WHBN 07-01

Welsh Health Building Note

Renal care: Satellite dialysis unit

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It supersedes the previous guidance, HTM 07-01:2011 *Satellite dialysis unit: policy and services context manual. Version:0.1:Wales*

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

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Overview

This Welsh Health Building Note (WHBN) provides guidance on accommodation for maintenance dialysis based in a satellite unit.

The unit described in this WHBN includes accommodation suitable for:

- the treatment of adult patients requiring haemodialysis;
- teaching patients how to carry out appropriate tasks which, depending on local policies, may include continuous ambulatory peritoneal dialysis (CAPD), automated peritoneal dialysis (APD) and how to operate haemodialysis machines for home haemodialysis, and self-care.

This WHBN excludes guidance on accommodation for:

- nephrological services provided by highly specialised centres such as university and teaching hospitals;
- nephrological services provided by main renal units in acute general hospitals, as this will be covered in the main renal unit guidance;
- renal transplantation, as this will be covered in the guidance on transplant units;
- children requiring renal services, as it is assumed that they will be treated in a paediatric nephrology department;
- the preparation of dialysers marked for re-use.

Acknowledgements

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The content of the original document was reviewed by NHS Wales Shared Services Partnership – Specialist Estates Services and the Welsh Renal Clinical Network.

Contents

Chapter 1 Policy context

1.1 The physical environment affects the well-being of patients, particularly haemodialysis patients, for whom the dialysis unit is their living room for four hours per day, three times per week, for the remainder of their lives.

1.2 While medical equipment cannot easily be concealed, more can be done to humanise the surroundings where people with established renal failure are treated, to improve their experience and physical comfort.

1.3 Good practice suggests the following areas are the pivotal points for both the delivery of high-quality dialysis treatment and the best possible patient experience and well-being:

- Careful attention should be given to both the siting and the design of dialysis units so that they meet modern requirements, provide patients with good access, including dedicated parking spaces, and have a positive impact on patients' well-being.
- There is good evidence that for many patients satellite units are as effective as main renal units and often more acceptable and accessible. Therefore, the opportunity to locate a satellite dialysis unit within existing or planned community service buildings (for example, shopping centres) should be considered, as this may enable patients, carers and the community to feel more integrated and may allow for other activities unrelated to the dialysis day to be incorporated with least effort.
- Adequate transport is so important to people on haemodialysis that it plays a vital role in the formation of patient views and attitudes towards dialysis. Good transport systems can improve patient attendance, and shorter travel times can improve patient co-operation if the dialysis treatment frequency needs to be increased. Efficient transport facilities reduce interruption of patients' social life and may therefore improve their quality of life.

Chapter 2 General service considerations

2.1 The main function of a satellite dialysis unit is to provide maintenance haemodialysis for adult patients with chronic established renal failure. Some satellite units also teach patients how to carry out continuous ambulatory peritoneal dialysis and train patients for home haemodialysis. Patients attending a satellite dialysis unit:

- are mainly ambulant;
- may be of any age (but not children); and
- may be physically and/or sensorily handicapped.

2.2 New established renal failure patients requiring maintenance dialysis may be referred to a satellite unit by consultant nephrologists working in main renal units.

The nephrological service

2.3 The function of a comprehensive nephrological service is the early detection, diagnosis and treatment of renal disease and the long-term management of its complications such as high blood pressure, anaemia, cardiovascular disease and bone disease.

2.4 Renal failure may be either acute or chronic. Acute renal failure occurs abruptly, often as a result of severe trauma, post-operative complications, and renal insults. Although it can be severe enough to influence patient morbidity and survival, it is often reversible. Dialysis is usually needed for only a few days or weeks before the renal function returns.

2.5 Chronic renal failure is the progressive loss of kidney function over months or years, and is irreversible. Established renal failure can be treated by renal replacement therapy (RRT), that is, dialysis and/or renal transplantation.

Dialysis

2.6 Renal dialysis involves the removal of waste products from the blood by allowing these products to diffuse across a thin membrane into dialysis fluid which is then discarded along with the toxic waste products. The chemical composition of the fluid draws the waste products across the membrane without the blood coming into contact with the fluid.

The role of a satellite dialysis unit

2.7 The majority of dialysis patients are stable and, although requiring long-term care, do not need the highly specialised treatment provided in a main renal centre. In addition, according to the recommendations of the Kidney Alliance (2001) report *End stage renal failure: a framework for planning and service delivery*, patients should ideally have to travel no more than 30 minutes for their treatment. This principle to ensure equitable access for all may be met by locating satellite units in the community, allowing the provision of renal services close to patients' homes.

2.8 A satellite unit may be managed in a variety of ways. There are advantages and disadvantages to each one, but it is outside the scope of this manual to detail these. Choice will be based on local factors:

a. **managed by a main renal centre:** these satellite units operate under the aegis of the specialist nephrological service at its parent hospital, usually located on another site. Patient care and management policy in the satellite unit are determined by staff in the main renal unit. Some satellite units may develop into sub-regional units. These units are autonomous, usually in everything but renal transplantation, and require at least one or two nephrologists permanently based on site.

b. **contracted out to the private sector:** in such units, the private contractor provides a dialysis service which usually includes the building equipment, consumables and all the staff except the consultant medical staff. The contractor is paid an agreed fee for each episode of dialysis treatment. When located on an NHS site, all mains services are generally provided by the

hospital, with the contractor being charged for consumption. The contractor may buy in support services from the hospital, for example, cleaning, catering, portering, linen, laundry, pathology, maintenance etc.

c. **self-managed option:** in such units, the building, equipment and consumables are provided by the private sector. The contract may be on a 'number of sessions' basis or for a number of patients over a number of years. This type of facility may be shared by two or more trusts.

Location

2.9 A satellite unit is not a physically integral part of a main renal unit. The appropriate location for a satellite dialysis unit will depend on a number of factors, including demography, transport links, case mix etc.

2.10 Satellite dialysis units may serve populations that do not have easy access to a main renal unit. The opportunity to locate a satellite dialysis unit within existing or planned community service buildings should be considered, as this may enable patients, carers and the community to feel more integrated and may allow for other activities unrelated to the dialysis day to be incorporated with least effort. Patients usually require treatment at least three times a week, every week – a community centre setting would go a long way to providing a less clinical environment.

Opening hours/shifts

2.11 Flexibility to accommodate patient choice is likely to be key to the opening hours and shift patterns of satellite dialysis units in the future. Most are likely to operate at least a two-shift system. Running a third shift in the evenings may appeal to some patients, for example those in full-time employment, and this is likely also to prove more economically viable since more patients can be treated without having to increase the number of treatment stations. Dialysis duration makes it possible to run a fourth shift if other factors allow, and there is increasing interest among patients and clinicians for daily dialysis. However, the provision of a third or fourth shift may not always be possible due to the practical problems associated with operating very late at night, such as the availability of transport, shortage of staff, and safety for patients and staff travelling home.

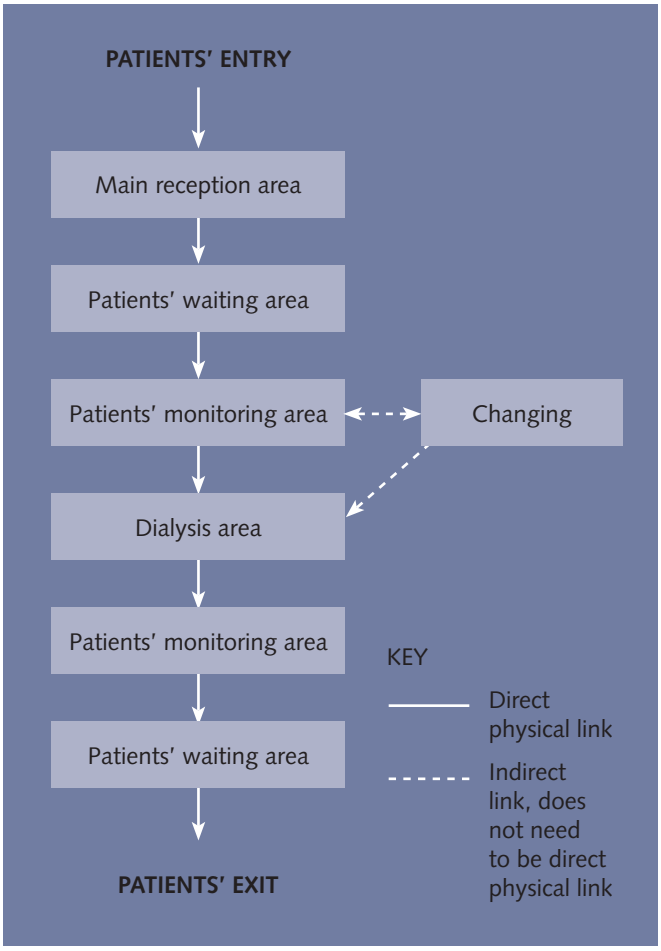
2.12 With one dialysis treatment usually taking between four and five hours, two to three patients can be dialysed per station per day (including the time taken for cleaning between sessions). Patients should receive three treatments per week unless the clinician prescribes fewer hours or less frequency on medical grounds.

Organisation and patient flow

2.13 Patients normally undertake the following 'journey' during a dialysis session at a satellite unit:

- On arrival at the unit, a patient will wait in the waiting area until the dialysis machine has been prepared for use.
- Patients transfer to the monitoring area, where they either take their own blood pressure and weigh themselves or ask for assistance to do so (renal data management systems are now also available which electronically transfer data, that is, blood pressure and weight, to the dialysis machines via smart cards). Many patients also choose to change into loose, comfortable clothes before going on the dialysis machine.

Figure 1 Patient flow



- At the treatment station, patients themselves may prepare supply trolleys or these will be already prepared, depending on the practice of the unit and patients' requirements. Patients are then either linked to the machine or link themselves with the necessary supervision. Dialysis generally takes about four hours, but varies according to individual prescriptions.
- The patients' temperature and blood pressure may be monitored during the treatment.
- After treatment, either the patients monitor their own blood pressure and weight or these are monitored for them. They then retrieve their possessions and either leave the unit or remain in the waiting area until their transport arrives.

Chapter 3 Factors affecting the size of a satellite renal service

Demand

3.1 Rates of demand are likely to increase but estimating such rates is made hard by the multi-factorial nature of the influences. Planning estimates for hospital haemodialysis have been made using upper and lower rates of 2.9% and 0.2% respectively. Factors that may reduce demand include improved rates of transplantation, more patients choosing home therapies and more active and early management of disease.

3.2 Diabetes is the leading cause of chronic renal failure. If survival rates in Type II diabetes improve but nephropathy progresses, the number of people with diabetes needing dialysis will increase. The *National Service Framework for Diabetes (Wales) Standards* (2002) sets standards for care and service provision.

3.3 The dialysis population is becoming increasingly elderly, with a greater prevalence of comorbid illness. This has a consequence for support activities, for example, appropriately equipped emergency resuscitation facilities in the event of cardiac arrest and the need for networked links to the main renal unit.

3.4 Haemodialysis services are under considerable pressure in some areas, and project teams need to carry out a needs assessment to estimate how many patients will require treatment over the coming years and also how many of these are likely to be dialysed at home. This will enable them, together with clinicians working in this area, to plan what services will be needed and the most appropriate configuration of those services, taking account of local priorities.

The resurgence in home haemodialysis

3.5 The benefits of carrying out haemodialysis in the home include not having to travel to a satellite or main renal unit and more choice about when the dialysis is carried out, so there may be less disruption to normal life. On the other hand, some patients and their carers find it a strain to have the responsibility of carrying out the procedure, which can be time-consuming, and of dealing with any problems. Home haemodialysis has been the subject of NICE technology appraisal guidance (TA48) which recommends that it be available as an option for all suitable patients (NICE 2002).

Potential for offering daily haemodialysis as an option

3.6 The advantages of daily and nocturnal haemodialysis mean that the proportion of patients on home haemodialysis should increase, as may the number of sessions per patient offered by a satellite or main renal unit.

Value for money

3.7 The size of a dialysis unit will depend on local circumstances, such as the dialysis population, shift patterns and location (that is, whether rural, urban or inner-city). The dialysis area should consist of dialysis stations in increments of three. The schedules of accommodation for this guidance are based on a 12-, 18- and 24-station unit. The final number should take into account the provision of a spare station for routine maintenance, breakdowns and expansion.

3.8 Project teams will need to consider the number of treatment stations needed to ensure the economic viability of a central water treatment plant. The use of individual bedside water treatment units is a matter for local decision; however, required standards of water purity must still be monitored and achieved. In general, these individual units are not advised for the following reasons:

- overall, lifetime costs are generally higher compared with a central water-treatment plant;
- they take up more maintenance time for technicians;
- water purity tests need to be undertaken at regular intervals on each unit;

- the quality of water that can be achieved with a central water-treatment plant is generally far higher than that which can be obtained from individual units. This may stop the unit from undertaking haemodiafiltration.

Chapter 4 Planning and design considerations

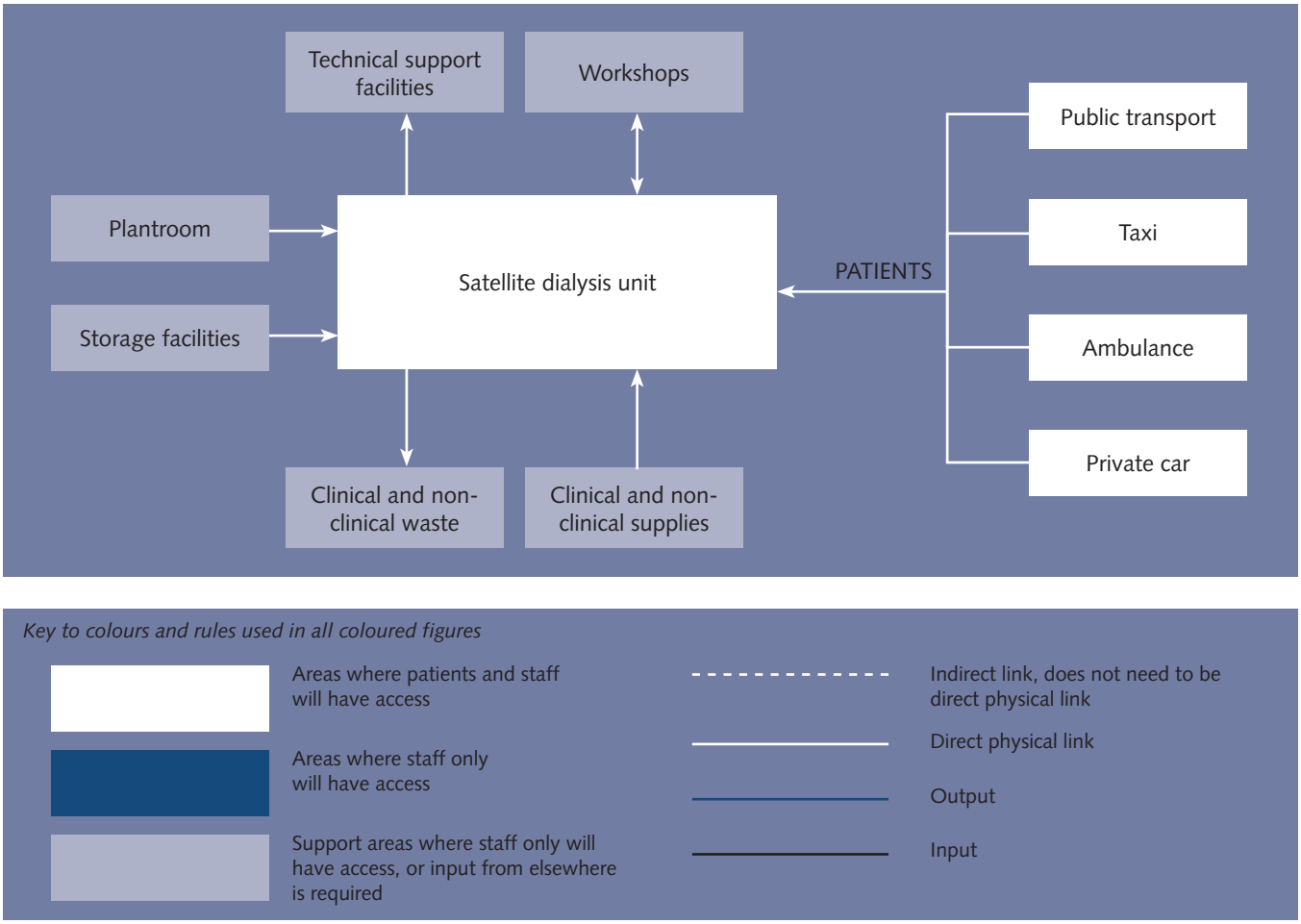
Access to the unit

4.1 Many patients attending a satellite unit are likely to arrive by their own transport. However, they may also travel to the unit by public transport or by NHS patient-transport services including taxis or ambulance. Where possible, therefore, satellite units should be located near public transport routes. It is also important to provide dropping-off points for ambulances and designated patients' car parking spaces immediately adjacent to the unit. Based on a 12-station dialysis unit, it is recommended that there is one dedicated space for every three dialysis stations, of which one of the four should be a disabled-width bay. The entrance to the unit should be covered so that patients transferring from a vehicle into the unit are not exposed to the weather.

4.2 The unit should preferably be located on the ground floor and, ideally, have its own dedicated entrance. (Units based away from hospital sites are likely to have dedicated entrances by nature of their location.) Where the unit is based on a hospital site, this is to facilitate the comfort and passage of patients, especially at shift changes, during which congestion might occur if only a shared entrance is available.

4.3 The entrance should be easily accessible to people using wheelchairs or walking aids.

Figure 2 Access to the unit



4.4 There should be access for large vehicles so that they can off-load at the various storage facilities without disturbing the unit's operation or traversing through patient or treatment areas.

4.5 The satellite unit will require large volumes of clinical and non-clinical supplies to be delivered and off-loaded routinely (see also paragraphs 5.56 to 5.98 'Support/utility'). This will lead to large volumes of clinical waste and non-clinical waste that will need to be removed daily. Thus, the eventual location of the unit and plantroom must be considered carefully, as waste fluids in such volume require correct disposal.

4.6 Access to storage facilities, technical support facilities, workshops and the plantroom must be considered and adequate provision must be made:

- access from the outside of the building should be via separate, lockable double doors, and security camera surveillance should be considered;
- attention should be paid to access to allow removal or replacement of the units and for delivery of heavy goods such as salt for the water softeners;
- for the deliveries of goods and supplies (particularly as renal goods are delivered in bulk), a separate – possibly remote – entrance is required, as some deliveries are impromptu and noisy. As some deliveries arrive very early in the day, this area needs to be well lit.

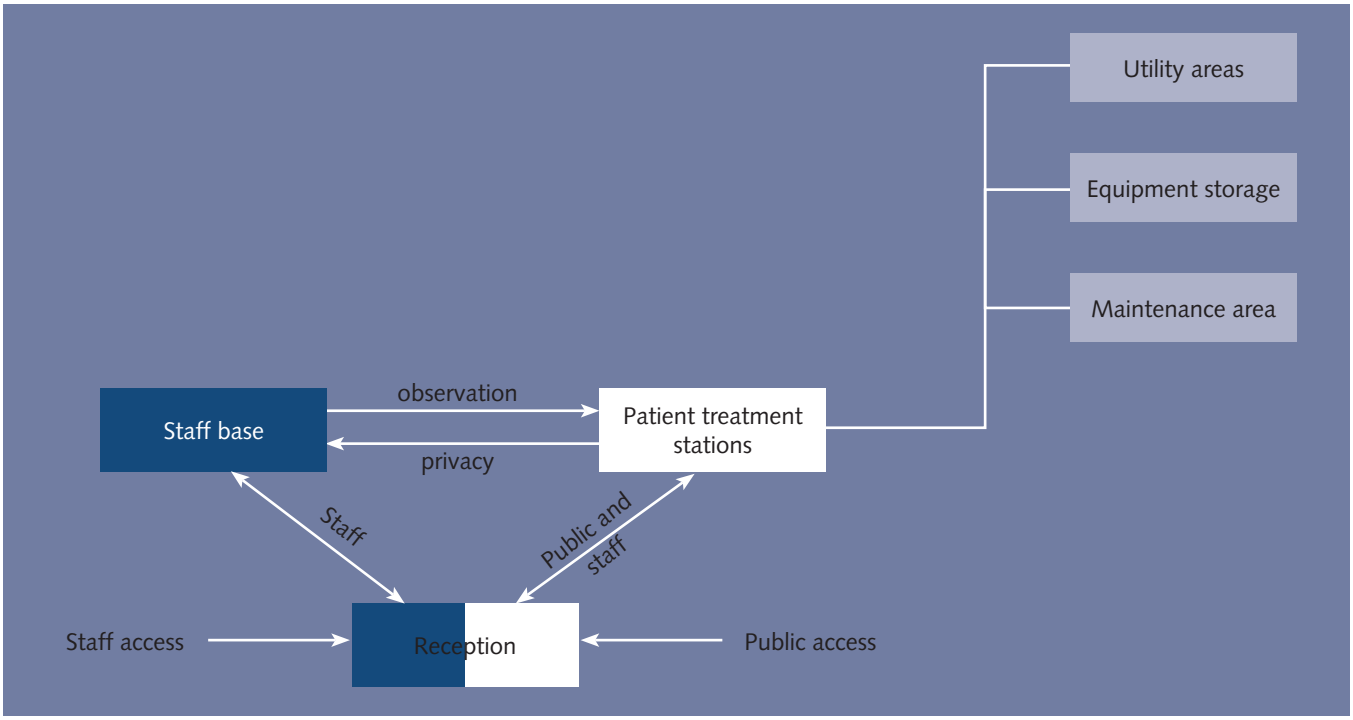
4.7 See also paragraphs 5.56 to 5.98, 'Support/utility'.

Functional relationships

4.8 A satellite dialysis unit contains three zones: patient treatment stations, associated support facilities, and staff areas. There are key functional relationships both within and between these zones which should be taken into account when designing accommodation. Details of these relationships are described below.

- **Staff-base/patient treatment stations:** staff at the staff base must be able to see and hear patients in the dialysis area. A balance should be struck between providing adequate observation for staff and privacy for patients.
- **Patient treatment stations/utilities and equipment storage:** utility areas and equipment storage and maintenance areas should be located to provide ease of access to patient treatment stations.
- **Patient treatment stations/staff areas:** staff rest rooms and offices should be separate from, but close to, patient treatment stations.
- **Treatment station/treatment station:** the layout of the multi-station dialysis area should

Figure 3 Functional relationships within the unit



enable patients to talk to one another, and nurses to call for assistance from one station to another, but care must be taken to allow sufficient space between dialysis stations to prevent the risk of cross-infection and for a degree of privacy (a preferred minimum of 900 mm between stations is required in this guidance).

Privacy and spatial arrangement in the dialysis area

4.9 Project teams should be aware that patient privacy can be compromised by the open-plan design of the dialysis area. A balance should be struck between patient privacy; patient/patient social interaction; need for blood-borne virus control; and the need for staff and patients to be able to observe one another. The ideal balance is likely to arise from local consultations among all parties, including patients, with their views being encompassed in a written design brief.

4.10 The use of non-fixed, partial barriers may offer flexibility in arrangements and give patients a greater sense of personal space. Treatment stations could be arranged in modules, with demountable partitions. However, a balance must be maintained between privacy and the ability for staff to maintain eye contact with other patients and staff. For further guidance on the use of partitions, reference should be made to WHBN 00-10 Part B:2014 *Walls and ceilings*.

4.11 The module configuration must allow for staff to communicate with groups of patients, yet stay within the constraints of plumbing and electrical needs, as well as provide for an easy renovation or expansion of the facility.

4.12 Noise levels can be reduced by the use of acoustically treated ceiling tiles and partitions.

Infection control

4.13 The Health and Safety Executive and the Renal Association both produce a wealth of guidance on reducing the risk of infection from blood-borne viruses. Project teams should consult the following websites for the latest advice as they are both regularly updated and added to:

http://www.hse.gov.uk/biosafety/blood-borne-viruses/health-care.htm

http://www.renal.org/guidelines/modules/blood-borne-virus-infection

See also the standard principles of infection control in NICE Clinical Guideline 139 *Infection: Prevention and control of healthcare-associated infection in primary and community care* (2012), and WHBN 00-09 *Infection control in the built environment* (NB, please check Specialist Estates Services' Publications webpage, at the time of publication these guidelines had not yet been published) which will include guidance on 'designing-in' infection control.

Future expansion

4.14 Project teams should allow for the future expansion of the dialysis service. Expansion may be achieved by developing existing internal spaces or by extending the building. Locating the dialysis area on an external wall will facilitate future expansion.

Information management and technology

4.15 Information management and technology (IM&T) is fundamental to the successful operation of a dialysis unit. The Welsh Renal Clinical Network should be consulted with regards to selection of the appropriate IM&T system, which should offer a wide range of facilities and be consistent with local and NHS Wales IM&T strategies.

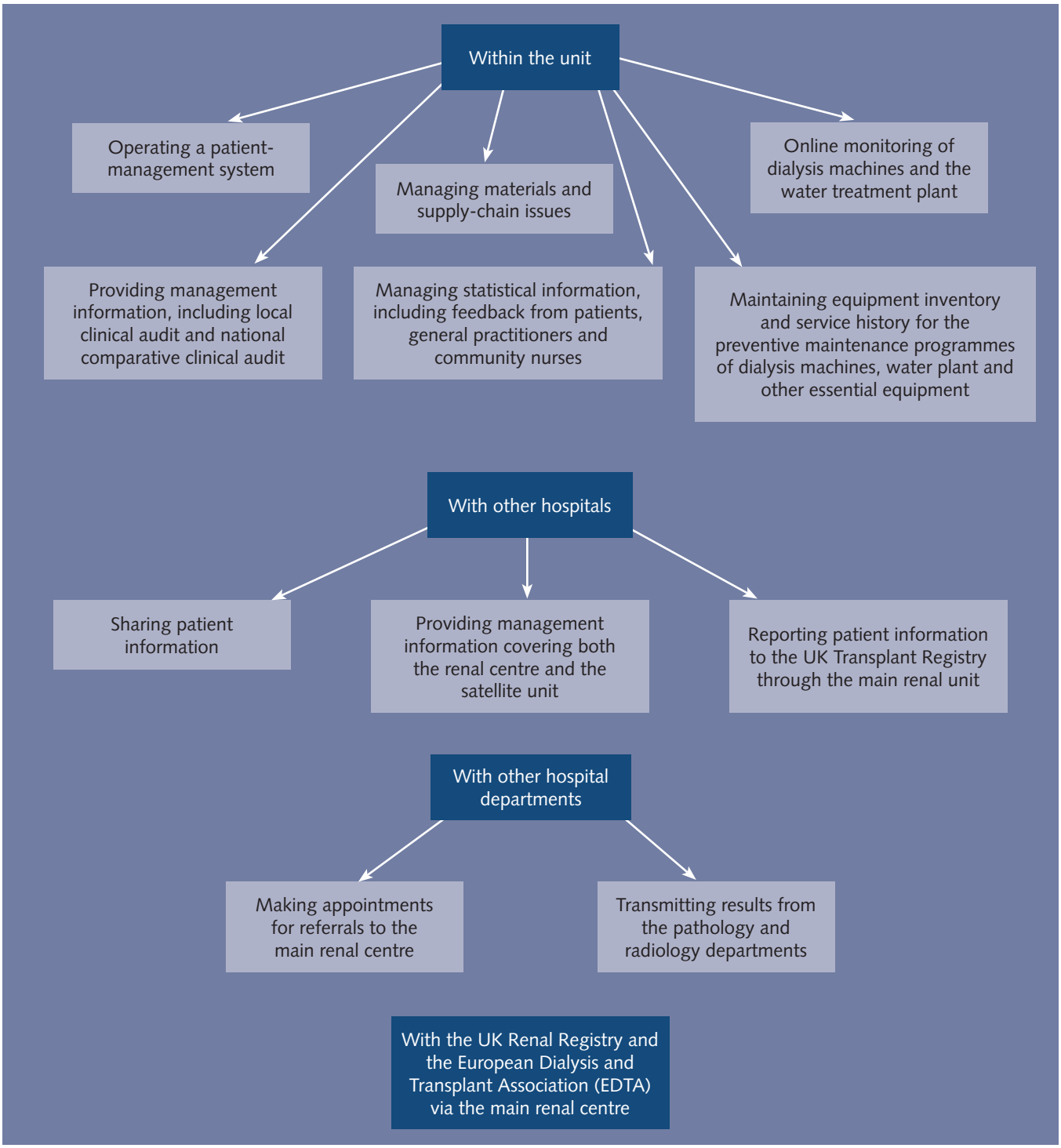
4.16 The IM&T facilities provided for a satellite dialysis unit should be the same as those available at a hospital-based dialysis unit.

4.17 Choice of systems and matters such as the location of computer terminals, which functions to include on the system, and access levels to information, should be determined locally. Examples of data handling needs which can be met by installation of a network are shown in Figure 4.

4.18 Project teams should pay particular attention to the following:

a. They should consider the IM&T needs of the unit at an early stage, taking account of the current strategy in Wales and future expansion of the unit (for example, the NHS Wales equivalent of the introduction of individual patient care plans and the provision of integrated electronic patient records in England).

Figure 4 Examples of the data handling needs of a satellite dialysis unit



b. They should review current IM&T developments nationally and at both the renal centre and any satellite units.

c. They should check that proposals conform to local IM&T policies at both the renal centre and the satellite unit, which may or may not be within the same trust.

d. They should ensure that sufficient space is provided at the design stage to meet the anticipated initial needs for special power supplies, modems, monitors, printers and associated software, stationery, and conduits for cables and for future expansion.

e. It is likely that an area will be needed to contain either IM&T server equipment or IM&T communications equipment, or both. The room

should be large enough to contain not only the equipment to be installed initially, but also any expansion of facilities at a later date. The team should also take into account that replacement equipment may need to be installed before existing equipment is removed.

f. Ideally, the room should be separate from other equipment rooms in the unit and should be able to be secured separately. The equipment in the room should not be visible from outside the room.

g. Arrangements should be made to ensure that the environment in the room is suitable for the equipment that may be kept in the room. This could include controlling the temperature, humidity, and levels of dust in the air. Space requirements and temperature limits should be obtained from the equipment manufacturers.

h. There must be adequate space for maintenance staff to access the equipment and carry out their work without inconveniencing the normal operation of the satellite unit.

j. They should ensure that monitors are sited so that the displayed text is not visible to members of the public (although it may be considered an advantage to be able to turn the screen to enable the patient to check the accuracy of the information entered).

k. They should ensure that the contents of the monitor screen are legible.

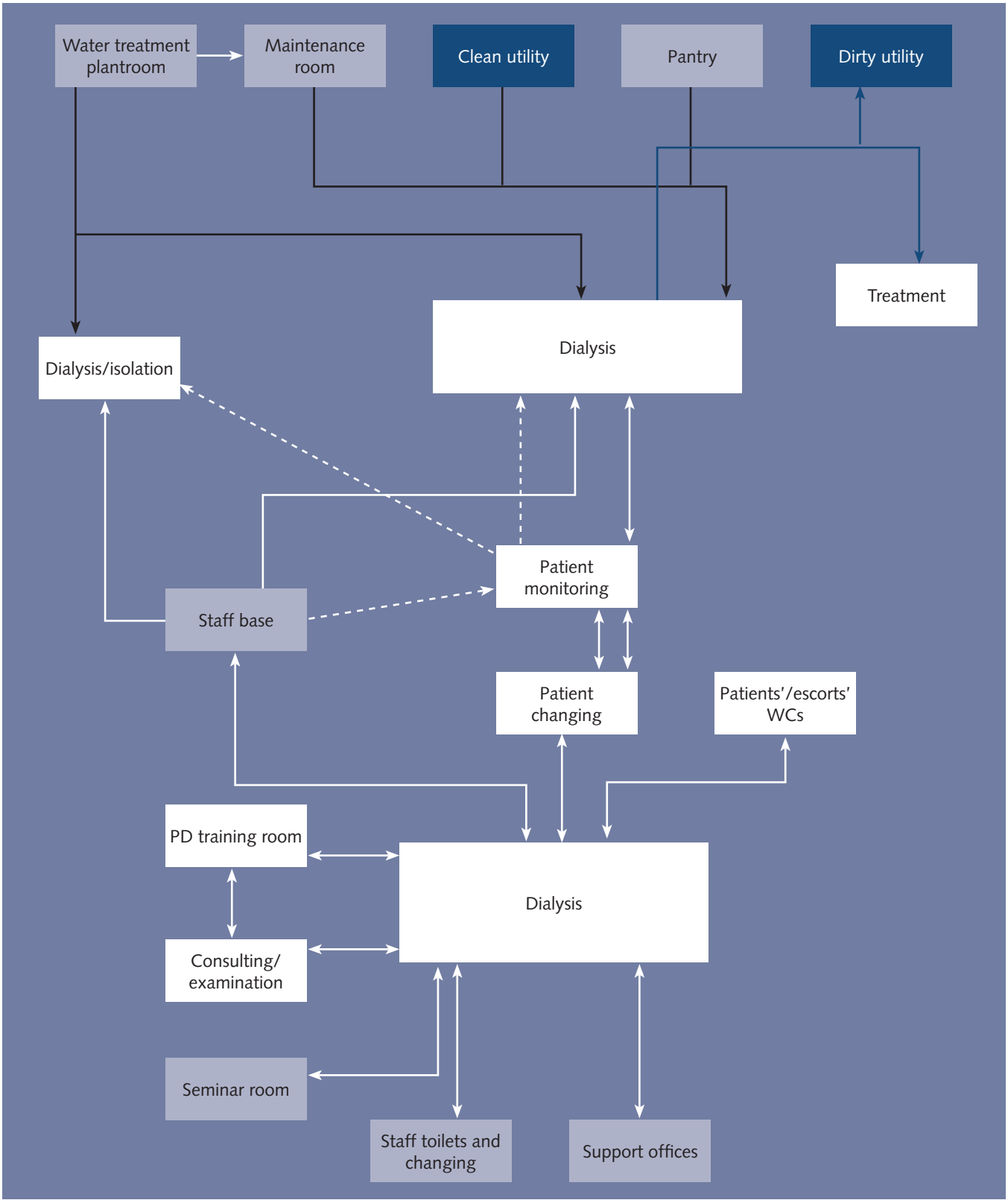
m. They should ensure that equipment noise is controlled within acceptable limits and, where necessary, fit acoustic hoods or locate the equipment in a separate room.

n. They should ensure that adequate provision is made for the security of data and devices. If operational data is to be stored on equipment in the unit, arrangements need to be made to ensure that the data is copied onto separate storage media. These backups should be stored in a fireproof safe in a secure, waterproof storage area off-site.

p. Allowance should be made for the downloading of information from other medical devices including dialysis machines and physiological monitors.

Chapter 5 Spaces

Figure 5 Specific functional relationships between areas



Reception and waiting

Reception office

5.1 An office is required at the entrance to the unit and adjacent to the waiting area for receiving and registering patients upon arrival and to provide the administrative and communication centre of the unit.

5.2 See also 'Reception desk: Design manual' and 'Offices' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Waiting/refreshment area

5.3 The waiting area can become very busy at changeover times and should be large enough to accommodate two shifts of patients. Refreshment facilities should be provided, as patients may spend long periods waiting to be connected to machines and waiting for transport.

5.4 If pre-dialysis or routine clinics are to be held in the satellite unit (this will be a local decision), the waiting area will need to be larger to accommodate the additional numbers of patients who will be in the unit on these days.

5.5 See 'Waiting area: Design manual' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Patients' changing area/locker room

5.6 Separate male and female patient change/locker rooms should be provided where patients can change into comfortable clothing before dialysis and can store their outdoor clothing and other personal items while they are on the machines.

5.7 Full-length lockers for the secure storage of dry outer and middle garments, footwear and small personal belongings are required. Hanging rails, with security, for the storage of wet outer garments, and lockers for large personal belongings should be provided. The number of lockers provided should be arrived at following consultation with patients, bearing in mind any likely future expansion of the unit, and should be included in the design brief. Lockers could be at the bedside.

5.8 A shower can be provided en-suite, but this is optional. The patient change/locker room door should be lockable.

5.9 See 'Changing facilities' in WHBN 00-02:2013 *Sanitary spaces*.

Patients' sanitary facilities

5.10 Separate male and female sanitary facilities, including WCs with hand-wash basins, should be located adjacent to the patient changing/locker room.

5.11 Patient sanitary facilities should include an accessible toilet, and baby-changing facilities.

5.12 See 'WCs' in WHBN 00-02:2013 *Sanitary spaces*.

Wheelchair storage area

5.13 A wheelchair storage area should be included for patients who, while being dialysed, have to leave their chairs.

Treatment

Patient-monitoring area

5.14 This space is used to monitor and record patients' weight, blood pressure and general health before each dialysis treatment. This area should be either within the dialysis area or adjacent to the dialysis area and/or the patient waiting area, depending on operational policy. Data may be recorded either on computer or on paper, depending on local policy.

5.15 Facilities required include: chair weighing scales and wheelchair weighing scales; a desk and chair; storage for blood pressure equipment. A clinical wash-hand basin, accessible by wheelchair patients, will also be required, as patients will need to wash their fistula arms before treatment.

5.16 There should be sufficient space to accommodate a nurse, one patient, a helper and wheelchair scales.

Multifaith/quiet room

5.17 This room will be used as a quiet room for worship, meditation, reflection and counselling. If provided, it should be available to everyone who attends the unit. The project team should give careful consideration to local needs, including the range of denominations and faiths wishing to use the accommodation, as this will vary according to the population served. The room should be comfortably furnished and include easy and upright chairs and an occasional table. Space and the arrangement of seating should accommodate 15 wheelchairs. Accessories of worship vary in accordance with denomination or faith, and therefore suitable storage cupboards should be provided. Appropriate washing facilities should be

provided. This room is optional accommodation dependent on the needs of the population served.

Dialysis area

5.18 The dialysis area should consist of dialysis stations in increments of three. The schedules of accommodation for this guidance are based on a 12-, 18- and 24-station unit. The final number should take into account the provision of a spare station for routine maintenance, breakdowns and expansion. For guidance on spatial arrangement and patient privacy in the dialysis area, refer to paragraph 4.9, 'Privacy and spatial arrangement in the dialysis area'.

5.19 Project teams should involve patients in the choice of chairs, and any conclusions should be included in the design brief (for example, this may include considering modified chairs that can be used by patients as cycle machines for exercise while on dialysis). Sufficient space must be allowed for the chair to be fully reclined, and for nurses to carry out procedures. Treatment stations will need to be arranged so that patients can be attached to the machine by either arm or by cannulae in their neck or groin. If beds are to be used instead of reclining chairs, floor areas for each station will need to be reviewed, as area allowance is slightly larger for bed provision. One emergency call button (with an audible and visual alarm) per station should be provided.

5.20 Facilities are required at the station for the storage of frequently-used medical items, and for patients to carry out seated activities, including watching television, while undergoing dialysis. Storage shelves should be located so that items can be seen and reached easily by staff and patients. A mobile table may also be used by the patient for storing books, newspapers and other personal belongings, and by staff for recording the patient's notes.

5.21 Project teams should consider providing a computer outlet, telephone point and a network connection point at each station. Computer data points for staff use are likely to become increasingly important as remote electronic data access becomes more widespread.

5.22 There should be at least one wash-hand basin between two stations. The basin should be located as near to the station as possible without causing risk of splashing and cross-infection. At each station, there needs to be:

- an alcohol hand-rub dispenser;
- a wall-mounted soap dispenser;
- a towel dispenser;
- a clinical and non-clinical waste bin;
- a sharps container.

5.23 The floor should be slip-resistant, easily cleanable and have an impervious finish with coved skirting, as the risk of spillage of body fluids and other contaminants is high.

5.24 Adequate adjustable lighting should be installed on walls and ceilings for use by staff carrying out procedures and by patients for reading, writing etc. Lighting controls should be within easy reach of patients and staff.

5.25 Consideration should be given to the provision of a communication and entertainment system with individual TV, radio, video and stereo headphone systems, and a telephone handset that allows patients to both make and receive calls. Televisions may be suspended from the ceiling, mounted on walls, placed on mobile units, or, if flat-screen, on a swing-out arm for each patient. To avoid disturbance to other patients, sound outputs from radios, televisions and other auditory equipment should be via headphones only. Consideration should also be given to providing access to the internet through a data point or wireless connection for patients who have laptop computers.[1]

5.26 It is important to ensure the comfort of patients and staff in all weather conditions. The ability to keep the room temperature low is important for patient well-being and stability during dialysis and for staff working conditions. The extent of ventilation required will depend on the total heat gain within the dialysis area, but project teams should be aware that it is usually more cost effective to install air-conditioning from the outset than to provide it after the facility has been completed.

5.27 The provision of medical gases, including oxygen and suction, at each station is for local consideration.

1 If a bedside communication and entertainment system is to be procured for the satellite unit, the system supplier/contractor may offer discounts or reach an agreement with the NHS trust about providing the service to patients free or for a nominal amount. These issues are best addressed locally.

5.28 The dialysis area should have plenty of natural daylight with an outside view. Natural lighting is important to human well-being. Artificial lighting, as well as providing levels of illumination to suit activities, can make an important contribution to interior design. Designers should develop a lighting scheme that will help to promote a high-quality image of the services being offered and a non-clinical, soft environment. Uplighting, the level of which can be varied by patients, has been found to be very beneficial – see the Chartered Institution of Building Services Engineers (CIBSE) SLL Guide LG2 *Hospitals and healthcare buildings*; and Guide F: *Energy efficiency in buildings*.

Resuscitation trolley bay

5.29 A resuscitation trolley bay, with space for parking a resuscitation trolley (with defibrillator), a mobile suction unit and a cylinder of oxygen on a trolley (if these are not piped to the bed or chair side), should be located with easy access to all spaces used by patients. Guidance on gas storage is contained in HTM 02-01 *Medical gas pipeline systems* (Parts A and B).

Consulting/examination room

5.30 One or more (depending on the use to which the satellite unit is put, for example if the unit were to support a pre-dialysis clinic) combined consulting/examination rooms are required for consultation and examination.

5.31 The consulting/examination room requires a desk, chairs and an examination couch, screened by curtains. Space is needed for a mobile adjustable inspection lamp, an X-ray viewer, blood-pressure monitoring equipment, a computer terminal, an alarm call system and clinical wash-hand facilities.

5.32 See 'Consulting, examination and interview spaces' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Isolation room

5.33 There is a strong and increasing body of opinion that an isolation room is essential and that it should not be necessary to transfer patients to a main renal centre if they are medically stable. Some stable patients may need to be dialysed in isolation from other patients either temporarily or on every occasion. This would usually be for infection control purposes, and the control measures taken would depend on the mode of spread of the particular pathogenic organism. There is a need to agree cross-infection/isolation requirements (including those for hepatitis B, hepatitis C, HIV and MRSA) with the local infection control team to allow maximum flexibility of the facility, taking into account local and national guidelines.

5.34 There should be an allocation of one to two isolation rooms per 12 stations.

5.35 It should be accessible from the main dialysis area, and a viewing window to that area should be provided.

5.36 The room may also be used for 'routine' dialysis, particularly when other treatment stations are fully utilised.

5.37 See also WHBN 04-01 Supplement A:2014 *Isolation facilities in acute settings*.

Staff base

5.38 The staff base/bases should be located so that staff sitting at the base can observe the patients in the dialysis area. If separating screens are used, they will need to be of a height to allow direct vision from a staff base, but allow privacy to patients. The number and location of the bases will depend on local policies and will be arrived at after consultation, the conclusions of which should be translated into the design brief. Staff bases must not be a source of disturbance to patients.

5.39 The likely numbers of nursing staff, the choice and location of monitoring and computing equipment, storage policies and requirements for notes, forms and other stationery must be considered.

5.40 It is recommended that a separate room be provided for staff handovers to promote privacy. The manager's office or the seminar room can be used for this function.

Treatment room

5.41 A treatment room is required for medical and nursing staff to perform minor diagnostic and treatment procedures requiring a clinical environment, for example inserting and changing the lines and cannulae required by continuous ambulatory peritoneal dialysis (CAPD) and haemodialysis patients. This will require enclosed storage areas for equipment and disposable items. Ultimately, the kind of treatment room needed will depend on the procedures to be carried out, and these should be clarified at an early stage of planning.

5.42 An island couch should be provided, with space for staff to work from all sides. Facilities for recording patient data, and for storage and disposal of dressings and other disposables, should be supplied.

5.43 The treatment room should be located adjacent to the dialysis area, dirty utility and clean utility.

5.44 See 'Treatment rooms' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Training room

5.45 There should be facilities for teaching patients how to perform a variety of tasks including CAPD and automated peritoneal dialysis, and how to operate haemodialysis machines for home haemodialysis and self-care, and for carrying out administrative duties. Project teams should be aware that home haemodialysis patients and CAPD patients are trained differently and therefore need different facilities/environments. Training should take place in an informal, non-clinical environment that relates more to a patient's home environment.

5.46 There should be enough space to accommodate a nurse, two patients and two escorts. Clinical hand-wash facilities are required as well as a separate sink for the disposal of saline solution and other waste products.

5.47 A bag warmer is required. Facilities to operate an automated peritoneal system should be provided.

5.48 A variety of cupboards and shelves for the storage of CAPD equipment, stationery and other office supplies should be provided.

5.49 The peritoneal dialysis nurse will need a workstation and computer terminal. In units with a large number of CAPD patients, a separate administration office for CAPD staff may be required.

5.50 The training room is optional accommodation. However, where project teams do decide to include an area for PD training, a separate room for patients who come into the unit on a 'drop-in' basis for advice and information should be considered. Alternatively, one of the consulting/examination rooms could be used for this purpose if the number of 'drop-in' patients is likely to be few.

Office accommodation

Manager's office

5.51 This office is the administrative base for the unit manager. It should be sufficiently private for confidential discussions among staff. See 'Office: 1-person: Design manual' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Multidisciplinary office/interview room

5.52 This office space may be shared on a sessional basis by dieticians, social workers and other members of the renal team. It may also be used for counselling, interviews etc. See 'Offices' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Administration office

5.53 Some units will have a dedicated person (or small team) that organises fluid deliveries, holiday arrangements etc on behalf of patients.

5.54 Alternatively, this room could be optional if facilities and logistics allowed its functions to be carried out at the main renal centre. See 'Offices' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Seminar room

5.55 A seminar room may be provided for teaching, tutorials, meetings, case conferences and clinical instruction. See 'Seminar room' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Support/utility

Water treatment plantroom

5.56 Drinking water standards are inadequate for haemodialysis, since patients are exposed to many thousands of litres of dialysis fluid annually. Water to be used for haemodialysis and haemodiafiltration needs to be treated appropriately to remove impurities.

5.57 The Renal Association & Association of Renal Technologists have published the following document which draws together all of the international standards for water for haemodialysis (BS EN ISO 11663:2014, BS EN ISO 13959:2014, BS EN ISO 23500:2014, ISO 26722:2014): *Guideline on water treatment facilities, dialysis water and dialysis fluid quality for haemodialysis and related therapies* (UK Renal

Association and Association of Renal Technologists 2012). Please note, at the time of publication this guideline does not cover the latest standards for water for haemodialysis, but it is due for review.

5.58 For normal haemodialysis, water purity must meet the minimum standards as set out in these guidelines. For haemodiafiltration, the water quality must achieve ultrapure standards as set out in the guidelines.

5.59 To achieve ultrapure water standards 'double pass reverse osmosis (RO)' may be required or reverse osmosis with additional ultra-filtration. This will have an effect on the space allocated to the water treatment room. The distribution loop should be capable of being disinfected at an appropriate frequency to prevent the development of biofilm. With appropriate maintenance which is performed by a reputable organisation the water treatment system should produce water which is consistently ultrapure.

5.60 The specification for the water treatment plant will be determined by the composition of the water supply; project teams should seek the advice of the local water authority, a renal technologist, the specialist water treatment plant supplier and the medical physics department.

5.61 Equipment selected should be designed to have a duty/standby facility to allow treatments to continue even if there is a fault within one part of the system.

5.62 It is important that the plant be close to the dialysis area (although not adjacent to it because of noise considerations) as this will shorten the distance covered by the distribution ring. It should also be located close to vehicle access to enable deliveries of chemicals and salt (if softening is required).

5.63 There should be sufficient space to accommodate a maximum of two people to monitor, adjust, service and repair the water treatment plant.

5.64 The plantroom should be sized to accommodate the plant and storage of chemicals. Areas within the plantroom providing bulk storage of any corrosive liquids should be suitably sealed and bonded.

5.65 The plantroom floor should be sloped to a drain and treated with a chemical resistant sealant, and the door accesses should have a lip and ramp to prevent water seeping to the rest of the unit in the event of a large water leak. The floor should also be 'bunded' to contain any major water leakage.

5.66 The door should be lockable for security. The plantroom should be adequately lit and ventilated. Mechanical ventilation may be necessary if the heat gain from the water treatment plant cannot be controlled by natural ventilation.

5.67 The plantroom should have provision for local and remote monitoring of the water treatment plant.

5.68 The water treatment plantroom should not house any other equipment (for example, calorifiers) other than that which is specific to its function. It should also not be used for storage for consumables for the dialysis unit.

5.69 This plantroom is optional accommodation if the dialysis area is near to the renal ward, as departments could share the water-treatment plant. (Note, however, that there should be separate water-treatment systems for the renal ward and for the haemodialysis area.)

Maintenance room

5.70 A workshop is required for the maintenance and repair of dialysis machines. The space provision should be sufficient to park and manoeuvre equipment and accommodate a workbench with integral lockable cupboards. The floor should have an impervious finish with coved skirting.

5.71 A computer terminal should be provided to record all services and repairs on a central database. It is recommended that manufacturers' user manuals are kept in this room.

5.72 A clinical wash-hand basin, a sink for cleaning of components and disposal of non-toxic fluids, and also a wash-hand basin should be provided. Alternative disposal should also be made available for contaminated wastes.

5.73 A lobby associated with the equipment service room will provide space for holding equipment awaiting repair and/or calibration. A separate area should also be provided for machines that are already repaired and ready to go back into use.

5.74 The maintenance room requires a suitable electricity supply and a treated-water supply to the same specification as that being supplied to the dialysis area. A water supply and drainage facilities are also required.

5.75 There should be enough storage space for spare parts. There should also be suitable storage facilities for CMOS (complementary metal oxide semiconductor) boards and other sensitive electronic components.

5.76 The maintenance room is essential complementary accommodation.

Maintenance room: equipment storeroom

5.77 A separate equipment storeroom will be needed to store spare and isolated dialysis machines. (The maintenance room itself should not be used to store any spare machines.) A treated water supply, power and drainage facilities are required.

Clean utility

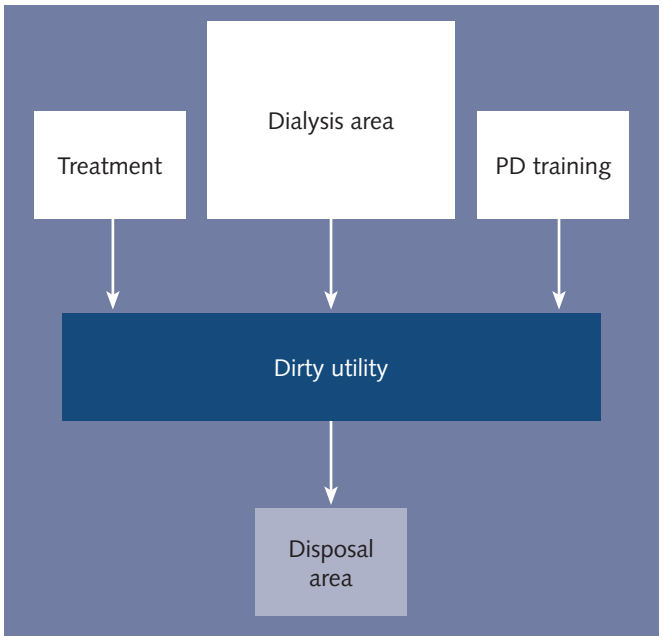
5.78 A clean utility room is required for storing and preparing drugs, medicines and lotions, and for holding a working supply of clean and sterile supplies. A controlled drugs cupboard – attached to a load-bearing wall and alarmed – may be located here. A refrigerator will be required to store specialist drugs. The clean utility should be adjacent to the treatment room. Clinical hand-wash facilities are required. The floor should have an impervious finish. See 'Utility' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Dirty utility

5.79 See 'Utility' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Disposal room

Figure 6 Disposal flow



5.80 See 'Facilities management' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Staff rest room

5.81 The staff rest room should have windows with a pleasant outlook and be comfortably furnished. See 'Refreshments and rest' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Pantries: patients and staff

5.82 See 'Refreshments and rest' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Staff change/locker room

5.83 See 'Changing facilities' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Staff sanitary facilities

5.84 See 'WCs' in WHBN 00-02:2013 *Sanitary spaces*.

Equipment storeroom

5.85 Renal consumables should have a dedicated storeroom. This store should be large, with plenty of racking. The exact size of the store will depend upon how frequently supplies are delivered. However, it is worth pointing out that storage space is frequently understated. There should be provision for a bottled gas rack within this room.

5.86 The store will require lockable and alarmed double doors to the exterior for receiving delivered goods.

5.87 Additional storage space is required for the storage of equipment (chairs, drip-stands, etc) and of disposables. It is preferable to store these separately. The equipment store will require lockable and alarmed double doors to the exterior for receiving delivered goods.

Fluid store

5.88 A storeroom for 'bulk fluid' deliveries should be considered. This is a different way of providing dialysis fluid and requires one or more tanks to be installed for storing the fluid. The size of this room will depend on the number of stations and the frequency of delivery. This room is optional accommodation as not every unit will use this system.

Clean linen storage

5.89 For infection control purposes, clean linen should be kept in a closed store rather than on open trolleys. Local policy will determine whether linen is stored in single-bed rooms or in a central store.

Cleaners' room

5.90 See 'Utility' in WHBN 00-03:2013 *Clinical and clinical support spaces*.

Electrical distribution cupboard

5.91 An electrical distribution cupboard, with lockable doors, housing the main isolators and distribution fuse switchgear, should be:

- accessible directly from a circulation area (access space may be part of the circulation area);
- sited away from water services; and
- lockable.

5.92 The electrical distribution cupboard, where possible, should be sited within the unit. There should be clear and safe access for maintenance staff, and care should be taken to ensure that safety is not compromised, during maintenance, from passing traffic or the opening of adjacent doors. All equipment should be mounted at a height to give easy access from a standing position.

IT room

5.93 The IT room will contain network servers and communications equipment.

5.94 The room should be large enough, not only to contain the equipment intended to be installed initially, but also to allow for expansion of facilities at a later date. There may be a need at some time to install replacement equipment before existing equipment is removed.

5.95 The room should ideally be separate from other equipment rooms in the unit and should be separately securable. The equipment in the room should not be visible from outside the room.

5.96 Arrangements should be made to ensure that the environment in the room is suitable for the equipment that may be kept in the room. This could include controlling the temperature, humidity, and levels of dust etc in the air.

5.97 There must be adequate space for staff to be able to access the equipment for maintenance purposes. It should be ensured that this maintenance can be done without inconveniencing the normal operation of the unit.

5.98 A secure storage area should be provided for storing back-up media.

Chapter 6 Engineering services

Introduction

6.1 This chapter describes the engineering services required within a renal dialysis unit.

Water services for haemodialysis

6.2 Developing technology and the specialised nature of dialysis equipment will necessitate advice being sought from specialist water treatment companies, a renal technologist with specialist knowledge of treated water for dialysis, and equipment manufacturers.

6.3 A chemical and mineral water analysis from the local water authority should be obtained before selection of the water treatment plant is made. If on a hospital site, hospitals should conduct their water analysis as close to the proposed point of use as possible, as local pipework may have an effect on the results. The plantroom should be located as near as possible to the renal unit in order to reduce pipe runs. Plant should be in a separate area to hot water/heating services.

6.4 Water for dialysis should reach at least the standards given in the following:

- *Guideline on water treatment facilities, dialysis water and dialysis fluid quality for haemodialysis and related therapies* (UK Renal Association and Association of Renal Technologists 2012);
- BS ISO 13959:2014 *Water for haemodialysis and related therapies*;
- BS ISO 11663:2014 *Quality of dialysis fluid for haemodialysis and related therapies*;
- BS ISO 26722:2014 *Water treatment equipment for haemodialysis applications and related therapies*;
- BS ISO 23500:2014 *Guidance for the preparation and quality management of fluids for haemodialysis and related therapies*.

6.5 New equipment should be capable of producing ultrapure dialysis fluid (bacterial counts <0.1 CFU/mL, and endotoxin <0.03 EU/mL) in order to meet the recommendations given in the European Renal Association-European Dialysis and Transplant Association's (ERA-EDTA) *European best practice guidelines for haemodialysis* Parts 1 and 2 (2002, 2007). Ideally, this should be achieved using ultrapure water; however, water that meets the minimum standards can be used together with point-of-use filtration on the dialysis fluid.

6.6 A routine testing procedure for water to be used in dialysis should form part of the renal unit's policy (Renal Association, 2007).

Note

To avoid rescheduling of patients in the event of equipment failure, it is essential that the appropriate levels of redundancy be provided. Central water treatment plants should be duplicated to facilitate maintenance work being carried out.

Water supply and pipework

6.7 The water supply and pipework should comply with BS ISO 23500:2014.

6.8 For a main renal unit, the central installation providing water for dialysis should be distributed through a recirculation pipework ring. The design of this ring should minimise the number of direction changes and dead-legs so that the risks from bacteriological infection are reduced, and should also minimise sharp bends and shoulders in joints. The rings should be installed above the floor in the dialysis area and the maintenance room. Installations that utilise ceiling or floor voids are not advised, as these introduce unnecessary dead-legs within the ring.

6.9 Flexible hoses connecting the dialysis machine to the water supply and drainage outlet points should be provided with quick-release couplings. To avoid the risk of accidentally dislodging the drainage hoses from dialysis machines, it is recommended that the quick-release coupling be of a different size

to the water-supply coupling to avoid confusion and cross-connection.

6.10 The water-supply outlet point for each dialysis station and, as appropriate, in the maintenance room, should be kept as short as possible. This outlet point should also incorporate a means of isolation and a quick-release coupling.

Water treatment plant

6.11 The water treatment plant should be selected with reference to:

- *Guideline on water treatment facilities, dialysis water and dialysis fluid quality for haemodialysis and related therapies* (UK Renal Association and Association of Renal Technologists 2012);
- BS EN ISO 13959:2014 *Water for haemodialysis and related therapies*;
- BS EN ISO 11663:2014 *Quality of dialysis fluid for haemodialysis and related therapies*;
- BS EN ISO 26722:2014 *Water treatment equipment for haemodialysis applications and related therapies*;
- BS EN ISO 23500:2014: *Guidance for the preparation and quality management of fluids for haemodialysis and related therapies*.

6.12 The water treatment plant conditions should be monitored by the BMS and a plant status alarm panel providing visual or audible signals. The plant conditions should be capable of being transmitted to remote alarm panels.

6.13 The water treatment plant should provide for total redundancy with dual softeners, circulating pumps, RO equipment and carbon filters. Carbon filters should be selected to achieve sufficient contact time to remove all chlorine and chloramines. Connection to the supply must conform to water regulations (the *Water Supply (Water Fittings) Regulations* 1999).

Maintenance

6.14 With regard to the protection of the RO water treatment plant, devices for the control and safe isolation of engineering services should be in a separate secured room.

Internal drainage

6.15 The used dialysis solution should be discharged to a drainage outlet point and drainage system for each dialysis station and, as appropriate, in the maintenance room. This outlet point should incorporate a suitable air break, means of isolation, and a quick-release coupling of a different size to that of the water supply outlet point. Drainage pipework materials should be suitable for high temperature waste at times of automatic cleaning and disinfection (and also a range of disinfecting chemicals).

6.16 It is possible that a protein-type residue will build up in the dialysis (solution) drainage pipework. It is therefore recommended that the pipework gradient from the discharge outlet point to the drainage system be greater than the usual 1 in 50. The drainage pipework should be readily accessible with multiple rodding eyes and made of material able to withstand rodding.

6.17 At an early stage in the design process, designers should familiarise themselves with the types of discharge produced, and check with the client what effect the mixing of various chemical discharges may have upon the drainage system.

6.18 Proposals for the collection and discharge of chemical-contaminated effluent should be discussed and verified with the sewerage undertaker. Some water authorities may impose restrictions on the quantity and rate of discharge of such effluent into public sewers.

References

Acts and Regulations

Water Supply (Water Fittings) Regulations 1999, SI 1999/1148
http://www.legislation.gov.uk/uksi/1999/1148/pdfs/uksi_19991148_en.pdf

British Standards Institution

The latest version of any standard should be used, provided that it continues to address the relevant requirements of these recommendations
http://shop.bsigroup.com/en/

BS EN ISO 11663:2014 *Quality of dialysis fluid for haemodialysis and related therapies*

BS EN ISO 13959:2014 *Water for haemodialysis and related therapies*

BS EN ISO 23500:2014 *Guidance for the preparation and quality management of fluids for haemodialysis and related therapies*

BS EN ISO 26722:2014 *Water treatment equipment for haemodialysis applications and related therapies*

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 (WHBN)

WHBN 00-02:2013 *Sanitary spaces*

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

WHBN 00-09 *Infection control in the built environment* (Please note, at time of press these guidelines had not been published, please check the publications page of Specialist Estates Services website)

WHBN 00-10 Part B:2014 *Walls and ceilings*

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

WHBN 07-02:2016 *Renal care: main renal unit*

Welsh Health Technical Memoranda (WHTM & HTM)

WHTM 00:2014 *Policies and principles of healthcare engineering*

HTM 02-01 Part A:2006 *Medical gas pipeline systems. Part A: Design, installation, validation and verification*

HTM 02-01 Part A:2006 *Medical gas pipeline systems. Part B: Operational management*

Other

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best practice guidelines for haemodialysis (Part 2) *Nephrology Dialysis Transplantation* 22(2). http://ndt.oxfordjournals.org/content/22/suppl_2.toc

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UK Renal Association and Association of Renal Technologists (2012). *Guideline on water treatment facilities, dialysis water and dialysis fluid quality for haemodialysis and related therapies*. http://www.renal.org/docs/default-source/clinical-practice-guidelines-committee/clinical-practice-guidelines-committee/RA_and_ART_Guideline_on_Water_Treatment_Facilities_Dialysis_Water_and_Dialysis_Fluid_Quality_for_Haemodialysis_and_Related_Therapies_Draft_30_June_2011.pdf?sfvrsn=0

Welsh Assembly Government (2002). *National Service Framework for Diabetes (Wales) Standards*. http://gov.wales/docs/dhss/publications/100930diabetesen.pdf