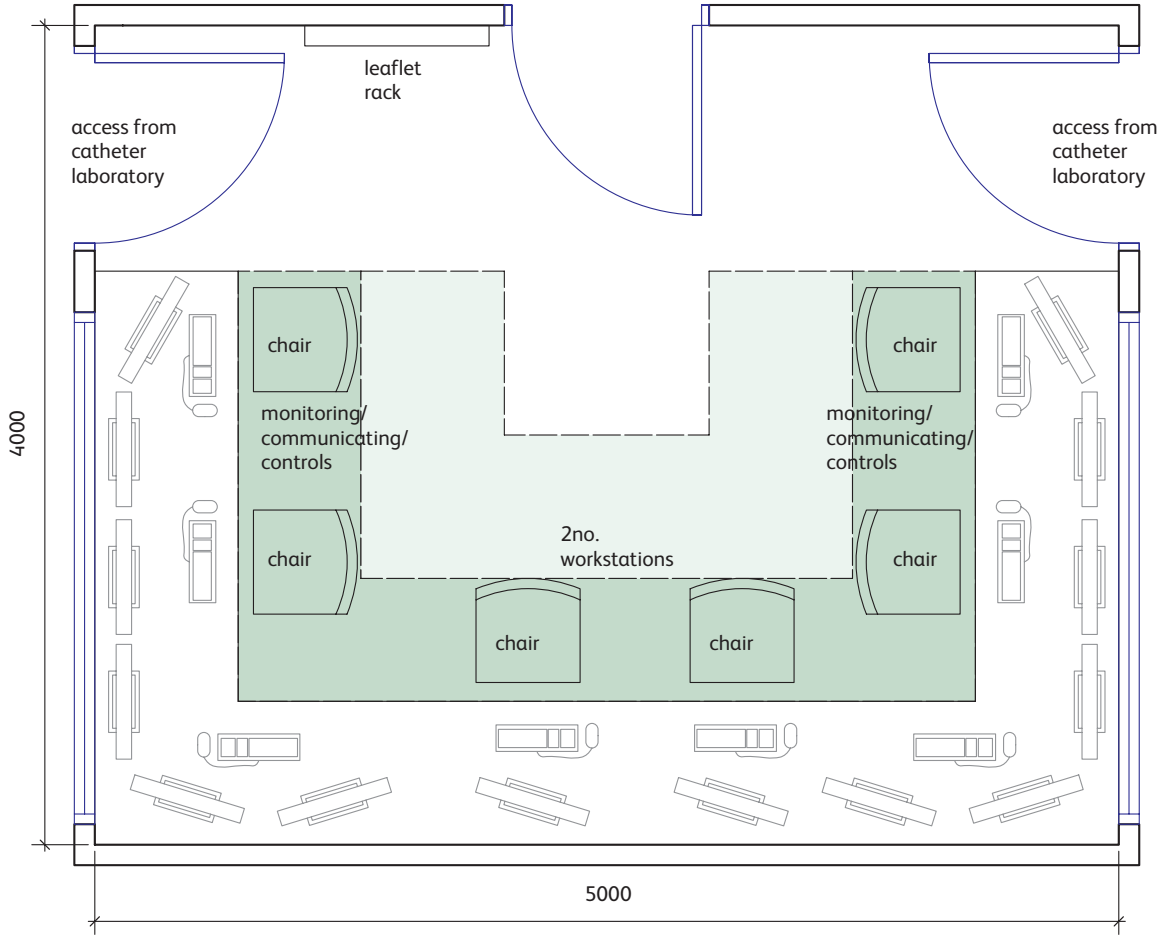

Figure 4 Control room serving two catheter laboratories

Anaesthetic rooms

5.15 Generally only children and adults with congenital heart defects require a general anaesthetic prior to a procedure in a catheter laboratory. However, patients with epilepsy and physical disabilities may require a general anaesthetic. Ideally the anaesthetic should be delivered in a separate anaesthetic room en suite to the catheter laboratory.

Emergency admission and post anaesthetic recovery bays

5.16 One or more bays may be needed:

- for the direct admission of primary PCI patients on beds or trolleys;
- for post-anaesthetic recovery and/or to stabilise patients before moving them.

5

5.17 This bay is identical to a standard post-anaesthetic recovery bay.

Preparation rooms (optional)

5.18 See **Figures 5** and **6**. Where preparation rooms are provided separately, these may serve a single catheter laboratory or a pair of catheter laboratories.

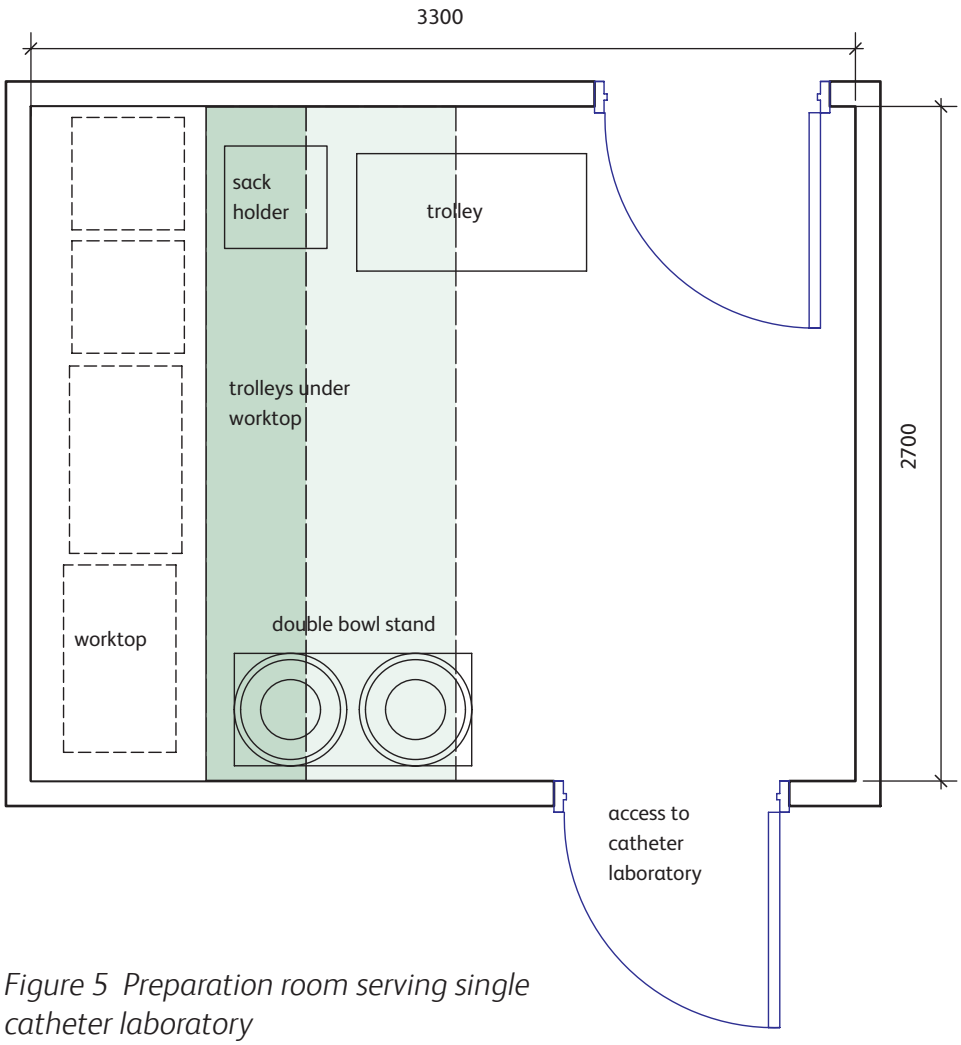

Figure 5 Preparation room serving single catheter laboratory

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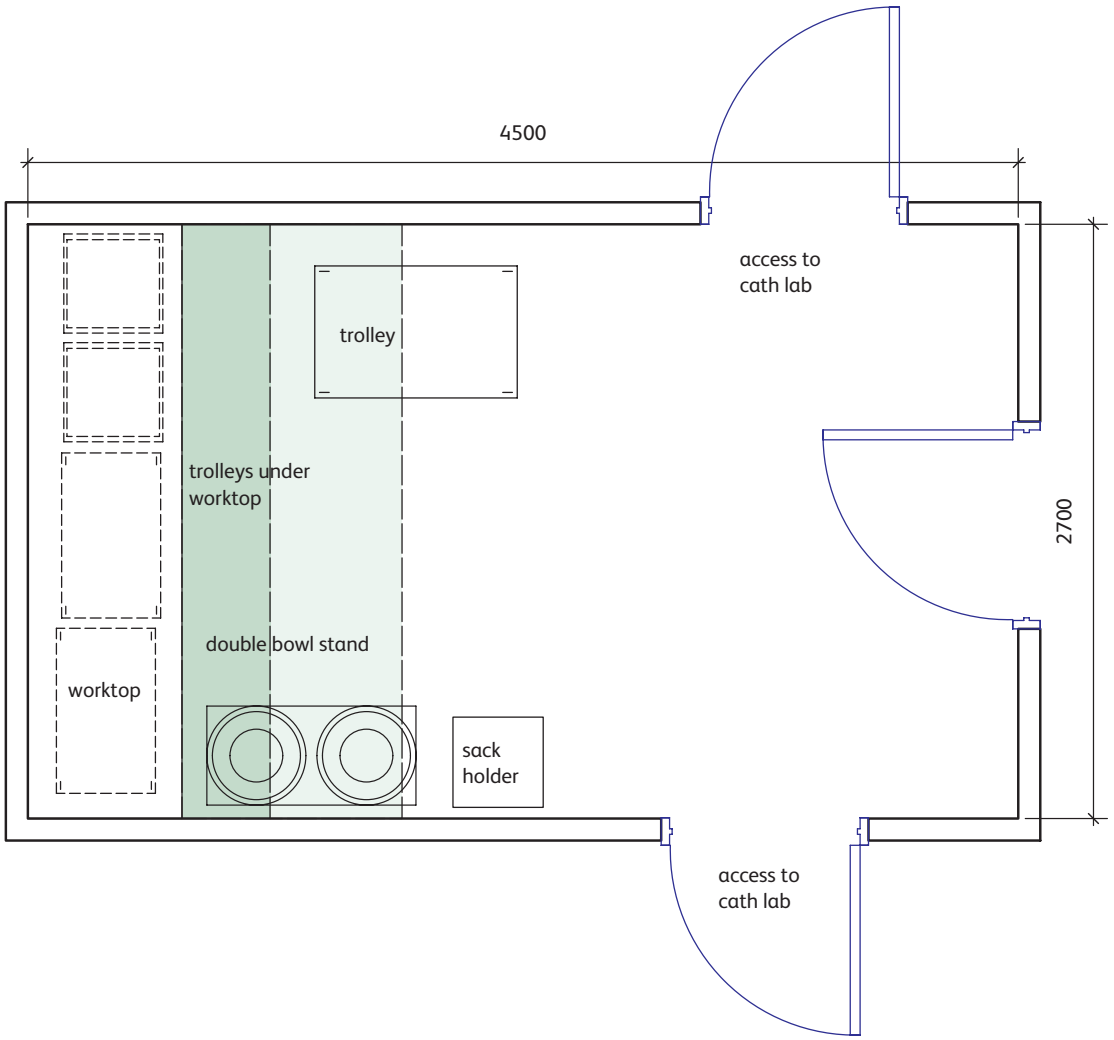

Figure 6 Preparation room serving two catheter laboratories

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Chapter 6

Clinical support spaces

Trolley/bed parking bays

6.1 These bays are not intended to provide for immediate post-procedure stage two recovery, which should take place in a day case recovery area. They are intended for bed or trolley storage while the patients are in the catheter laboratories.

Dirty utility room

6.2 Most procedures use fully disposable supplies. For this reason the dirty utility room should be equipped with a macerator.

Storage for equipment and consumables

6.3 The example layout of the catheter laboratory is based on the assumption that a core supply of consumables and equipment, including catheters, is held within the room.

6.4 The example schedules include an additional space allowance for a central stock of consumables and less frequently used bulky equipment, such as intravascular ultrasound (IVUS) machines, rotablation, robotic equipment, pressure wire workstations, balloon pumps and implantable devices. Facilities for charging syringes and IV pumps should be provided.

Image review/meeting room

6.5 An image review/meeting room may be required. The room should support multidisciplinary case reviews. It should accommodate approximately eight staff and include space for multiple workstations with access to PACS and any other systems necessary to access radiological images including CT, MRI, echo and angiography imaging.

6.6 In small units, the room may not need to be located in the catheter laboratory suite itself.

6.7 Variable lighting level control and avoidance of reflection on monitors through selection and positioning of luminaires is essential. Consideration should be given to the use of LED lighting.

6

Computer/imaging equipment room

6.8 Space is needed to house the X-ray imaging generators and computers that run the imaging systems. It should not be possible to enter this space while any of the catheter laboratories are operational.

6.9 The presence of high-tension electricity, and the need for radiation protection for persons working here, should be noted. Careful consideration should also be given to effective environmental control to prevent overheating of imaging equipment.

7

Chapter 7

Cardiac operating theatre suite

7.1 This chapter describes spaces that are unique to cardiac operating theatre suites. It also describes any variations to the provision of common theatre spaces as used in general operating theatre suites.

7.2 It is based on the assumption that patients will normally be admitted to an inpatient ward immediately prior to surgery. However, consideration should be given to providing facilities to enable final pre-procedure paperwork and clinical checks to be undertaken in the theatre suite without the need for direct admission to an inpatient ward. This will only be appropriate for certain patients.

7.3 For a full list of space requirements see the example schedule of accommodation for a 4-cardiac theatre suite. The example schedule provides 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. Exit space from each theatre is covered by the circulation allowance.

Whole unit planning and design considerations

Procedures undertaken in cardiac theatres

7.4 Cardiac operating theatres should provide a safe environment for patients to undergo cardiac procedures including closed and open-heart cardiac and thoracic surgery, and heart and heart/lung transplants.

Departmental relationships

7.5 The cardiac operating theatre suite should:

- be immediately adjacent to cardiac critical care (fundamental relationship);
- be close to the catheter laboratories, allowing for transfers for emergency surgery;
- provide close, simple access to and from the cardiothoracic wards, ideally located on the same floor – if not – with an immediately-accessible lift connection;
- have good access from the emergency department;
- have good access to and from the CCU and the cardiology/medical wards;
- provide good connections with sterile services.

7.6 See also **Figure 1.**

7

Clinical spaces

Cardiac operating theatres

7.7 Cardiac theatres should be at least 55 m^2, broadly rectangular and with a minimum dimension in any single direction of 7 metres.

7.8 When coronary bypass operations are being undertaken, it is necessary to accommodate two surgical teams with their support apparatus working on the patient simultaneously, and it is this requirement that has the greatest significance for the design and layout of the room, including the need for one main operating light and two smaller (satellite) lights.

7.9 Occupancy of the theatre during an operation will normally comprise:

- a lead and one or two support surgeons with a scrubbed practitioner and non-scrubbed 'runner';
- an anaesthetist and anaesthetist's assistant;
- a monitoring technician.

7.10 When a coronary bypass operation is being undertaken, that occupancy will be increased by:

- a second surgeon; and
- a perfusionist to operate the heart bypass machine.

7.11 Each cardiac theatre requires two ceiling-mounted twin-armed pendants to accommodate a range of equipment and for the provision of medical gases and electrical and data connectivity. For further details see the description of a general operating theatre.

7.12 Cardiac theatres also require a single ceiling-mounted vertical pendant for the perfusionist. The following equipment will need to be connected to the vertical pendant:

- perfusion machine (heart/lung machine);
- balloon pump;
- cell savers;
- echocardiography machine;
- mobile C-arm X-ray unit and monitors.

7

7.13 Most theatres will not require a fixed C-arm. Where provided, it should be ceiling-mounted to minimise the obstruction it may cause to surgical teams.

7.14 The pendants should be positioned so that during bypass operations all teams have access to their pendant without impeding the surgical fields.

7.15 Modern techniques may require minimally invasive 'stacks' and numerous sterile trolleys.

7.16 An ultra-clean ventilation canopy is not an essential requirement in most cardiac theatres, although it should be seriously considered in theatres in which transplant work will be undertaken.

7.17 The theatre will need to accommodate a sterile trolley for examining specimens.

7

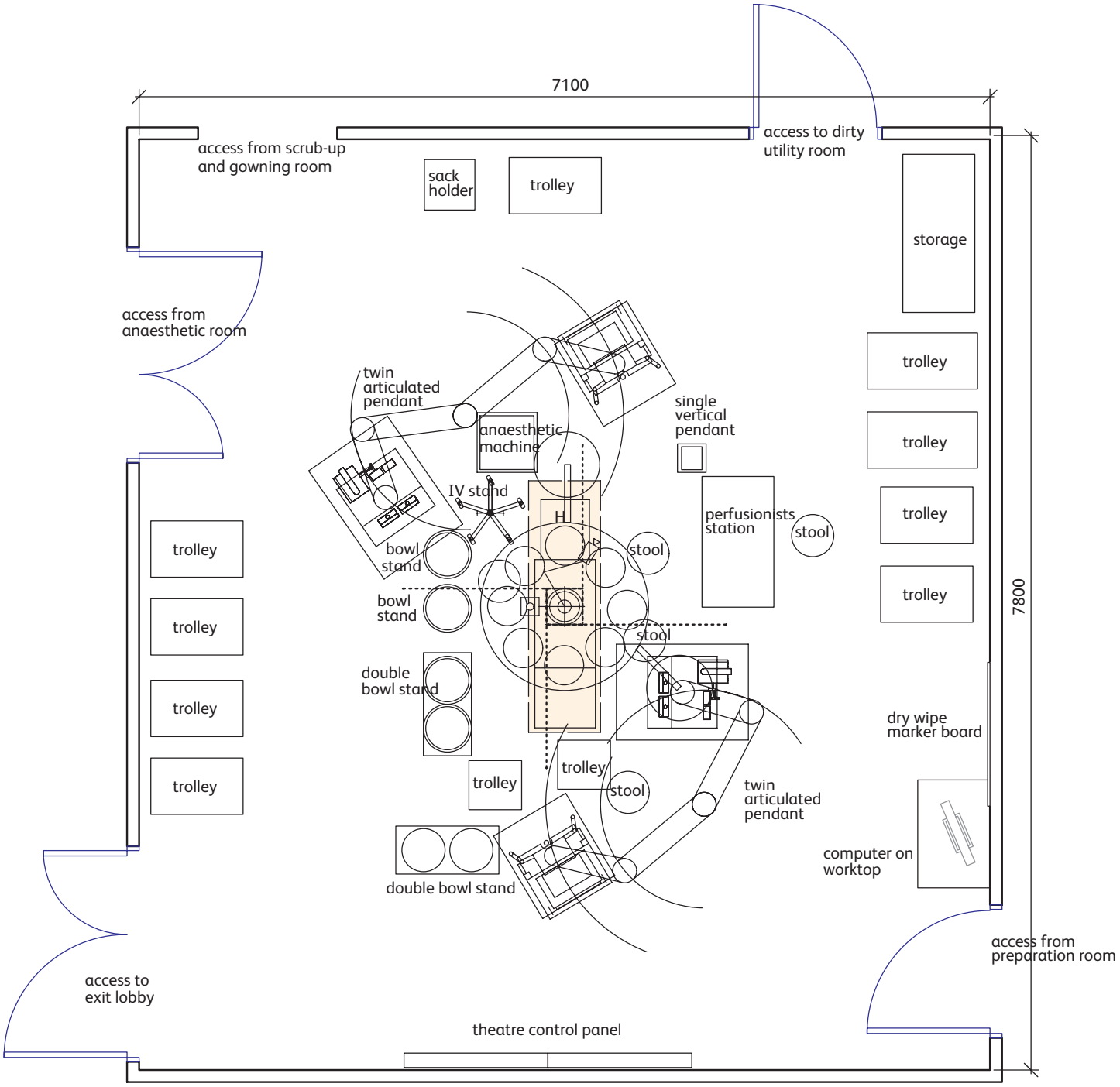

Figure 7 Cardiac operating theatre

7

Recovery bays

7.18 One post-anaesthetic recovery bay is recommended for every two cardiac theatres. This is based on the assumption that a large proportion of cardiac surgical patients will go directly to critical care rather than remaining in theatre recovery. It is less than the two recovery places per theatre recommended for general operating theatre suites.

7.19 Most thoracic cases require post-anaesthetic recovery. If a high proportion of thoracic patients are being seen, the ratio of recovery bays will need to be increased. Equally, if cardiac patients are not transferred immediately to critical care, the ratio of recovery bays will need to increase.

Clinical support spaces

Perfusion suite

7.20 A perfusion workroom is required for the cleaning and setting up of perfusion machines.

7.21 There should be at least one perfusion machine for each theatre, plus one spare.

7.22 The room should contain computer workstations for accessing patient records, work surfaces of sufficient height to store trolleys underneath, and should be fitted with cupboards and shelving.

7.23 An adjacent area should be provided for the storage of perfusion machines, balloon pumps and cell savers when not in use. Storage for large quantities of disposable packs and volumes of fluids should be provided. This will require heavy-duty shelving.

7.24 An office may be provided according to local project requirements, for use by the perfusionists and other theatre staff.

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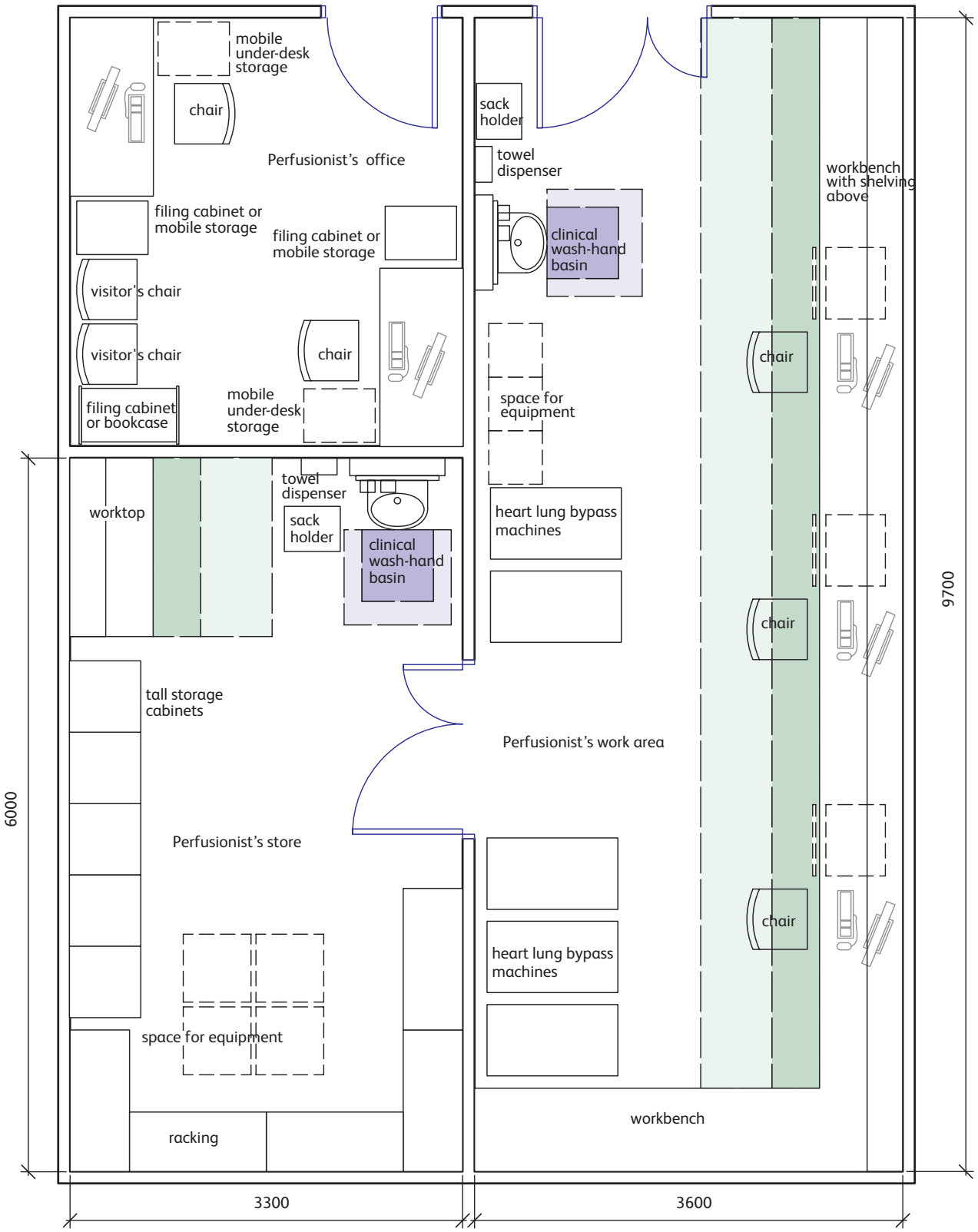

Figure 8 Perfusion suite

8

Chapter 8

Minor cardiac procedures suite

8.1 This chapter describes a minor cardiac procedures suite.

8.2 A minor cardiac procedures room will need access to the following facilities:

- dirty utility room;
- stores for equipment and consumables
- disposal hold.

8.3 Where a catheter laboratory suite is provided on-site, the minor cardiac procedures room may be included as part of this suite. If this is the case, it may be sized so that it can be converted into a catheter laboratory in the future, and consideration given to the possible future requirement for a control area and access to a computer/imaging equipment room.

Whole unit planning and design considerations

Procedures undertaken in a minor cardiac procedures room

8.4 A minor cardiac procedures room can be used for a range of minor cardiac investigations and treatments, where the risk of infection is low, a general anaesthetic is not required and immediate recovery period is short, including:

- transoesophageal echocardiograms (TOEs);
- cardioversion;
- insertion and adjustment of simple implantable devices;
- implantable cardioverter defibrillators (ICDs);
- cardiac resynchronisation therapy (CRT)/biventricular pacing (BVP).

8.5 They can also be used for non-cardiac procedures such as bronchoscopies and biopsies.

Departmental relationships

8.6 The minor cardiac procedures suite should be located as close as possible to a day case admission and recovery area to provide immediate access to stage two recovery facilities if required. This area will also be used for stage three recovery and pre-procedure paperwork and clinical checks.

8.7 The suite should be easily accessible from the CCU and cardiology/medical wards.

8

Clinical spaces

Minor cardiac procedures room

8.8 The minor cardiac procedures room should be able to accommodate a mobile or fixed C-arm (comprising an X-ray source and image detector), a moveable, fully-adjustable and long-axis tilting couch (offering all-round access to the patient), ceiling-mounted minor operating light, and a small surgical procedures trolley.

8.9 The sketch layout in **Figure 9** shows a mobile image intensifier. However, mobile image intensifiers have a narrower field of view than fixed image intensifiers, possibly necessitating longer exposure times, and are of restricted value for undertaking device implants. If simple device implants are regularly undertaken, a fixed image intensifier is recommended.

8.10 An early decision regarding the choice of imaging equipment and its features is essential as this will influence the room's design; the specifications are also needed to determine power supply needs as well as air cooling considerations.

8.11 Consultation with the RPA will be necessary to determine whether and to what extent radiation protection is required. Leaded screening of doors may be necessary, and the room itself may need lead-lining, both of which may have structural implications.

8.12 If there is a requirement for Medical oxygen, medical compressed air and medical vacuum, together with nitrous oxide and active anaesthetic gas scavenging this should be provided from wall-mounted outlets or a ceiling-mounted pendant.

8.13 Ventilation requirements will depend on the range and nature of the procedures to be undertaken. Many simple procedures of short duration, such as inserting temporary pacemakers and simple implantable devices, require ventilation only to treatment room standards.

8.14 The sketch layout of the room includes a preparation area. Alternatively, a separate preparation room may be provided. Additional storage is required for rooms undertaking device implants.

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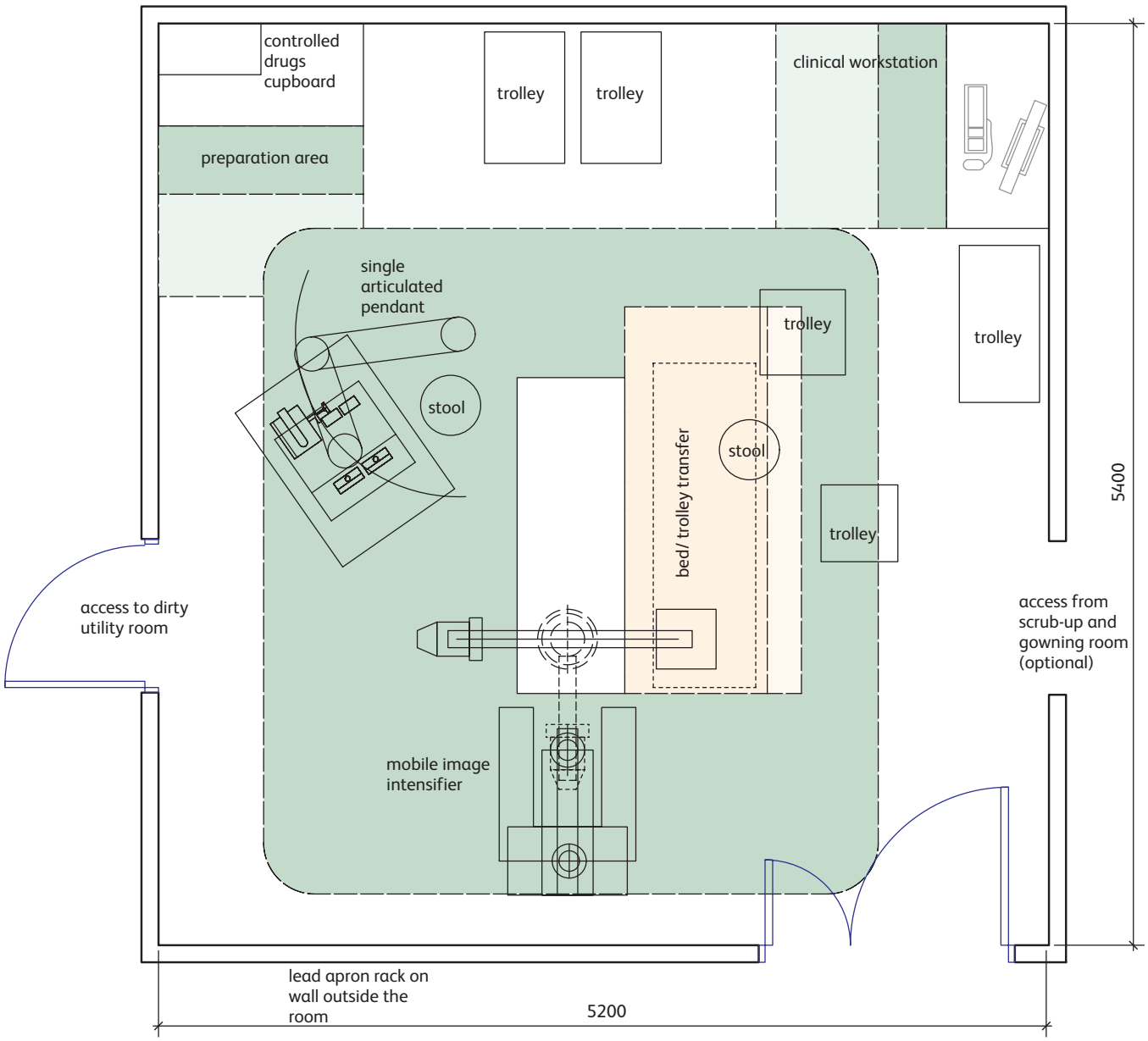

Figure 9 Minor cardiac procedures room

Scrub-up and gowning room

8.15 The need for a scrub-up and gowning room will depend on the range of procedures to be undertaken in the minor cardiac procedures room. This facility will be required where devices are implanted and/or pacing work is undertaken.

9

Chapter 9

Cost information

Introduction

9.1 For all types of health building, it is important that building costs and revenue expenditure are best value and consistent with acceptable standards. In applying this guidance, the need for economy should always be of prime concern. Where appropriate, space should be shared between similar activities taking place at different times. However, this solution should not be detrimental to the proper functioning of the spaces involved, nor to the needs of users.

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 (WHEN) 10/14 *Measures to Update 2002/2003 DCAG's 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 applicable for this WHBN reflect the total building, engineering and accommodation requirements for cardiac services located on an acute hospital site, where common services are shared. Costs are based on a typical two-storey new-build unit on a greenfield site with no planning constraints. There is no specific DCAG for cardiac facilities, however, the spaces can be broken down and DCAGs for other applicable WHBN spaces can be utilised as described in **Chapter 2**. Contact NWSSP-SES for further guidance as to which DCAG is most appropriate to each space described within this WHBN and to agree any adjustment to best represent each area.

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 (such as communication space, external works, external engineering services and abnormals) should be added to the DCAGs.

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

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Location factors

9.7 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 NHS, 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

9.8 The schedules of accommodation include the following example units:

Example 1: Catheter laboratory suite: 2 rooms.
Example 2: Catheter laboratory suite: 4 rooms.

9.9 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.

Dimensions and areas

9.10 The critical dimensions of an area are determined by the spatial requirements of any activities to be carried out within it. Space requirements for various generic activities appear in WHBN 00-02:2016 *Sanitary spaces*, WHBN 00-03:2013 *Clinical and clinical support spaces* and WHBN 00-04:2014 *Circulation and communication spaces.*

9.11 Planning teams should have data available at the earliest stages of a project to enable the approximate assessment of sizes involved. Areas used for the purpose of establishing cost allowances are listed in the schedules of accommodation. These areas do not represent recommended sizes and should not be regarded as specific individual entitlements.

9.12 The efficient planning of a building may necessitate a variation to the areas given. For example, in the refurbishment/conversion of older property:

- Rooms tend to be larger than the areas given;
- Some rooms may be too small or in the wrong location for efficient use;
- Circulation space tends to form a larger than normal proportion of the total area.

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Circulation spaces

9.13 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.

9.14 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.

Communication spaces

9.15 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

9.16 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

9.17 Engineering services listed below are included in the DCAGs applicable to spaces within cardiac facilities. Primary engineering services are assumed to be conveniently available at the boundary of the department.

Mechanical services

9.18 The following mechanical services are included in applicable DCAGs:

- heating – low-pressure hot water system;
- ventilation – mechanical supply to, and extraction from, clinical areas, and other areas requiring mechanical ventilation such as WCs and showers (excludes ventilation plant, such as air handling units or extract fans);
- cold water – central supply to service points including drinking water (excludes storage tanks);

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- hot water – supply from a central system (excludes storage and generation);
- piped medical gases – oxygen, nitrous oxide and medical air (400 kPa).

Electrical services

9.19 The following electrical services are included in DCAGs:

- departmental distribution boards;
- general lighting, as required by task;
- examination lighting (examination lamps);
- staff location system;
- emergency luminaires, as appropriate;
- socket-outlets and other power outlets for fixed and portable equipment;
- supplementary equipotential earth bonding;
- uninterruptible power supply (UPS) and equipment;
- fire, security, and controlled drug cupboard alarm systems;
- TV/radio wireways;
- telephone internal cabling distribution and outlets (exclude handsets);
- data wireways;
- building management system.

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Equipment (Group 1)

9.20 The following Group 1 equipment is included in DCAGs:

- controlled drugs cupboards;
- dishwasher;
- impulse clocks.

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Appendix 1

Example schedules of accommodation for catheter laboratory suite

Example 1 : Catheter laboratory suite: 4 rooms					
ADB Code	**Room name/ function**	**Unit area allowance**	**Quantity**	**Net External Area**	**Notes**
Clinical and clinical support spaces					
Catheter laboratory area					
X1029/X1030	Catheter laboratory	50.00	4.00	200.00	Example schedule includes one dedicated catheter laboratory for children/patients with congenital heart defects
X1031	Control Room	12.00	4.00	48.00	1 per catheter laboratory
N0317	Anaesthetic Room	19.00	1.00	19.00	For children/patients with congenital heart defects
B2425	Emergency admission and post-anaesthetic recovery bay	14.00	2.00	28.00	Based on case mix of patients in example schedule
J1264	Parking bay: trolley/bed	4.00	4.00	16.00	1 per catheter laboratory
G0180-01	Parking bay: resuscitation: trolley	2.00	2.00	4.00	1 per 2 catheter laboratories; minimum of 2 in case of 2 emergencies simultaneously
Y0346	Dirty utility room: theatre	12.00	1.00	12.00	1 per 4 catheter laboratories
W1584/1585	Storage: equipment and consumables	4.00	4.00	16.00	4 m^2 per catheter laboratory

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Shared clinical support spaces					
M0326-03	Image review/ meeting room: 2 workstations	16.00	1.00	16.00	1 per suite
Y0646	Disposal hold: 3000 litres	12.00	1.00	12.00	
Y1510	Cleaner's room	8.00	1.00	8.00	1 per suite
Staff spaces					
D0434-04	Rest room/ meeting room: 2 workstations	1.90	12.00	22.80	3 places per catheter laboratory
V0554-03/ V0667-01/ V0725/ V01321	Changing area: staff (size based on number of lockers)	1.40	31.00	43.40	Includes uniform exchange area, showers and a number of individual changing rooms. Based on 7 people per catheter laboratory. 10% space contingency allowance for male/ female split (suggested apportionment 2/3 female to 1/3 male)
Y0511	Footwear washing utility room	4.00	1.00	4.00	
V1321	Shower room: ambulant	2.50	1.00	2.50	Additional shower rooms to allow for male and female segregation
V0725	Changing room: semi-ambulant	2.00	1.00	2.00	Additional individual changing rooms to allow for male and female segregation
V1010	WC: ambulant	2.00	4.00	8.00	Associated with staff changing areas

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	Total allowance			**461.70**	
	Circulation and Communication allowance 35%			**161.60**	
	Engineering allowance, clinical 33%, Support and Staff 19%			**135.74**	
	Gross internal areas			**759.04**	
Optional clinical and clinical support spaces					
T0531	Preparation room	9.00	4.00	36.00	1 per catheter laboratory
T0522-02	Preparation room	12.00	2.00	24.00	1 per 2 catheter laboratories
N0219	Scrub-up and gowning room: 2 places	7.00	4.00	28.00	1 per catheter laboratory. In lieu of scrub-up and gowning area within catheter laboratory
X1031-01	Control room	20.00	2.00	40.00	1 per 2 catheter laboratories. In lieu of a dedicated control room for each catheter laboratory
X1035	Minor cardiac procedures room	28.00	1.00	28.00	Project option

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Optional staff space					
M0251	Office: 1 person	8.00	1.00	8.00	For unit manager
M0278-01/ M0281/ M0410/ M0731	Admin area: shared use (size based on number of workstations).	6.60	4.00	26.40	Notional allowance
V1010	WC: ambulant	2.00	1.00	2.00	
V0922	WC: Independent Wheelchair	4.50	1.00	4.50	
H1304-02	Seminar room: 20 places	34.00	1.00	34.00	Notional allowance
	Cost guide allowance	**Circulation**	**Engineering**		
	Clinical	**35%**	**33%**		
	Staff	**35%**	**19%**		

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Example 2: Catheter laboratory suite: 2 rooms					
ADB Code	**Room name/ function**	**Unit area allowance**	**Quantity**	**Net External Area**	**Notes**
Clinical and Clinical support spaces					
Catheter laboratory area					
X1029	Catheter laboratory	50.00	2.00	100.00	
X 1031	Control room	12.00	2.00	24.00	1 per catheter laboratory
J1264	Parking bay: bed/ trolley	4.00	2.00	8.00	1 per catheter laboratory
G0180-01	Parking bay: resuscitation trolley	2.00	2.00	4.00	1 per 2 catheter laboratories; minimum of 2 in case of 2 emergencies simultaneously
Y0436	Dirty utility room: theatre	12.00	1.00	12.00	1 per 4 catheter laboratories
W1584/1585	Storage: equipment and consumables	4.00	2.00	8.00	4 m^2 per catheter laboratory
Shared clinical support spaces					
Y0642	Disposal hold: 1700 litres	8.00	1.00	8.00	
Y1510	Cleaners' room	8.00	1.00	8.00	1 per suite

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Staff spaces					
D0434-01	Rest room with mini kitchen (size based on number of seats)	1.90	6.00	11.40	3 places per catheter laboratory
V0554-03/ V0667-01/ V0725/V1321	Changing area: staff (size based on number of lockers)	1.4	16	22.40	Individual changing rooms. Based on 7 people per catheter laboratory. 10% space contingency allowance for male/ female split (suggested apportionment 2/3 female to 1/3 male)
Y0511	Footwear washing utility room	4.00	1.00	4.00	
V1321	Shower room: ambulant	2.50	1.00	2.50	Additional shower rooms to allow for male and female segregation
V0725	Changing room: semi-ambulant	2.00	1.00	2.00	Additional individual changing rooms to allow for male and female segregation
V1010	WC: ambulant	2.00	2.00	4.00	Associated with staff changing areas
	Total allowance			**218.30**	
	Circulation and Communication allowance 35%			**76.40**	
	Engineering allowance, clinical 33%, Support and Staff 19%			**63.32**	
	Gross internal area			**358.02**	

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Optional clinical and clinical support spaces					
T0531	Preparation room	9.00	2.00	18.00	1 per catheter laboratory
T0522-02	Preparation room	12.00	1.00	12.00	1 per 2 catheter laboratories
N0219	Scrub-up and gowning room: 2 places	7.00	2.00	14.00	1 per catheter laboratory. In lieu of scrub-up and gowning area within catheter laboratory
X1031-02	Control room	20.00	1.00	20.00	1 per 2 catheter laboratories. In lieu of a dedicated control room for each catheter laboratory
N0317	Anaesthetic room	19.00	1.00	19.00	Number to be determined by case mix of patients
B2425	Emergency admission and post-anaesthetic recovery bay.	14.00	1.00	14.00	Number to be determined by case mix of patients
M0326-03	Image review/ meeting room: 2 workstations	16.00	1.00	16.00	1 per suite. In small units, this room may not be located in the catheter laboratory itself
X1035	Minor cardiac procedures room	28.00	1.00	28.00	Project option

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Optional staff spaces					
M0251	Office: 1 person	8.00	1.00	8.00	For unit manager
M0278-01/ M0281/ M0410/ M0731	Admin area: shared use (size based on number of workstations)	6.6	2.00	13.20	Notional allowance
V1010	WC: ambulant	2.00	1.00	2.00	
V0922	WC: independent wheelchair	4.5	1.00	4.50	
H1304-01	Seminar room: 10 places	19.00	1.00	19.00	Notional allowance
	Cost guide allowance	**Circulation**	**Engineering**		
	Clinical	**35%**	**33%**		
	Staff	**35%**	**19%**		

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References

Acts and Regulations

Equality Act 2010 **http://www.legislation.gov.uk/ukpga/2010/15/contents**

Health and Safety at Work etc. Act 1974. **http://www.legislation.gov.uk/ukpga/1974/37/contents**

Ionising Radiations Regulations 1999 **http://www.legislation.gov.uk/uksi/1999/3232/contents/made**

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**

Welsh Health Building Notes (HBN & WHBN)

HBN 8: 2004 *Facilities for rehabilitation services*

WHBN 00-02:2016 *Sanitary spaces*

WHBN 00-03:2013 *Clinical and clinical support spaces*

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

WHBN 04-01:2014 *Adult in-patient accommodation*

WHBN 04-02:2016 *Critical care units*

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Welsh Health Estates Notification (WHEN)

WHEN 10/14 *Measures to Update 2002/2003 DCAG's for Changes in Specification (i.e. changes not covered by MIPS), to 8th July 2010.*

Other publications

Welsh Government (2017). *Heart Conditions Delivery Plan.*
http://gov.wales/docs/dhss/publications/170106heart-reporten.pdf