

SHFN 30

Part A: Manual

Information for Design Teams, Construction
Teams, Estates & Facilities and Infection
Prevention & Control Teams



Health Facilities Scotland

Engineering and Environment

October 2014

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Disclaimer

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Acknowledgements

Health Facilities Scotland would like to thank the SHFN30/HAI-SCRIBE Steering Group for their efforts in producing Part A of SHFN 30. Their input has been gratefully appreciated.

Thanks are also due to the Pilot Study Group for their assistance with trialling the process.

Finally, HFS would take this opportunity to express gratitude to everyone who contributed to the consultation phase of completing this document.

1. Introduction and scope

Note: The Project Team referred to throughout the document is the team of NHS staff assembled to fulfil the role of 'The Client' and to manage the delivery of the project. Through the various stages of the project it may include NHS Project Managers, Clinicians, Estates staff and Infection Prevention and Control specialists.

1.1 This guidance consists of two parts:

- **SHFN 30 Part A: Manual:** This provides Built Environment Infection Prevention and Control information for Design Teams, Construction Teams, Infection Prevention and Control Teams and Estates & Facilities Teams;
- **SHFN 30 Part B: HAI-SCRIBE:** comprises the Implementation and Assessment Process which describes the process for identifying, eliminating or managing built environment infection control risks. It also describes the key personnel involved in this process together with their roles and responsibilities and the fact that collaboration among all those involved in the process is pivotal to its success.

It is envisaged that participants will use the HAI-SCRIBE document (SHFN 30 Part B) to help them identify, manage and record built environment infection control risks. The same Group will use the Manual document (SHFN 30 Part A) for sourcing information to help in the decision making process so that identified risks can either be eliminated or successfully managed.

Questionsets and Pro-formas

- 1.2 Arrangements have been made to make available on the [HFS Website](#), separately, the portfolio of Questionsets and Pro-formas for each stage of project development suitable for photocopying and application to individual projects as appropriate.
- 1.3 Additionally, compliance with these guidance documents can ensure that there are facilities in place to help fulfil the mandatory requirements outlined in the [National Infection Prevention and Control Manual](#) produced by Health Protection Scotland.
- 1.4 The Project Team members and contributors from various disciplines will take different advice from the guidance and it is the ensuing debate and analysis which will improve the quality of the delivered facility.
- 1.5 This Manual is intended to provide an insight to the key factors within the built environment which can impact on the prevention and control of infection and will also be useful as a guide for best practice in existing healthcare facilities.

- 1.6 In the future due to changing patient populations and changing healthcare needs there may be different factors to be considered when planning accommodation. These include the increase in the ageing population, caring for Bariatric patients, and more focus on community-based care.
- 1.7 The design of the built healthcare environment plays a fundamental role in infection prevention and control. The increasing threat of antimicrobial resistant organisms and other emerging pathogens in healthcare may present new and more difficult challenges in future healthcare facility design and planning efforts.
- 1.8 A system of recording projects, signing-off plans and meeting notes by all participating parties will be needed. The completion of questionsets in the 'Implementation strategy and assessment process' part of this guidance will fulfil most of this requirement. It is important that the Project Team sign-off each stage of the project having taken advice from Estates & Facilities, Infection Prevention & Control representatives and other appropriate disciplines.

Note: To manage or mitigate infection risks requires knowledge from many sources. Input from the Project Team will not only include Infection Prevention and Control Teams (IPCT). Estates and Facilities Teams and Design and Construction Teams also have important roles to play in managing or mitigating these risks. However, it is not expected that any single group will possess full knowledge or experience of another's discipline. It is expected, therefore, that there will be an ongoing liaison during each stage of development where appropriate specialist knowledge from all sources of relevant expertise can be derived and incorporated into the design team appointments, project briefing, contract conditions, specification and quality control of construction and maintenance.

2. Risk assessment

Identifying risk

- 2.1 The time taken to plan or refurbish a healthcare facility can vary from a relatively short period in the case of urgent renovation, to as long as three or four years for a major capital build project. It is therefore important that all members of the Project Team are notified of capital bids at the earliest opportunity. The Infection Prevention and Control Team need to be involved in the first planning meetings. Most meetings thereafter will require some input from them.
- 2.2 To avoid mistakes and pitfalls the Project Team must consider issues including:
- how will the product, equipment, room or premises be used?
 - what possible solutions are available?
 - what are the budgetary limitations?
 - which prevention and control of infection principles apply?
 - which external regulations apply?
 - what does the evidence suggest in relation to the specific context?
 - what are the laws governing the project?
 - what standards and guidelines apply from architectural and engineering bodies, Health Facilities Scotland, local and national government departments and accrediting agencies?
 - which product or design best balances the infection prevention and control requirements with employee and patient safety and satisfaction, and cost constraints?
 - what legal requirements are required under Health & Safety law?

Common pitfalls

- 2.3 Common pitfalls arise from a number of pressures, for example, the pressure to choose the cheapest products or design.

Note: The best products or designs may be more expensive initially but in the long term they will probably realise cost benefits as they may prevent outbreaks, or they may last longer and require less maintenance and be more durable.

Assessing risk

- 2.4 Designing premises that prevent the transmission of infectious agents to patients, healthcare workers and visitors is an important component of prevention and control of infection programme or plan. Outbreaks of infection have been related to the design, plan, layout, function and/or finish of the built environment. Thus, risk assessment is a fundamental imperative in the planning and design stages of a healthcare facility. It is often overlooked or compromised throughout the lifecycle of the project. It has not been unknown for the clinical outcome of a well-intentioned risk assessment to create other problems. There is therefore a need to verify that these outcomes are themselves risk assessed. Disseminating good specialist advice relating to Infection Prevention and Control throughout all phases of construction and renovation projects will reduce risks. There will be instances when it is not possible to achieve the ideal. This applies particularly to refurbishment projects within existing accommodation and is often related to spatial issues. In these circumstances the aim should be to make the best use of available facilities.

Note: Failure to assess properly risks affecting prevention and control of infection can lead to expensive redesign later and expose the patient and healthcare worker to unnecessary risks. It is important to bear in mind that any control measures put in place to prevent the spread of infection during a building stage and subsequent maintenance of any project take into account the effect that they would have on patients and staff in the surrounding areas.

Source

- 2.5 Building professionals must be aware of the risks associated with construction projects and that the environment can be a reservoir for potentially infectious agents. The source is the person, animal, object or substance from which an infectious agent is transmitted to a host. The immediate healthcare environment can be a potential reservoir of micro-organisms and source of infection or contamination, therefore, Designers and Planners need to consider eliminating potential sources of infection by practising good design, for example:

- adequate storage facilities;
- choice of materials, avoiding unnecessary surfaces that may become reservoirs for infectious agents;
- ensuring materials and surfaces can be cleaned and maintained.

3. Procurement and construction process

Overview

- 3.1 The procurement and construction of a healthcare facility are highly complex processes and require input from a wide variety of sources.
- 3.2 Infection Prevention and Control advice is essential in relation to procurement at the design and planning stage of a project. There is a case for stipulating that Designers for healthcare projects should be able to demonstrate their knowledge and understanding of prevention and control of infection in relation to current guidance. The NHS Project Team needs to confirm this in the course of interviewing Design Teams *prior to their appointment*.
- 3.3 The specification of building materials, especially surface finishes, healthcare facility equipment etc. should take account of the input from the Project Team who are best placed to ensure that requirements are met, based on risk assessment.

Securing appropriate skills

- 3.4 HAI-SCRIBE aims to manage infection risks through the use of a prevention and control of infection questionnaire, as set out in the Implementation Strategy and Assessment Process section of this guidance. The system highlights the need for a multi-disciplinary team of specialists with appropriate skills to ensure its implementation. This is an essential requirement in terms of the evaluation of the site for development. Where issues such as contaminated land or suspected geological faults arise, specialist advice should be obtained.

4. The Planning Process

General overview

- 4.1 In general the stages of a typical healthcare building project are:
- establishing the 'need to build' and obtaining agreement from Scottish Government Health and Social Care Department (SGHSCD) where required;
 - appointment of a design team;
 - preparing a project brief and carrying out feasibility studies;
 - preparing a business case and securing funding;
 - developing the design;
 - appointment of a contractor;
 - construction of the building works;
 - handover;
 - NHS commissioning of the building i.e. installing loose furnishings and equipment and training staff;
 - occupation.

Business Case process

- 4.2 The preparation of a business case is the process that supports NHS Board submissions for funding of new projects. A business case must convincingly demonstrate that there is a need for a new building, alteration or refurbishment to improve the delivery of healthcare services and that the project is economically sound, financially viable and will be properly managed by the NHS Board.
- 4.3 Details of the business case process can be found in the Scottish Capital Investment Manual which can be found on the Scottish Government Health and Social Care Directorate website at: www.scim.scot.nhs.uk/.
- 4.4 It is important at this stage to identify and involve key people who have a direct interest in the end product including members of the Project Team along with other specialists or departmental heads as required. Specifically at this stage, they need to:
- establish the goals of prevention and control of infection;
 - agree the agenda for prevention and control of infection design and planning;
 - communicate prevention and control of infection imperatives throughout the course of the project, but especially at the initial stages;
 - work through conflicting issues to reach an optimum compromise;

- determine available resources that can be used and recognise the cost benefits of not cutting corners on prevention and control of infection issues.

The brief/concept/feasibility study

4.5 The planning process starts with the identification of a 'need' by the users. The development of this need will involve feasibility studies to enable a design brief or output specification to be developed with consideration given to the following:

- the effect additional beds or departments will have on policies such as waste management, linen and catering, etc.;
- the effect of extra theatres would have on decontamination services, workflow, etc.;
- additional specialised areas that will probably require extra infection prevention and control and laboratory input as well as specialist advice which may not be available in-house e.g. bed space and size of departments, etc., plus engineering services needs such as ultra-clean ventilation, showers, baths, etc.

Space planning

- 4.6 The planning of the building can contribute to reducing the risk of transmission of micro organisms. For example internal and external routes identified for removal of dirty laundry, segregated recyclates and residual wastes, need to be carefully planned.
- 4.7 The location of departments, theatres, wards and rooms needs to take account of good prevention and control of infection practice and ensure that workflows are designed to inhibit infection spread.
- 4.8 Similarly, the detailed design of the building elements can contribute to reducing the risk of transmission of micro organisms e.g. selection of finishing materials for floors, walls and ceilings; designing the ventilation system to inhibit the spread of contamination.
- 4.9 A number of design and layout issues could contribute to the risk of transmission of micro-organisms. For example, the ventilation system needs to inhibit contamination spread rather than contribute to it. Internal and external routes identified for removal of dirty laundry, waste food, healthcare waste, similarly need to be carefully planned.

Concept Design/ Developed Design

- 4.10 Drawings at a scale 1:200 will be available at this stage. They will assist the Project Team in determining clean and dirty traffic flow patterns and confirming room relationships and adjacencies. In addition to verifying compliance with the appropriate Scottish Health Planning Notes (SHPN) or Health Building Notes (HBN), the Project Team should be asked review

these plans to comment where their specialist knowledge may assist in the decision-taking process regarding issues such as:

- confirming operational procedures;
- setting out traffic flow patterns;
- establishing baseline and future staffing profiles;
- establishing baseline and future revenue budgets;
- establishing equipment requirements;
- providing equipment bays;
- strategy for equipping;
- procurement and selection of furnishings and equipment;
- missing rooms;
- appropriate placing and accessibility of hand hygiene facilities;
- ventilation systems including the level of filtration where specialised ventilation is required;
- water supply, heating and plumbing;
- surface finishes: ceilings, walls, work surfaces, floor coverings and furnishings;
- storage (including waste collection points and delivery areas) and DSRs equipment cleaning areas;
- ancillary areas;
- single rooms;
- isolation rooms;
- changing facilities;
- providing flexibility of space: e.g. to allow for cohort nursing (a full glossary of terms can be found in [Appendix 2](#));
- lifts;
- pneumatic delivery systems.

Particular issues to be addressed by the Project Team

- 4.11 The Project Team must ensure that prevention and control of infection implications are not compromised by reducing standards set by NHS guidance or by overcrowding in clinical areas and they should communicate their views to the Project Manager for further action.

Technical design

- 4.12 Drawings at a scale of 1:50 will be available at this stage confirming more precise detail such as the number and location of sanitary fittings, equipment, furnishings, etc.

4.13 The Project Manager, with advice from the Project Team, will also need to consider the prevention and control of infection issues around:

- workflow;
- wash-hand basins: types, numbers and location;
- fixtures/fittings/flooring;
- waste water and sewage/body fluid disposal;
- ventilation;
- heating and lighting;
- water systems;
- suction/medical gases;
- storage systems;
- ward kitchens/pantry.

NHS guidance on the design and/or installation of the above can be found in planning notes and technical memoranda available on the HFS website.

4.14 To assist with understanding and mitigating risks associated with bacterial contamination of water distribution and supply systems, it is recommended that the NHS Board should have in place a Water Safety Plan (WSP) as outlined in SHTM 04-01 providing a risk management approach to the microbiological safety of water and establishing good practice in local water distribution and supply. Those organisations with robust water management policies for *Legionella* will already have in place much of the integral requirements for delivering a WSP.

Note: Refer to Health Protection Scotland Guidance for neonatal units (NNUs) (levels 1, 2 & 3), adult and paediatric intensive care units (ICUs) in Scotland to minimise the risk of *Pseudomonas aeruginosa* infection from water.

	Process and corresponding RIBA Plan of Work Stage	Planning process Time Period																Issues to consider	
Design Stage	0:Strategic Definition																	Space	Waste
																		Catering	Cleaning/disinfection/sterilisation
	1:Preparation and Brief																	Specialist area	
																		Engineering facilities	
																		Laundry	
	2:Concept Design/3:Developed Design																	Storage (linen, waste, patient equipment, domestic equipment)	Lifts
	Outline business case																	Ancillary areas	Pneumatic delivery systems
Procurement																		Changing facilities	Patient placement
																			Single rooms
	3:Developed Design/4:Technical Design																		Isolation rooms
	(Depending on Procurement Route)																		
Delivery																		Ventilation	Wash-hand basins
																		Heat/light	Storage systems
																		Water systems	Ward kitchens
																		Sewerage	Workflow
																		Vacuum	Fixture and fittings
	Full business case																		
	Tender																		
Delivery	5:Contract																		
	Construction																	Equipment	
																		Space	
	6:Handover & close-out																	Specialist equipment	
Delivery																			
	7: In use																	Check for any changes made to original agreement/plan	

Table 1: Project Development Chart

Typical Key Stages of Project Team Input

1. **The Brief/Concept/Feasibility study: Project Team should contribute to the review of operational policies and procedures, such as:**
 - adding beds to ward area may require an additional sluice or single rooms;
 - adding extra theatres will need a review of decontamination services for instruments.
 - additional specialised areas will need extra prevention and control of infection input;
 - traffic flows.
2. **Concept design/developed design: Sketch plans at 1:200 scale available at this stage, the Project Team needs to give a broad view of prevention and control of infection issues e.g. rooms missing, wards without ancillary areas such as disposal rooms or dirty utility.**
3. **Technical design: (1/50 designs – early period)**
There is a need to finalise locations of rooms for correct workflows/prevention and control of infection practice, i.e. wards, theatres.
4. **Technical design: (1/50 designs – later period)**
Need to discuss finer details within rooms: location and type of fixtures and fittings, e.g. hand-wash basins/types of basins; airflows in theatres, flooring.
5. **Construction:** A designated individual should be appointed particularly if the new build is attached to an existing healthcare building, to ensure that control measures prevent risks to patients.
6. **Equipment:** decisions on equipment should be made as an ongoing process, but it is at this stage that it will be seen that previous equipment 'wish-lists' may not fit the rooms/departments or are now outdated. It is important that Project Teams also have input during this period (especially if it is a PFI/PPP build).
7. **Commission/equipping:** Project Teams must have input during this stage if costly and dangerous mistakes are to be avoided.
8. **In use:** this is an important stage in which lessons learnt can be highlighted for future projects, both within NHS Boards and throughout NHSScotland. Post-project evaluation is mandatory and results should be available to other NHS Boards.

Table 2: The Key Stages of the Planning Process and examples of Project Team input

Accommodation areas/internal environment/general services	Examples: Key issues and areas to be considered	
Accommodation areas		
Bed areas: Single-bed rooms.	Placement of patients at high-risk. En-suite facilities. Doors on bays.	
Dirty utility/clean utility.	Standardisation of rooms/choice of equipment. Appropriate storage. Space.	
Domestic services room.	Space, adequate sinks and storage.	
Workflow/layout.	Standard ward area versus specialised area.	
Bed planning.	Elective. Emergency.	
Linen services and facilities.	Storage, transport and handling.	
Catering/kitchen areas.	Furnishing, fixtures and fittings plus workflow crucial for HACCP. Commercial systems e.g. cook-chill versus in-house systems.	
Intensive care unit/High dependency unit (ITU/HDU).	Single rooms versus 4/6 bed bays.	
Clinical wash-hand basins.	Number dependent on room types. Correct wash hand basin specifications. Facilities to ensure compliance with hand hygiene. Located to encourage staff use.	
Staff change areas/storage of uniforms.	Type of uniform provided inline with national uniform policy.	
Decontamination facilities. Central Decontamination Unit/Local Decontamination Unit (CDU/LDU).	Operational policy dictated by choice of decontamination strategy.	
Equipment.	Bed/mattresses. Endoscopes/instruments. Patient specific. Area for Decontamination facilities.	Purchase versus hire. Cleaning/disinfection-requirement. Enough equipment available.

Table 3: Infection control issues for the Project Team to consider in the Capital Planning Process.

Specialty areas		
Critical care. Ultra clean ventilation. Theatres. Hydrotherapy. Mortuaries. SCBUs and maternity.	Renal units. Oncology. Neurology. Paediatrics. Decontamination units. Pharmacy aseptic dispensary.	Every specialist area will have different requirements and infection control issues so cannot be planned as standard departments.
Internal environment		
Ventilation.		Single rooms, bays, theatres, pacing rooms, treatment rooms, internal sanitary areas, enhanced single bed rooms with positive pressure lobby for isolation.
Heating/ventilation.		Dust-free options i.e. hidden heat panels versus radiators. Minor procedure rooms.
Lighting.		Quantity. The use of sealed units.
Furnishings, fittings and artwork.		Walls/floors/ceilings – hygiene versus aesthetics.
Water.		Dead-legs. Water turnover. Appropriate temperature for hot and cold systems. Water coolers/fountains.
General services		
Disposal of waste.		NHS versus Private Sector. Storage.
Communications.		IT systems (timely information on pathology, etc, operational policies, infection control policies, procedures and training).
Emergency plans.		Water storage if water cut off/heating/medical gases and vacuum/suction/emergency generator, ventilation, etc.

Table 3 continued: Infection control issues for the Project Team to consider in the Capital Planning Process.

Note: This is not an exhaustive list

Design Development stages

- 4.15 It is during the design stages that the Project Manager should verify with the Infection Prevention and Control Team that advice given previously is being followed up. As members of the Design Team, drawings and specifications should be available to them to explain how the design fulfils their requirements at the 1:200 and 1:50 plan stages of the project. Suggestions for improvement in operability are encouraged at this stage.

Note: Plans should be physically signed-off on completion of this stage to confirm full collaborative agreement. This is set out in Part B - Implementation Strategy section of this documentation.

- 4.16 In alteration or refurbishment projects, consideration should also be given to the impact on existing local facilities, e.g. ventilation, water supplies, etc.

Note: The Project Manager will need to recognise that value engineering will take place and that collective decisions should be taken on the basis of value for money.

Provision of single-bed room accommodation and bed space

- 4.17 Reference should be made to SHPN 04-01: 'Adult in-patient facilities'. CEL 27(2010) Provision of SHPN single room accommodation and bed spacing states that for:-

New build facilities

For all new-build hospitals and other healthcare facilities which will provide inpatient accommodation there should be a presumption that all patients will be accommodated in single rooms unless there are clinical reasons for multi-bedded rooms to be available. These reasons should be clearly identified and articulated in the appropriate Business Case and will be subject to Scottish Government agreement as part of the Business Case approval process.

Refurbishment of existing healthcare facilities

For projects where existing accommodation is being refurbished it is recognised that each building to be refurbished will present unique problems. Taking into account the constraints of the existing building, a minimum of 50% single room accommodation will be allowed but close to 100% will be expected. Issues related to the adaptability of existing engineering services will have to be assessed.

Bed space

- 4.18 In relation to the issue of bed spacing for multi-bedded rooms, the current advice remains unchanged. That is, taking into account the ergonomic criteria, primarily the space required for patient handling and other activities which take place in the immediate vicinity of the bed, it is recognised that the minimum bed

space should not be less than 3.6m wide x 3.7m deep. Further guidance can be found in the [notebox](#) following paragraph 4.27.

- 4.19 When carrying out refurbishment work to existing multi-bedded ward accommodation, the NHS Boards should seek to achieve this bed spacing. This may require considering reducing the number of beds in the room and a risk based approach should be applied. NHS Boards should also seek to achieve this bed spacing standard in accommodation which is not being refurbished or replaced. Again a risk based approach should be applied.

Sizing of space

- 4.20 As indicated above in new build projects the bed provision will be in single rooms and the optimum space standards are set out in SHPN 04-01: 'Adult in-patient facilities'. Where single bedroom accommodation is not possible in the alteration or refurbishment of existing wards and the minimum bed space of not less than 3.6m wide x 3.7m deep cannot be achieved then a risk assessment will be required to establish that appropriate space between beds is provided in accordance with the type of clinical intervention to be undertaken in the immediate patient environment.
- 4.21 Design, accessibility and space in patient areas all contribute to ease of manual handling, cleaning and maintenance.
- 4.22 Spacing must take into account access to equipment around the bed and access for staff to hand hygiene facilities. Sufficient space for equipment (e.g. hoists) is a health and safety issue for staff and patients.
- 4.23 Where it is not possible to meet the guidance recommendations set out in SHPNs and HBNs, Healthcare facilities must provide sufficient sanitary facilities including showers/bathrooms to ensure easy access, convenience and independence.
- 4.24 The principle should be to maintain sufficient space for ergonomic reasons to allow activities to take place safely, such as moving of equipment, patient lifting and movement, as well as ongoing maintenance. The exact space needed will vary according to numbers and activity of staff, type of patient, and environmental factors such as ventilation and humidity. Health Building Notes (HBN) 00-03: 'Clinical and clinical support spaces' and HBN 00-02: 'Sanitary spaces' provide details on calculating the optimum spaces required.
- 4.25 Particular issues for consideration sizing space include:
- patient groups;
 - transmission of micro-organisms;
 - avoiding cross-infection;
 - the environment and its role in cross infection;
 - shared equipment;
 - movement of patients.

- management of issues:
 - clinical pressures;
 - best use of single rooms;
 - avoiding unnecessary movement of patients between areas.

Bed density

- 4.26 The increase in the prevalence of antibiotic-resistant bacteria and immuno-compromised in-patients was one of the compelling reasons for mandating the maximum provision of en-suite single rooms.
- 4.27 Provision of isolation/single rooms used to segregate patients will help prevent the spread of micro-organisms, especially those transferred by the airborne route or those easily disseminated into the immediate patient environment.

Note: The source of guidance related to the provision of single bedrooms and bed spacing requirements can be found in Scottish Health Planning Note 04-01: 'Adult in-patient facilities' and CEL 27 (2010) issued by Health Finance Directorate of the Scottish Government 20 July 2010.

- 4.28 As previously described, the provision of adequate space around the bed can significantly improve the quality of the patient's experience and aid the clinical and healing process. Clinicians and carers need adequate space around the bed, arranged in a functionally suitable way, to undertake their work efficiently and safely, making the most effective use of resources. Facilities should also serve the psychological needs of patients and their families providing a place of safety and privacy.

Departmental issues

- 4.29 There are some departments in a healthcare facility where infection risk is higher. The adjacency of these departments should be arranged so as not to increase further the risk of infection.
- 4.30 For example, departments with patients at a higher risk of contracting infection should be located and serviced to minimise risk of contamination from departments where patients are an infection risk.
- 4.31 For particular information on the content and conditions to be maintained within various rooms reference should be made to the Scottish Health Planning Notes (SHPN) or Health Building Notes (HBN) still applicable in Scotland that are appropriate to the department under review.

Interior finishes, fixtures and fittings

Note: Throughout this section of the document there is frequent reference to interior finishes, fixtures and fittings not being physically affected by detergents and disinfectants. Health Facilities Scotland National Cleaning Specification provides details on cleaning procedures and frequencies for use within NHS Scotland Healthcare Facilities. Additionally, Appendix 11 of Health Protection Scotland's belonging to National Infection Prevention and Control Manual gives guidance on the management of blood and body fluid spillages and states that use of:

10,000ppm available chlorine disinfectant is recommended for disinfection of surfaces contaminated with spills of blood or certain body fluids (cerebrospinal fluid; peritoneal fluid; pleural fluid; synovial fluid; amniotic fluid; semen; vaginal secretions; breast milk; any other body fluid with visible blood).

1,000ppm available chlorine disinfectant is recommended for disinfection of surfaces contaminated with spills of urine/faeces/vomit/sputum only.

In addition, the Transmission Based Precautions section of the same document states 1,000ppm available chlorine disinfectant is recommended for environmental decontamination when caring for: patients with symptoms of infection; asymptomatic patients who are suspected or incubating an infection; or patients colonised with an infectious agent (i.e. Transmission Based Precautions).

Among other things, consideration should be given to meeting the requirements set out in these documents when selecting interior finishes, fixtures and fittings.

Flooring in clinical areas

(SHTM 61: Flooring)

- 4.32 Flooring must be seamless, impermeable, slip-resistant, easily cleaned and appropriately wear-resistant. There should be coving between the floor and the wall to prevent accumulation of dust and dirt in corners and crevices. Any joints should be welded or sealed to prevent accumulation of dirt and damage due to water ingress. Wood, tiles and flooring with unsealed joints are difficult to keep clean and should be avoided.
- 4.33 In areas where frequent wet cleaning methods are employed, floors should be of a material that is unaffected by the agents likely to be used, such as a disinfectant solution of 1,000 parts per million available chlorine.
- 4.34 Floors that are particularly subject to traffic when wet (bathrooms, kitchens) should be seamless, impermeable and slip-resistant, but be easily cleaned. Consideration will be required as to the suitability of existing cleaning equipment and its compatibility with new floor finishes.
- 4.35 Carpets are not recommended in clinical areas. Exceptions may include palliative care setting and audiology departments, however if there is a risk of blood/body fluid contamination in these areas the carpets should be able to

withstand exposure to a disinfectant solution of 10,000 parts per million available chlorine.

Walls

(SHTM 56: Partitions)

- 4.36 Smooth wipable impermeable surfaces are recommended in clinical areas and design should ensure that surfaces are easily accessed and will not be physically affected by detergents and disinfectants. Additional protection to walls should be considered to guard against gouging and impacts from bedhead and trolley movements. Surfaces should be free from fissures and crevices. Floors or walls penetrated by pipes, ducts and conduits should be sealed to prevent entry of pests and ease cleaning.

Ceilings

(SHTM 60: Ceilings)

- 4.37 Smooth jointless impermeable ceilings should be used in operating theatres and special ventilated isolation rooms.
- 4.38 Suspended ceilings may be installed in general clinical areas and other areas. Smooth wipable impermeable surfaces are recommended in clinical areas and design should ensure that surfaces are easily accessed.
- 4.39 Dust and fungal spores may accumulate on the upper surfaces of ceiling tiles over time and dispersal on removal of tiles may pose an inhalation risk to highly immuno-compromised patients. An HAI-SCRIBE review should be carried out before such work is undertaken.

Note: Routine and repetitive maintenance activities do not require fresh risk assessments on every occasion they are carried out.

Doors

(SMTM 56: Doors)

- 4.40 Doors should be cleanable, that is, smooth, wipable and have impermeable surfaces to ensure that surfaces will not be physically affected by detergents and disinfectants. This applies especially in clinical areas where contamination with blood or body fluid is a possibility.
- 4.41 Doors should have handles that can be easily cleaned and dried. Additional protection to doors should be considered to guard against gouging and impacts from bed and trolley movement. Particular advice related to mental health units is contained in [Appendix 3](#).

Windows

(SHTM 55: Windows)

- 4.42 Windows should be sealed and unopenable in operating theatres. Consideration should be given to the elimination of windows in such accommodation. Windows should be sealed and unopenable in ICUs, Neonatal, Oncology and Haematology departments and special ventilated isolation rooms. Internal ledges to all windows should be avoided to prevent build up of dust and clutter. Sloping ledges should be considered in clinical areas.

Fixtures and fittings

- 4.43 All surfaces should be easily accessed, wipable and will not be physically affected by detergents and disinfectants. All work surfaces should be impermeable, designed for easy cleaning and be free of fissures and unsealed joints. They should be able to withstand the effects of regular cleaning with both detergents and disinfectants.
- 4.44 Gaps, ledges, etc., should be eliminated or minimised as they will harbour dust, particularly where fixtures and fittings interact with walls and floors making them difficult to clean.

Sanitary fittings

(SHTM 64 Sanitary assemblies and HBN 00-02 Sanitary spaces)

Hand hygiene facilities

- 4.45 Compliance with hand hygiene guidelines can be improved by conveniently placed and well-designed hand hygiene facilities. The importance of facilities to encourage and facilitate good hand hygiene practices should be high on the list of priorities when designing and planning new healthcare premises or refurbishment of existing premises is being undertaken.

Wash-hand basin design

(SHTM 64 Sanitary Facilities)

Clinical wash-hand basins - Specification

- 4.46 The dimensions of a clinical wash-hand basin should be large enough to contain most splashes and therefore enable the correct hand-wash technique to be performed without excessive splashing of the user or surrounding surfaces. This can also occur if the water outlet is placed too high above the basin.
- 4.47 Clinical wash-hand basins should be wall-mounted using concealed brackets and fixings. They should also be sealed to a seamless waterproof splash-back to allow effective cleaning of all surfaces. It should be noted that tile grouting is difficult to keep clean.

- 4.48 They should not have a plug or a recess capable of taking a plug. A plug allows the basin to be used to soak and reprocess equipment that should not be reprocessed in such an uncontrolled way.
- 4.49 Clinical wash-hand basins should not have overflows as these are difficult to clean and become contaminated.
- 4.50 Taps should not be aligned to run directly into the drain aperture, as contamination from the waste outlet could be mobilised and splashing could occur.

Clinical wash-hand basins - Provision

- 4.51 The location and provision of clinical wash-hand basins should ensure that they are all readily available and convenient for use. The location of clinical wash-hand basins is as important as the bed-to-basin ratio. Multi-bed room rooms' basins should be located to ensure access by staff with the minimum travel between patient and basin; for example, one clinical wash-hand basin on each side of the entrance or at opposite sides of the room.
- 4.52 Taps in augmented care wards should not have flow straighteners (aerators), as Biofilm can develop on flow straighteners, rosettes and aerators. It is therefore recommended that these are removed. However, the decision to remove flow straighteners, rosettes and aerators should be based on risk assessment, as their removal can create turbulent flow at increased pressure resulting in splashing of surrounding surfaces and flooring.
- 4.53 Hand hygiene facilities to support the practices as set out in Health Protection Scotland's National Infection Prevention and Control Manual should be readily available in all clinical areas. There should be sufficient numbers and appropriate sizes of clinical wash-hand basins to encourage and assist staff to conform readily to hand hygiene practices as set out in the HPS manual.
- 4.54 Guidelines for the appropriate numbers and location of clinical wash-hand basins in wards are given in Scottish Health Planning Note 04-01 'Adult in-patient facilities' and in other clinical areas in Health Building Note 00-03 Clinical and clinical support spaces. In order to encourage good practice and to give reasonable access, it is recommended that:
- in en-suite single bedrooms a clinical wash-hand basin should be located in the bedroom and a general wash-hand basin for patient's personal hygiene in the en-suite;
 - in four bedded rooms there should be two clinical wash-hand basins in the room and a general wash-hand basin for patient's personal hygiene in the en-suite. (Note that there should be no more than four beds in a multi-bed room in line with Health Building Note 04-01); Space may preclude this being provided in refurbishment projects within existing premises and risk assessments may accept this situation given the provision of alcohol-based hand rub facilities as the first choice for routine hand hygiene;
 - in intensive care and high dependency units (critical care areas), a clinical wash-hand basin should be available by each bed space. It should be noted,

however, that under-usage of basins encourages colonisation with *Legionella* and other microorganisms. Whilst there should be sufficient hand wash stations for hand washing, the provision of more than is necessary presents an avoidable risk of infection from water. Advice on number and location of hand wash stations in clinical areas should be sought from the IP&CT.

Note: Outlets that are used infrequently are a potential problem with water stagnation in all clinical areas. Measures to control the spread of microorganisms in healthcare premises include the regular use of alcohol-based hand-rubs, and this can result in a significant reduction in the use of hand-wash basins. There has also been a trend to providing an enhanced provision of hand wash basins resulting in reduced throughput of water to each. Under-use of taps encourages colonisation with *Legionella* and other microorganisms such as *Pseudomonas* spp. Designers should be aware of these issues and, accordingly, consider how they might impact on the frequency of use of hand washing.

- 4.55 NHS Boards should have policies in place to avoid contamination of the delivery system and ensure that clinical wash-hand basins are not used for other purposes such as emptying of patient bathing water into the water delivery system where they can colonise existing biofilms.
- 4.56 HBN 00-03 'Clinical and clinical support spaces' and HBN 00-02 'Sanitary spaces' give guidance on activity spaces required for clinical wash-hand basins including in primary care and out-patient settings, where clinical procedures or examination of patients/clients are undertaken. A clinical wash-hand basin should be accessible to where the procedure is carried out.

General wash-hand basins

- 4.57 All en-suite facilities should have a wash-hand basin for use by patients.
- 4.58 All toilet facilities should have a wash-hand basin. Wash-hand basins should not have overflows as these are difficult to clean and become contaminated.
- 4.59 Taps should not be aligned to run directly into the drain aperture.
- 4.60 All general wash-hand basins should be sealed to a seamless waterproof splash-back.
- 4.61 HBN 00-02: 'Sanitary spaces' gives guidance on activity spaces for en-suites, showers, baths and changing facilities.
- 4.62 SHTM 64 gives details of sanitary assemblies for other areas such as theatre scrubs, kitchens etc.

Note: For guidance on mental health and learning disability settings, see [Appendix 3](#).

Water/taps

- 4.63 Health and Safety regulations (The Workplace (Health, Safety and Welfare) Regulations, 1992) require that both hot and cold running water should be available in areas where employees are expected to wash their hands.
- 4.64 Hands should always be washed under running water; mixer taps allow this to be practised in safety in healthcare settings where hot water temperatures may be high to control *Legionella* spp. (see Scottish Health Technical Memorandum 04-01).
- 4.65 Taps can be fitted with thermostatic mixing valves (TMVs) to ensure that the temperature of the water delivered does not cause scalding etc (no greater than 41°C). TMVs are recommended in most healthcare settings depending upon outcomes of local risk assessments. TMVs should be sited within the tap or on pipework immediately prior to the taps. Taps should be capable of accommodating point-of-use filters which may have to be retro-fitted at some time following an outbreak of Legionellosis or *Pseudomonas* infection. (Scottish Health Technical Memorandum 04-01 refers).
- 4.66 There have been multiple observations of TMV colonisation with *Pseudomonas* spp. including *Pseudomonas aeruginosa* particularly in older TMVs. This observation includes colonisation with multiple antibiotic-resistant strains. This is most significant in high dependency units (for example, intensive therapy units, special care baby units, and burns units) where patients may be particularly susceptible to colonisation and infection with this opportunist pathogen. Conventional manual mixer taps may not be as prone to such colonisation and may be appropriate in situations where monitored patients are confined to their beds and consequently there may be under-usage at these outlets.
- 4.67 Consideration should be given to the provision of removable, accessible, TMVs and/or taps or taps with removable spouts in high dependency accommodation. By holding a float of spares, decontamination could be undertaken without prolonged interruption to hot and cold water supplies.
- 4.68 A local risk assessment of patient susceptibility to *Pseudomonas* infection versus scald risk where patients operate taps could be used to inform the use of TMVs or conventional manual mixer taps.
- 4.69 Non-TMV taps are also available for certain applications (for example, kitchens and cleaners' sinks). These taps allow the user free rein to determine the temperature of the water delivered at the point of use. However, a local risk assessment should be undertaken first.
- 4.70 Taps should be easy to turn on and off without contaminating the hands and be elbow/wrist operated or sensor operated.
- 4.71 Taps discharging directly into a drain hole can cause splashing, which could disperse contaminated droplets. The tap outlet flow should not discharge directly into the waste aperture.

- 4.72 Swan-neck tap outlets are not recommended for new build projects nor in refurbishment schemes, as they do not fully empty after use. Strainers, aerators (flow straighteners) and anti-splash fittings at outlets are recommended not to be used as they become colonised with bacteria. Adjustments to flow may be required to minimise splash risks. Careful consideration as to the appropriateness should be given to the need to provide sensor taps in clinical wash hand basins.
- 4.73 Where water systems are closed down, a *Legionella* risk assessment should be undertaken. This should include the risk bacterial overgrowth in dead-legs poses to adjacent water systems. Flushing and hyperchlorination should also be considered when the system is reinstated.

Alcohol based hand rub/Soap dispensers

- 4.74 Liquid soap dispensers should be wall-mounted at all wash-hand basins and be designed to be operated without contamination from the user's hands coming into direct contact with the dispensing mechanism. Dispensers should not be refillable but be of a disposable, single cartridge design (see [Appendix 3](#) for guidance on mental health units).
- 4.75 Alcohol based hand rub dispensers should be available to staff as near to each individual patient as possible, subject to local risk assessment. Users and IPC teams should liaise and advise on the precise position and number of these units in clinical areas (Further information can be found in CNO (2005)1).

Hand drying

- 4.76 Paper hand-towel dispensers should be conveniently placed by all wash-hand basins (clinical and non clinical).
- 4.77 The use of paper towels in rolls should be discouraged. They are difficult to tear off without contaminating the remaining roll.
- 4.78 Fabric towels are a source of cross-contamination and must not be used for hand hygiene.
- 4.79 Hot-air hand dryers reduce paper waste and may be considered for use in public areas of healthcare facilities. Many machines dry hands more slowly than paper towels, and these should not be installed for staff use in clinical areas. They are noisy and should not be used in clinical areas where patients could be disturbed.
- 4.80 Hands-free waste bins, sack holders or receptacles, with appropriate colour-coded waste bags, should be provided by each wash-hand basin.

Sinks and slop-hoppers

- 4.81 Using sinks for both hand-washing and the cleaning of equipment is not allowed as this will significantly increase the risk of hand and environmental contamination. Dirty utility rooms should contain:

- a hopper;
- a macerator;
- a separate sink for cleaning equipment;
- a clinical wash-hand basin;
- space to accommodate colour-coded disposal bags for bagging waste.

4.82 Convenient access to these is important, as contaminated fluids such as patients' wash-water should not be emptied down clinical wash-hand basins in adjacent ward areas.

Note: Equipment for destruction of disposable bedpans or cleansing non-disposable bedpans may generate significant noise. Care should be taken to eliminate this spreading to adjacent accommodation.

4.83 Slop-hoppers should be provided in areas where dirty waste water, is disposed, e.g. domestic services room, cleaners' cupboards/areas for cleaning equipment. Hoppers should be provided in dirty utility rooms where required for the disposal of small amounts of liquid waste e.g. from urinalysis. (Further detail is provided in HBN 00-03 Clinical and clinical support spaces).

Soft furnishings

4.84 Soft furnishing used within clinical areas should be chosen for ease of cleaning and compatibility with detergents and disinfectants. They should be covered with material that is impermeable, preferably seam-free or heat-sealed.

Curtains and blinds

4.85 Privacy curtains become contaminated with micro-organisms which can be transmitted to staff hands. Where patients may be particularly susceptible to infection, curtains should have fittings that allow quick and convenient replacement. Consideration should be given to disposable curtains for which such fittings are common.

4.86 In new-build or refurbished augmented care units, consideration should be given to having separate curtains for each multi-bed space sufficiently separated such that staff can easily and correctly identify which curtain belongs to which bed space.

4.87 Reusable curtains should be able to withstand decontamination in healthcare laundering processes.

4.88 There should be a local policy on the changing of privacy curtains both for routine changing when the curtains become soiled and after discharge of a patient with a known or suspected infection. The policy for changing of privacy curtains both for routine changing when the curtains become soiled and after discharge of a patient with a known or suspected infection should reflect the practice set out in the National Cleaning Services Specification.

- 4.89 Window blinds are not recommended in clinical areas for new-build or refurbishment applications but where currently in place they require to be readily and regularly cleaned as part of local policy.

Equipment

- 4.90 The purchase of fixed equipment (Group 1&2) will normally take place before the operational commissioning period. (A full definition of Group 1&2 equipment can be accessed in [Appendix 1](#)). However, it is important during the design, construction and equipment scheduling stages that there is consultation with the Infection Prevention and Control Team in discussion of equipment. Some of this will be purchased/fitted by the Contractor and may have significant design implications. All equipment must be compatible with the need for prevention and control of infection and all equipment must be compliant with decontamination guidance.
- 4.91 Technical commissioning of the building, services and equipment should include any areas that require inspection and testing to demonstrate compliance with prevention and control of infection standards, i.e. theatres, hydrotherapy pools, isolation/segregation rooms and clean rooms in pharmacy and Central Decontamination Units (CDUs). There is a legal requirement for compliance in CDUs and pharmacies.

Procurement Stages

Infection Prevention and Control Expertise in Procurement activities

- 4.92 Infection Prevention and Control Specialist input is essential at the procurement stage of any construction/refurbishment project. This input is initially required when consideration is being given to the selection of Architects and Designers following interview.

Tender/contract

- 4.93 The Project Manager should seek the views of the Project Team as part of the tender evaluation process and scoring of relevant sections of tenders/contracts to assess competence in relation to the technical nature of the build.

Health & Safety expertise

- 4.94 Prevention and Control of HAI is a Health and Safety concern and the actions or omissions of those involved in the provision or operation of the facility could become evidence in any legal action stemming from an infection. For this reason it is essential that, as with other considerations of professional competence, all those involved in the design and planning are able to demonstrate that appropriate expertise was in place and advice sought.

Legislative issues

- 4.95 Before any work commences, there is a need to be aware of all legislative issues, which apply to the project. Examples of relevant legislation may include

- The Health and Safety at Work etc Act 1974;
- The Construction (Design and Management) Regulations 2007 (CDM);
- The Provision and Use of Work Equipment Regulations (PUWER) 1998;
- The Control of Substances Hazardous to Health (COSHH) Regulations 2002.

An expanded list appears in the References section of this document.

Delivering a safe environment

- 4.96 A number of pieces of legislation put the primary responsibility for the safety of the facility, including HAI, on the employer, usually the NHS Board. In construction procurement the 'employer' sets the resource, assesses the competence of the Design Team and evaluates the output. This means the employer should lead on setting the quality culture that will deliver a safe environment.

Delivery/Construction Stages

- 4.97 HAI-SCRIBE provides additional information on infection prevention and control.

Construction (new build)

- 4.98 When the project is a new-build, the largest risk is at the beginning of the project where there may be excavations of large amounts of soil together with its transportation away from the site. NHS Project Managers should visit the site at appropriate and mutually convenient times, as soon as possible after the Contractor has taken ownership of the site, meeting with the Contractor and observing work practice and familiarising themselves with the layout of the various departments. This will help them to detect any unidentified problems or ones caused by design changes. Any changes identified should be risk assessed in compliance with the Management of Health and Safety at Work and recorded.

Construction (new-build attached to existing site or refurbishment)

- 4.99 Involvement of Project Teams in refurbishment projects is important not only for ensuring that 'designed-in' prevention and control of infection is achieved, but also for assessing the potential risks to patients in existing buildings from dust, dirt and pathogens.

Note: The Health and Safety file and method statement should be reviewed prior to handing over the site to the contractor. It should include clear indications as to how waste is transferred, controlled and the site managed. By listing the HAI control measures in the Health & Safety file or similar documents the design team will have the opportunity to evaluate the suitability of the proposed controls prior to commencing HAI-SCRIBE assessment.

- 4.100 Measures that limit the spread of dust, dirt and pathogens during construction may include the following:

- undertaking work in winter as the risk is lower for *Aspergillus* spp. and other fungal infections. Clinical teams would need to bear in mind the impact of winter bed pressures and Norovirus outbreaks when planning work over this period;
- cleaning and vacuuming areas under construction and the surrounding areas frequently;
- placing adhesive floor strips outside the door to the construction area to trap dust; these should be replaced regularly to remain effective;
- sealing windows, doors and roof-space to control dust;
- installation of temporary sealed partitions where appropriate;
- provision of barriers which should be physically robust, smooth and easy to clean;
- damp-mopping the area just outside the door to the construction area daily or more often if necessary;
- using a high-efficiency particulate air (HEPA) filtered vacuum to clean areas daily or more often if necessary eg where there is a greater risk of infection spread or a greater need for control of infection;
- transporting debris in containers with tightly fitting lids, or covering debris with a wet sheet;
- all debris should be bagged and sealed for removal at convenient times. This would reduce the risk associated with frequent travel. Follow-on cleaning of the traffic routes would be required as appropriate;
- not hauling debris through patient-care areas;
- removing debris after normal work hours through an exit restricted to the construction personnel;
- designating an entrance, a lift and a hallway that the construction workers must use outwith times that it would be used by patients, visitors or healthcare workers;
- shampooing carpets when the construction project is completed;
- commissioning hotel services regarding cleaning during construction stage.

Note: The Project Manager or delegated person should monitor the effectiveness of dust control measures and any signs of dust accumulation outwith the contained area. The frequency would be based on the risk assessment of surrounding clinical areas.

4.101 HAI-SCRIBE control measures must be clearly documented, followed and recorded. Similarly, a daily checklist is maintained as a minimum during the progress of the construction project and signed off by the designated appropriate person.

Barriers		N/A
Construction signs posted for the area	Yes/No	
Doors properly closed and sealed	Yes/No	
Floor area clean, no dust tracked	Yes/No	
Air handling		
All windows closed behind barrier	Yes/No	
Negative air pressure at barrier entrance	Yes/No	
Negative air pressure machine running	Yes/No	
Project area		
Debris removed in covered container daily	Yes/No	
Waste materials in appropriate container	Yes/No	
Routine cleaning done on job site	Yes/No	
Traffic control		
Restricted to construction workers and necessary staff only	Yes/No	
All doors and exits free of debris	Yes/No	
Dress code		
Appropriate for the area (e.g., Theatres, CDU)	Yes/No	
Required to enter	Yes/No	
Required to leave	Yes/No	

Table 4: Daily construction survey

Surveillance and monitoring during renovation or construction work

- 4.102 Incidences of *Aspergillosis* and *Legionellosis* associated with environmental changes arising from construction and renovation work have been reported (Fournel *et al* 2010, Boivin *et al* 2012). Therefore the need for additional surveillance and environmental monitoring may be identified by the Project Team through Risk Assessment.
- 4.103 Where any patients may be placed at risk, it is important that an appropriate risk assessment be carried out. This would be undertaken in advance of any demolition works or disturbance/alterations to the building fabric/ventilation systems. Advice on patient groupings should be obtained from clinicians.
- 4.104 Since the airborne spores of *Aspergillus* spp. can travel significant distances, this will apply generally to all works in the immediate vicinity or within the boundary of the healthcare site. The need would be dependent on the HAI Risk classification such as type 3 or type 4. Particular care will be required in Transplant units and other accommodation for Immuno-compromised patients.

Delivery/Commissioning Stage

- 4.105 Upon completion of construction, the facility must be brought into use; the complexity of the task involved generally means that a Commissioning Manager and Commissioning Team will be needed. Senior managers, infection prevention and control teams, specialist teams and users should be fully involved in the process. The commissioning entails:

- drafting operational procedures;
- establishing baseline and future staffing profiles;
- establishing baseline and future revenue budgets;
- establishing final equipment requirements;
- identifying policy issues for referral to the Commissioning Team or the construction project team;
- identifying staff training needs;
- establishing the occupation programme for each user function, for incorporating into the overall masterplan.

4.106 The Project Team may also need to be involved in processes for:

- transfer of facilities;
- phased or staged occupation;
- strategy for equipping;
- selection of equipment;
- storage and subsequent cleaning/disinfection of any furniture or equipment;
- commissioning domestic services for cleaning;
- site visits;
- artwork;
- furnishing and fittings including decorating;
- interior finishes and fixtures;
- post-handover period;
- decommissioning of redundant facilities;
- period of handover to operational management.

Note: Although this must be robustly resisted, commissioning of building services is frequently curtailed to meet deadlines or put in the hands of inadequately qualified or inexperienced personnel. This is invariably to the detriment of user satisfaction, operational efficiency, HAI risk and running costs and should be avoided.

Post Project Evaluation

4.107 The purpose of post-project evaluation is to improve project appraisal, design, management and implementation. This typically takes place 12 months post-handover and is a learning process that should not be seen as a means of allocating blame. There are three stages:

- project appraisal;
- monitoring and evaluation of the project;

- review of project operations.

- 4.108 It is useful for members of the Project Team to be included at this stage in the evaluation teams that are reviewing project alternatives. The outcomes (activity and its consequences) of the project will not be amenable to evaluation until the facility has been in use for some time. However, if the project is part of a phased refurbishment or new build, valuable lessons can be learned and implemented during ongoing project work.

Note: It is important that the project is evaluated in terms of its original objectives, not in the light of any new legislation or development.

- 4.109 Reference should be made to the HAI-SCRIBE questionsets in Part B - the Implementation Strategy and Assessment Process section of this guidance relating to the design and planning stage of any development.

Logistics

- 4.110 The design of the healthcare facility must realistically consider the logistics of a functioning facility. It is essential that systems are in place which will inhibit the spread of infection and resources and personnel are managed so that they do not contribute to the risk of infection.

- 4.111 Examples of logistical issues to consider include:

- the delivery and distribution of clean materials and people via connecting corridors and lifts;
- the collection, transportation and storage pending removal or disposal of waste materials;
- the separation of clean and dirty traffic flows;
- clinical workflows.

- 4.112 These issues require careful planning and design which recognise the potential for infection spread through the mismanagement of such issues.

Summary

- 4.113 The following are the main issues for designers and Project Team personnel to consider in designing a healthcare facility. However, the infection risk should be assessed in conjunction with other risks as conflicts can arise (e.g. with respect to the needs of dementia patients).

- 4.114 Design to facilitate cleanliness and cleaning:

- use finishes that are impermeable, smooth, seamless and durable, as far as practicable;
- cove hard flooring up the walls for a short distance to provide an easy to clean junction;

- eliminate or minimise dead-legs and blind ends in water systems, both in the original design and as the systems are modified;
- provide hands-free operation for as many facilities as is practicable – for example: bins, taps, lights, sanitary equipment, flushing, doors;
- consider integral blinds as an alternative to curtains at internal windows.

4.115 To facilitate safe working practices (for example, tidiness, and hand hygiene):

- provide sufficient space for activities to take place and to avoid cross-contamination between adjacent spaces;
- provide sufficient storage for patients' possessions and for all supplies to discourage clutter;
- ensure proper segregation and management of waste, including healthcare waste and linen;
- provide sufficient domestic waste receptacles;
- provide bedside waste disposal facilities for patient use;
- eliminate or minimise difficult to clean gaps and ledges or horizontal surfaces such as window sills which encourage clutter;
- provide enough wash-hand basins and soap dispensers;
- plan for and deliver good separation of clean and dirty activities;
- provide sufficient space for storage and preparation of cleaning equipment and materials;
- provide suitable facilities for cleaning of equipment.

4.116 Design for easy cleaning:

- it is always best practice to maintain a visibly clean environment that is free from dust and soilage, and acceptable to patients, their visitors and staff;
- good design can make cleaning immeasurably easier, for example
 - using finishes that are easy to clean;
 - in clinical areas, flooring should be seamless and smooth, slip-resistant, easily cleaned and appropriately wear-resistant.
- consultation should take place with the local IPC team prior to purchase and on planning.

4.117 The Infection Prevention and Control Team should be consulted throughout a building or renovation project and their advice and recommendations taken into account and documented.

5. Typical rooms: purpose and content

Note: For the purposes of this guidance, the following terminology is used (A full Glossary of terms can be found in [Appendix 2](#)):

- a. **Multi-bed room** is a room that contains more than one bed. It is best practice for these to have both en-suite toilet with shower, clinical wash-hand basin and doors to the main ward area.
- b. **Single-bed room** is a room with space for one patient and usually contains as a minimum: a bed; locker/ wardrobe; and clinical wash-hand basin. **(NB: single-bed rooms without en-suite sanitary facilities are not recommended).**
- c. **En-suite single-bed room** this is the same as 'b' but with en-suite shower, WC and wash-hand basin. (In new build, space for a social support zone for overnight stay and a clinical support zone is also provided).
- d. **Enhanced Single room (with en-suite facilities)** this is the same as 'c' but with a ventilation system that prevents uncontrolled escape of infectious aerosols from the room to adjacent areas. It can also provide a degree of dilution of infectious aerosols in the room for the safety of staff and visitors. The room should have extract ventilation that exceeds its supply, such that gaps in its fabric leak inwards not outwards.
- e. **Enhanced Single room (with en-suite facilities and ventilated lobby)** this is the same as 'd' but with a lobby having positive pressure ventilation.

SHPN 04:01 Supplement 1: Within this guidance Isolation facilities either suite/room with specialised ventilation are parts d & e.

Generic rooms

Note: Information on sanitary fittings, taps, etc. is contained in paragraphs [4.45 – 4.73](#). For further information on room contents, refer to Activity Data Base (ADB) sheets generally issued as part of briefing information.

Isolation Facilities

- 5.1 The primary aim of Project Team is to prevent the spread of infection between patients, visitors and staff by control or containment of potentially pathogenic organisms. Many of these organisms can be controlled by basic IPC practices such as hand hygiene and environmental cleanliness and this can be facilitated by single room isolation. A small proportion of patients requiring isolation will require isolation facilities as per d & e. (SHPN 04-01 Supplement 1: 'Isolation facilities in acute settings').
- 5.2 The key to effective isolation on general wards is the provision of sufficient en-suite single-bed rooms to prevent patients known to be a risk for spreading

infections being cared for in open ward areas. Single rooms reduce the risk of cross-infection for non-airborne diseases. Most patients requiring segregation/isolation on general wards can be isolated effectively in en-suite single rooms.

- 5.3 NHS Boards should audit the use of en-suite single-bed rooms to determine local requirements.

Note: In Accident & Emergency departments, where it is feasible to do so, a dedicated room should be provided for patients with a known or suspected infectious agent/disease transmitted wholly or partly by the airborne route. If source isolation is required, this room should be at negative pressure to the corridor; a lobby is not required. This room should be suitable for general use when not required for isolation.

- 5.4 Multi-bed rooms can also be used to cohort patients with the same infection if they have en-suite toilet and shower, and a door to the main ward area. The possible need for this should be considered at the design stage.
- 5.5 Storage of, and ready access to, clean disposable PPE to support the practices set out in Health Protection Scotland's National Infection Prevention and Control Manual is important to encourage its use plus appropriate waste receptacles for disposal once worn.
- 5.6 Gloves and aprons and other disposable PPE should be sited at the entrance to single-bed rooms.
- 5.7 Additional storage facilities will be required for the care and treatment of patients in isolation facilities, especially if the isolation is likely to last for some time:
- the storage of the minimum amount of supplies needed;
 - lockable provision for personal clothing and possessions. (see [Appendix 3, paragraph 3/11](#) for additional information).

Design

- 5.8 Scottish Health Planning Note 04, Supplement 1 – 'Isolation facilities for infectious patients in acute settings' provides guidance on the facilities required for isolating infectious patients on acute general wards (source isolation). It also provides guidance on the ventilation parameters for an enhanced single bed room and ventilated lobby.

Ceilings

- 5.9 Removable ceiling tiles are not advised for specialist ventilated isolation rooms/suites (SHTM 60).

Doors

- 5.10 Doors design is critical to the design of a specialist ventilation isolation room/suite. For specific guidance on source isolation, refer to Scottish Health Planning Note 04-01, Supplement 1 – ‘Isolation facilities for infectious patients in acute settings’.

Enhanced single room with en-suite facilities and ventilated lobby ‘e’

- 5.11 Lobbies provide an area for staff to undertake hand hygiene and to don and remove PPE. (SHPN 04: Supplement 1).

Engineering requirements for special ventilated isolation rooms/suites

- 5.12 Maintenance programme and revalidation programmes should be established for specialised ventilated isolation rooms to ensure the design criteria are maintained and met at all times. Although it is impossible to give specific maintenance frequencies, each unit should be included in a Planned Preventive Maintenance (PPM) programme that includes pressure/air flow monitoring equipment.

Recommendations

- single-bed rooms with en-suite sanitary facilities are optimum for infection prevention and control design;
- there should be sufficient en-suite single-bed rooms to prevent patients known to be a risk for spreading infections being cared for in open ward areas. Healthcare providers should audit the use of en-suite single-bed rooms to determine where further local requirements and adaptations are greatest;
- the provision of additional isolation facilities should be considered when designing new healthcare buildings and renovating existing buildings.

Ancillary Areas

- 5.13 It is important that ancillary areas are of an acceptable standard to support effective infection prevention and control. Clean and dirty areas should be in separate rooms and the workflow patterns of each area should be clearly defined.
- 5.14 The design and finish of ancillary areas should facilitate good cleaning, have facilities for hand hygiene, and sufficient storage for supplies and equipment together with provision for the removal of Personal Protective Equipment to waste or to wash.
- 5.15 Infection Prevention and Control issues are determined on:
- the use of the ancillary area;
 - who will have access; and
 - what type of activity will be carried out there

- 5.16 Ancillary areas include:
- dirty utility;
 - clean utility;
 - clean linen store;
 - domestic services rooms (DSRs);
 - decontamination facility/disposal room;
 - day room/patient waiting areas;
 - play areas;
 - nappy-changing area;
 - storage;
 - visitors' toilets;
 - laundry departments;
 - changing accommodation;
 - treatment room.
- 5.17 Key activity spaces for each of the above functions are described in HBN 00-03. SHPN 04-01 and SHPN 36 describe the design requirements for the above rooms in hospital or community facilities.

Dirty utility room

(SHPN 04-01, SHPN 36 and HBN 00-03)

- 5.18 A dirty utility room should include facilities for:
- cleaning items of equipment;
 - testing urine;
 - disposal of body fluids;
 - decontamination of commodes;
 - temporarily holding items requiring reprocessing;
 - hand hygiene.
- 5.19 Space and facilities for holding, reprocessing or disposal of bedpans, urinals and emesis (vomit) bowls are required. Commodes, unused bedpans, urinals, vomit bowls and linen bag carriers can also be stored. Closed storage is required for aprons and gloves. Storage cupboards should be provided.
- 5.20 A working stock of clean goods should be stored within a Dirty Utility Room. Clean goods would include unused bedpans & urinals and cleaned commodes.
- 5.21 Where commodes are to be used, there should be sufficient space allowed for their decontamination and storage of a working stock.

- 5.22 A clinical wash-hand basin is necessary plus a deep sink for equipment with draining board (or macerator, if available) for urine disposal and a separate deep sink for decontaminating equipment.
- 5.23 There needs to be clear demarcation achieved between clean/unused equipment and soiled/dirty equipment. A defined clean-to-dirty workflow is also required.

Clean utility room

(SHPN 04-01 and HBN 00-03)

- 5.24 A clean utility room is required where drugs and lotions may be stored and prepared, a supply of clean and sterile supplies may be held and dressing trolleys prepared. Designated hand hygiene facilities are required but must be positioned sufficiently far away from infusate preparation to prevent splashing and contamination.
- 5.25 The room should be located adjacent to the treatment area.
- 5.26 It is important that planners/design teams think about the type of storage facilities provided. There are three options: cantilevered units, mobile units or units fixed to the floor with no gaps.
- 5.27 It is important that sufficient dedicated worktop area is provided to enable aseptic preparation to be carried out, e.g. preparation of intravenous infusion. This provision should be sufficiently distant from the wash hand basin as to prevent contamination.
- 5.28 Storage facilities should be able to be cleaned easily and quickly while protecting clean stores and equipment from dust and contamination. Sloping surfaces should be provided up to ceiling level to permit cleaning.

Clean linen store

(SHPN 04-01 and HBN 00-03)

- 5.29 Clinical areas should have designated areas for the storage of clean linen to maintain the cleanliness of the linen and allow easy access. Storage should be on slatted shelving or racking and be off the floor. Where shelving is fixed, it should be provided with kick boarding provided to avoid the need to clean the floor underneath. Shelving should be cleanable and not harbour dust.

Treatment room

(SHPN 04-01 and HBN 00-03)

- 5.30 A treatment room may be required for in-patient examination or investigations on the ward. It will certainly be needed in primary care settings and will require different design features according to its planned use, for example, immunisation, wound dressing or surgical intervention and investigations.

- 5.31 A clinical wash-hand basin should be provided (see Health Building Note 00-03).
- 5.32 Carpets should not be used in a treatment room.
- 5.33 Space should be available to allow for the storage of equipment and sterile supplies.

Disposal room

(SHPN 04-01)

- 5.34 This area should be secure and not be accessible to patients/public.
- 5.35 The disposal room is for temporary storage of supplies and equipment that have to be removed for cleaning, reprocessing or disposal, for example, items to be returned to the sterile services department (SSD).
- 5.36 The sizing and location of disposal rooms should be considered at the design stage, taking into account the predicted levels and types of waste to be generated and the planned operational policies relating to frequency and work flow of waste and linen collection.

D.S.R. (Domestic service room)

(HBN 00-03)

- 5.37 This room is used to deliver day-to-day cleaning services for a defined area. Cleaning materials and equipment in daily use should be stored in cupboards within this room.

Note: It should be noted that the requirements for DSRs have recently been under review by the domestic services review group.

- 5.38 The room should be provided with a sink with draining board and slop-hopper as well as a wash-hand basin situated well away from the equipment washing sink and slop hopper. There should be unrestricted access to the sink and slop-hopper.
- 5.39 Space should be provided for segregation and storage of mops, buckets and other cleaning equipment vacuum cleaner and scrubbing/polishing machine (for hard floors) and for lockable COSHH cupboard for cleaning supplies.

Day room/patient waiting areas

(HBN 00-03)

- 5.40 There is often conflict between the aesthetics of these areas and the prevention of contamination of the environment or furnishings and ease of cleaning/disinfection. This is especially the case in waiting areas such as in accident and emergency departments, primary care and minor injury units.

- 5.41 It is important that where blood and body-fluid spillages may occur, the environment should be able to be decontaminated effectively. Use of carpets should be the exception and then only after much consideration and risk assessment.

Note: There are special requirements for Mental Health Units which are categorised as low risk.

Play area

(HBN 00-03)

- 5.42 All equipment, finishes and furnishing will be wipeable, impermeable and be able to withstand cleaning and disinfection. This is particularly important for play mats and soft floor coverings.

Nappy-changing area

(HBN 00-03)

- 5.43 Facilities for disposal of soiled nappies and for hand washing in the immediate environment are required along with a regular cleaning programme of equipment used.
- 5.44 The area for nappy-changing will have a surface that can be easily cleaned and disinfected.

Staff/Visitors' toilets

(SHPN 04-01 and HBN 00-02)

- 5.45 These are heavily used and will provide enough space with wipeable, impermeable, durable finishes to maintain a high standard of cleanliness.
- 5.46 There will be provision of disposal facilities for sanitary waste in both women's, assisted, disabled and unisex toilets.
- 5.47 The number of toilets, wash-hand basins and hand drying facilities provided will be sufficient for the size of the facility (see Health Building Note 00-02). Minimum numbers for staff and patient toilets and visitor toilets in non-public areas are determined by NHS guidance documents. Provision for visitors in public areas will be determined by the Scottish Building Control technical standards.
- 5.48 Hand drying should be by single-use paper hand towels or hot air hand driers. If a facility is, in or closely adjacent to, areas where patients may be sleeping, hot air hand driers will be avoided due to noise.

Equipment storage

(SHPN 04-01, SHPN 36, and SHTM 63)

- 5.49 Storage areas need to be appropriate for the operational requirements of each clinical area.
- 5.50 The need for sufficient secure storage should not be underestimated. Many briefs start with sufficient storage, but this space is often lost to other areas during the design process. This can have implications for both clinical practice and infection prevention and control.
- 5.51 Storage away from areas of clinical activity is required for both small and bulky items of equipment to minimise clutter, enabling efficient environmental cleaning.
- 5.52 All healthcare premises need a storage area for large pieces of equipment such as beds, mattresses, hoists, wheelchairs and trolleys that are not currently in use. The use of equipment libraries can be an effective way of storing, maintaining and decontaminating large or electrical equipment.
- 5.53 Cleaning equipment, laundry and healthcare (including clinical) waste need to be stored in separate purpose-built areas to prevent cross-contamination.
- 5.54 Sufficient and appropriate storage will protect equipment from damage, contamination and dust, which may potentially carry microorganisms, but should also allow free access to floors and shelves for cleaning.

Storage for patients' possessions

(HBN 00-03)

- 5.55 Adequate space should be allocated for the storage of patients' possessions. Wardrobes and lockers used for storage of patients' possessions should be selected to be easily and efficiently cleaned. Louvre doors should not be fitted, as they are difficult to keep clean.
- 5.56 Consideration and risk assessment should inform choice of furniture, vandalism and ligature issues affecting all types of accommodation.

Out-patient and day surgery changing facilities

(HBN 00-03)

- 5.57 In areas such as out-patients, imaging and minor injuries units, it will be necessary to provide sufficient changing/storage facilities for patients if clothing has to be removed and kept safe. These should be included at the planning stage and should be able to be cleaned easily.

Clinical staff changing

(HBN 04-01 and HBN 00-02)

- 5.58 By providing staff changing facilities, sanitary facilities, showers and sufficient locker space for outdoor clothing staff will be able to change out of their uniform on-site. Wash-hand basins and shower facilities for staff should be made available and easily accessible in case of substantial blood or body fluid contamination. There needs to be sufficient storage for clean scrub suits and footwear. Facilities for disposal should also be available. Specialist departments will require local specialist staff changing (eg theatres and aseptic suites). Where these are not available, staff should change and contaminated uniforms bagged.

Maintenance staff changing

(HBN 04-01 and HBN 00-02)

- 5.59 Changing facilities should be provided for maintenance staff who undertake activities that could expose them to contamination. There should also be access to showers in case of significant contamination.
- appropriately sized changing facilities should be provided for staff, to encourage them to change out of their uniform on-site;
 - wash-hand basins and sanitary facilities should be included in showers in the event of contamination by blood or body fluid.

Linen cupboard

- 5.60 Each ward should have an area for the storage of clean linen which, in new build accommodation, should be purpose-designed. The area used for the storage of clean linen should ensure that linen is not exposed to contaminants. The areas are required to have:
- good ventilation;
 - adequate lighting;
 - impermeable flooring that is easy to clean and fitted with coving between the floor and the wall to avoid accumulation of dust and dirt in corners and crevices;
 - smooth, impermeable and easy to clean slatted shelving to ensure free flow of air.
- 5.61 If linen trolleys are used to store linen within the ward area, they should be managed so that:
- they are kept clean and tidy and enclosed with an impervious covering to ensure that linen is not exposed to dust;
 - linen bags are not left open or lying on the floor with the potential for exposure to dust which may potentially carry micro-organisms;

- appropriate procedures are in place to allow cleaning of linen trolleys.

Used linen storage

5.62 The following types of linen should be segregated at source before sending to the laundry;

- used linen;
- infectious linen;
- heat labile linen.

Central or local NHS Laundry facilities

Note: Prior to installation, it is important to ensure that validation, testing and recording of the laundry process (including thermal disinfection) can be undertaken, as this is vital for the effective decontamination of laundry in NHS settings. This is the responsibility of the maintenance manager or engineer.

5.63 The layout of laundry areas must be designed to ensure that effective cleaning can be undertaken. Finishes to walls, floors, work surfaces and equipment must be capable of withstanding regular cleaning and the impact of mechanical cleaning equipment. The area should be large enough to allow access for decontamination trolleys.

5.64 Laundry facilities should provide:

- suitable space for laundry machinery;
- suitable storage for used linen and for separation of used and laundered linen;
- storage space which is designed to prevent odours from migrating from storage areas to adjacent areas;
- storage space designed to accommodate trolleys, etc., used in the transportation of linen;
- appropriate facilities to allow the segregation of used linen, heat labile linen and infectious linen, in appropriate containers which are clearly identifiable;
- suitable facilities to allow compliance with hand hygiene practices;
- a laundry policy to ensure infection risks are minimised;
- a ventilation system that will minimise the level of airborne contamination and dust to minimise the risk of cross infection.

If processing infectious linen suitable vent pipes should be routed to a safe area outwith the laundry and effluent from the drains must be sealed from the machine to the drainage area outwith the laundry.

5.65 Ward based machines (industrial or domestic):

- ward based machines must not be used within the NHS for processing 'infectious linen' or 'contaminated uniforms';
- as it is costly and difficult to validate domestic washing machines, these should only be used in areas agreed by the IP&CT such as rehabilitation units for patients' own laundering or laundering of heat labile baby clothes. Validation and thermal disinfection processes is not required or suitable for domestic machines;
- it is preferable to install industrial type machines in ward areas as in the long term these are more cost effective due to durability, in addition some models have temperature recording facilities that can be used to ensure thermal disinfection is reached but this is not a requirement in this setting.

5.66 Tumble driers should be used to further support thermal disinfection where domestic washing machines are used.

Catering/food hygiene

(HBN 04-01)

- 5.67 There should be facilities for staff who prepare and serve food to wash their hands. Additionally;
- in centralised kitchens, physical separation must be provided for storage, preparation and cooking areas including any equipment that is used which is effectively done by use of colour coding;
 - cooked and raw products must be physically separated at all times;
 - ward kitchens should have a separate staff wash-hand basin with non-touch taps, liquid soap and paper towels;
 - storage areas such as cupboards must be clean and intact;
 - the refrigerator should have a thermometer either built in or separate and this should record daily temperatures to ensure the fridge is 5°C or below.

Waste management

- 5.68 Guidance on the management of all wastes arising within healthcare facilities or wherever NHSScotland services are delivered is provided in Scottish Health Technical Note (SHTN) 3. SHTN 3 is published for use by NHS Boards' staff and its contractors and comprises the following parts:
- Part A: Summary of requirements – best practice overview;
 - Part B: Waste management policy template;
 - Part C: Compendium of regulatory requirements;
 - Part D: Exemplar waste procedures; and,
 - Part E: Waste prevention and re-use guide.

- 5.69 Many of the regulatory requirements for NHS Boards' wastes are captured within 'Duty of Care' under the Environmental Protection Act 1990 (as amended).

Responsibilities under 'duty of care'

- 5.70 The 'Duty of Care' is described in Section 34 of the Environmental Protection Act 1990. The Act was recently amended in Scotland by the Waste (Scotland) Regulations 2012. Guidance on its use and interpretation can be found in the 'Duty of Care – A Code of Practice' published in October 2012.
- 5.71 The Code of Practice outlines the obligations of those involved in the waste management chain from waste producer to final disposal. It requires producers and others who are involved in the management of waste to prevent its escape and take all reasonable measures to ensure that the waste is dealt with appropriately from the point of production to the point of final disposal. In order to comply with this requirement NHS Boards should:
- ensure that waste is segregated in a manner which allows for the recovery of materials;
 - ensure that a written description accompanies all waste movements, adequately describing the type and quantity of waste;
 - ensure that those who manage the waste and sites receiving the waste are authorised to do so; and,
 - maintain records of all waste movements.
- 5.72 One of the main responsibilities under duty-of-care, which has major implications for IPC and the built environment, is to ensure that waste is stored safely on-site. Essentially:
- storage areas at ward and unit level should be secure and not publicly accessible;
 - storage areas should be sufficient in size to allow packaged waste to be segregated and to avoid waste of different classifications being stored together in the same area;
 - SHTN 3 provides further detail on waste segregation, receptacles and storage.

Waste segregation and storage

- 5.73 Any new capital developments should have enough space for waste receptacles to be located close to the point of waste production.
- 5.74 Healthcare wastes such as potentially infectious waste and pharmaceutical waste should be segregated into colour-coded receptacles in accordance with SHTN 3. Healthcare waste receptacles should not be accessible to the public.
- 5.75 Receptacles for recyclates should be easily accessible and clearly marked using the best practice colour coding specified in SHTN 3. Receptacles for

recyclates should be available in all locations where domestic waste is produced.

- 5.76 Residual waste is the name given to domestic waste once recyclates have been segregated at source. This waste should be placed into clear (preferable) or black bags. Receptacles for this waste stream should be clearly labelled.
- 5.77 Dedicated secure storage areas for waste are best located at entrances to wards or departments, preferably with access from both ward and hospital corridor to facilitate collection by authorised personnel only.
- 5.78 Storage for used linen should be in a clearly designated area separate from waste. This should minimise any risks of used linen being accidentally taken for disposal or waste being taken to the laundry.
- 5.79 Dedicated waste storage areas should be able to be cleaned easily and efficiently. The holding area should be of sufficient size to hold wheeled-bins and waste sacks ensuring that healthcare waste is clearly segregated from other wastes to avoid contamination.
- 5.80 A designated, secure area is also necessary to hold receptacles from the whole site (central waste yard) from which waste can be collected for off-site treatment and recycling. Guidance on the design and facilities required in waste storage areas is available in SHTN 3.

Note: Similar consideration will be required to route, contain and retain waste arising from construction activities in order to prevent debris and dust permeating clinical areas.

Waste receptacles

- 5.81 Comprehensive guidance on the size and colours of waste receptacles is available in SHTN 3. Waste receptacles should be of suitable size to meet waste arisings taking collection arrangements into consideration. Receptacles should be easy to clean, hands-free (i.e. foot operated) and comply with the requirements of SHTM 83: 'Firecode'.
- 5.82 Lids of waste receptacles that are used for healthcare waste need to be capable of being cleaned and disinfected. Avoid attaching temporary labels that would inhibit effective cleaning.

Healthcare waste (including healthcare waste generated in primary care and community settings)

- 5.83 In healthcare facilities such as care homes and primary care settings, all waste should be contained appropriately and kept secure at all times.

Note: There are special requirements for MHUs and Custodial accommodation.

- 5.84 The system and frequency of collection of waste service needs to be taken into account when planning facilities. Areas for temporary storage e.g. holding bays and/or intermediate rigid receptacles such as wheeled bins may be required.

Temporary storage facilities should be washable, secure and animal-proof. Only rigid lockable receptacles should be stored in external areas.

- 5.85 There should be a strict routine for removing waste to ensure it does not remain uncollected for extended periods.

Storage capacity

- 5.86 Storage areas need to be fit for purpose and a suitable size to allow different waste types to be stored safely and separately. Collection frequencies including contingency requirements (in the event of a failure in waste collection) should be taken into consideration when specifying the size of storage areas. The design of the facility should also take account of accessibility and space needed for vehicles collecting the waste.

Waste segregation

- 5.87 The storage area should be sufficient for different waste streams to be segregated pending collection in line with local policy. This will normally (at minimum) require that domestic wastes, including source segregated recyclates is to be kept separate from healthcare wastes (such as orange bags) taking into consideration appropriate treatment and disposal routes. See SHTN 3 for further details.

Note: The Waste (Scotland) Regulations 2012 have effectively banned the use of food waste disposal units (macerators) and food waste digesters involving the discharge of 'treated food' into the public sewer network.

6. Engineering services

Note: This section discusses various aspects of engineering services and the Infection Prevention and Control implications of each.

Heat emitters and temperature control

General

- 6.1 The selection of heat emitters will not only have a spatial impact but also on infection prevention and control.

Wall-mounted radiators

- 6.2 Options to ensure safety are as follows:
- low surface temperature heat emitters should be used;
 - where existing conventional radiators are being retained, guards/covers should be fitted. Ease of covers removal to facilitate cleaning is essential. (paragraphs 6.3 and 6.4 also refer);
 - temperature controls should fail to a safe position.
- 6.3 Of these options, covered heat emitters have raised the most prevention and control of infection concern. Heat emitter covers allow dust to build up beneath and inside the heat emitter grille. This dust has been found to contain potentially pathogenic organisms, and when heat emitters are switched on during the winter months, dust and bacteria are dispersed by heat convection to the ward area.
- 6.4 Where heat emitter covers are used, regular planned maintenance and cleaning should be undertaken to prevent the problems described.
- 6.5 When installing wall-mounted heat emitters, it is necessary to provide adequate space underneath the emitter to allow easy access for cleaning machinery to be used. Gaps and dust traps should be minimised.

Note: Ceiling-mounted radiant panels are intrinsically safe as hot surfaces are out of reach while also eliminating dust-traps.

Pipe-work siting and access

- 6.6 Where pipe-work is surface mounted it should be contained in a smooth-surfaced box that is easy to clean.
- 6.7 Penetrations where pipes and cables pass through walls above false ceilings should be sealed.

Heating, general ventilation and lighting grilles

- 6.8 Heating, ventilation and lighting grilles need to be accessed easily for inclusion in cleaning programmes by cleaning and estates staff.

Ventilation

Ventilation ductwork

- 6.9 Ventilation ductwork should be installed in such a way that it can be accessed. (This is important for extract ductwork as this has the most significant accumulations of lint and dust requiring removal, particularly if heat reclamation systems are used).

Specialised ventilation

- 6.10 The same basic principle applies for all clinical areas whereby positive pressurisation is maintained by providing supply ventilation in cleanest areas cascading to dirty areas where negative pressure will be achieved. This will inhibit the spread of contamination.
- 6.11 In healthcare premises, certain activities will necessitate the provision of ventilation equipment with additional special features in order to achieve and maintain specific conditions. For infection prevention in specialist areas such as operating theatres, ventilation should ensure contaminated air does not enter designated clean areas by ensuring that air flows from the cleanest to sequentially less clean areas. This direction of air flow prevents contaminated air passing in the opposite direction.

Note: See Scottish Health Technical Memorandum 03-01 Parts A and B for comprehensive guidance on the design, installation and operational management of ventilation systems in healthcare premises.

- 6.12 The following will usually have specialised ventilation requirements for infection prevention in:
- operating department;
 - source isolation;
 - bronchoscopy and sputum induction rooms, where a risk assessment has indicated a tuberculosis risk;
 - protective isolation accommodation for highly immuno-compromised patients;
 - cardiac catheter, interventional radiology units;
 - microbiology containment laboratories;
 - mortuaries.

Note: For information on ventilation for Isolation Rooms refer to [Paragraphs 5.8 - 5.12](#).

Split and cassette air-cooling units

- 6.13 Only units that are readily amenable to regular cleaning in a working hospital unit should be used. If installed they should be cleaned as part of a regular planned maintenance scheme. Particular consideration should be paid to the accessibility of the condensate drip tray for cleaning and to the disruption to normal use of the accommodation while maintenance is being undertaken. A preferred solution would be not to install these units in critical patient areas.

Chilled beam units

- 6.14 These comprise heat-exchange beams in a ceiling through which is passed water to cool or heat air that passes across them. They should be installed so that they can operate without generating condensate. They must be accessible for regular cleaning and maintenance.

Hot and cold water systems

Note: Reference should be made to Scottish Health Technical Memorandum 04-01: Parts A and B for comprehensive guidance on the design, installation and operational management of water systems in healthcare premises.

- 6.15 The Water Quality (Scotland) 2010 Regulations contain provisions to ensure that the drinking water supply within buildings to which the public has access remains wholesome and is not adversely affected by the local distribution system.
- 6.16 Immuno-compromised patients are at particular risk from cryptosporidium. Very low numbers of cryptosporidium cysts can occasionally occur in mains potable water.

Storage and distribution of water

- 6.17 Many organisms capable of causing disease, particularly in highly susceptible hospital patients, such as *Pseudomonas* and *Legionella*, have been isolated from hospital water systems. Preventive measures include:
- routine inspection of water storage tanks with cleaning as required;
 - identifying and removing dead-legs and blind ends;
 - keeping cold water systems cold and hot water systems hot; and
 - ensuring rapid turnover in water storage.
- 6.18 Temperature control is the preferred strategy for reducing the risk from *Legionella* spp. in water systems. This will require temperature monitoring on a regular basis. The recommended test frequencies are given in Scottish Health Technical Memorandum 04-01, Part B. It is good practice to ensure that hot and cold water pipe-work is insulated and separated. Cold water pipes should also be segregated from other heat sources and preferably not in the same service-ways to avoid unwanted heat transfer to the cold water supply.

- 6.19 Chemical and other water treatments that have been shown to be capable of controlling *Legionella* spp. to some extent may also be considered. They will only work in systems that are amenable to their use, for example those that do not have dead-legs and blind ends.
- 6.20 Scottish Health Technical Memorandum 04-01, Part B – ‘Operational policy’ provides guidance on the monitoring and maintenance of water systems (including water storage).

Sanitary facilities

- 6.21 WCs, urinals, bathrooms and showers should be designed to be easily cleaned and maintained. Wash-hand basins should be provided adjacent to WCs and urinals.
- 6.22 Showers are generally more practical than baths in the clinical situation and are easier to keep clean. Any fixture within a shower such as a seat should be easily cleanable, without small gaps and dust traps.
- 6.23 To minimise the possibility of bacterial colonisation of shower heads, they should be regularly cleaned and de-scaled.
- 6.24 Bidets may present infection risks, depending on design and patient group. The appliance should be rimless with an over-rim water supply. They are most frequently specified in maternity units. Therefore, if used, they should conform to the specifications given in SHTM 64: ‘Sanitary assemblies’ and HBN 00-02: ‘Sanitary spaces’. Baths and birthing pools in Maternity units should be easy to clean and not of a TMJacuzzi type.

Note: SHTM 64 ‘Sanitary Assemblies’ and HBN 00-02 ‘Sanitary spaces’ contain guidance to assist the design team in the selection, specification and application of sanitary assemblies in healthcare buildings. They also give guidance on the appropriate cleaning and maintenance regimes.

Wet rooms

- 6.25 These require high quality water-resistant cladding on walls to prevent mould.

Water fittings

- 6.26 Water fittings (washers, etc.) should not support microbiological growth. All fittings should satisfy the requirements of the Water Supply (Water Fittings) Regulations 1999.
- 6.27 Flexible hoses used in water supply systems should be identified and risk-assessed for the possibility of contamination with harmful microorganisms. Where flexible hoses must be used (for example, on essential equipment such as hi-low baths), they must be lined with a suitable alternative to ethylene propylene diene monomer (EPDM), and be Water Regulations Advisory Scheme (WRAS)-approved. Care should be taken to avoid kinking or distorting them during installation (see Health Facilities Scotland Safety Action Notice

SAN (SC) 09/03 Flexible water supply hoses risks of harmful micro-organisms and paragraph 11.35 of SHTM 04-01 Part A).

Ice for patient consumption

- 6.28 Where suitable for use, ice machines should be of a type that dispenses ice by a non-touch nozzle.
- 6.29 Ice should be made directly from water that is of drinking quality. Ice for the immuno-compromised should be made by putting sterile water into single-use ice-making bags, then into a conventional freezer.

Further guidance can be found in the Safety Action Notice (SAN) 06/46

Electrical services

Lighting

Note: Efficient lighting in all areas of wards or departments enables cleaning staff to undertake cleaning more effectively. The Chartered Institution of Building Services Engineers' LG2 – 'Healthcare and hospital lighting' gives guidance on lighting levels in healthcare facilities. SHTM 06-01 also refers.

Luminaires

- 6.30 Luminaires should be selected and installed to eliminate or minimise ledges/gaps/dust traps and, as far as is practicable, be accessible and easily cleanable.

Bedhead services

- 6.31 Bedhead services should be smooth, accessible and easy to wipe clean. Ledges, gaps and dust traps should be eliminated or minimised.
- 6.32 Sufficient dedicated 13-amp socket outlets should be provided in corridors and in individual rooms to enable cleaning appliances with 9m long leads to operate over the whole department.
- 6.33 Where possible, socket outlets should be provided flush-mounted or in trunking systems to enable easy cleaning and prevent the build up of dust.

Patient entertainment systems

- 6.34 Radio and TV headsets should be capable of being cleaned or disinfected between patient uses or be single use, whichever is the most economical method to adopt.
- 6.35 Risk mitigation measures should be considered, including the implications of power interruption when all electrical fittings are either non-touch or sensor operated.

Wastewater and sanitation

- 6.36 Wastewater is generated from a huge number of tasks carried out in healthcare buildings, which range from domestic cleaning, hand-washing, specialist laundries, surgical operations and areas such as renal dialysis units. Most of this wastewater contains pathogenic microorganisms and must be disposed of via a safely contained internal drainage system into the external waste water sewerage system.

Internal drainage system

- 6.37 An internal drainage system should use the minimum amount of pipe work, retain water and be airtight at joints and connectors. It should be sufficiently ventilated to retain the integrity of water seals.
- 6.38 The design should comply with the relevant British Standards and Codes of Practice, including BS EN 12056, Scottish Building Standards Technical Handbook and recommendations for spatial and access requirements for public health engineering services are contained in The Chartered Institution of Building Services Engineers' Guide G, 2014.
- 6.39 Provision for inspection, rodding and maintenance should be located to minimise disruption or possible contamination, eg access points should not be sited in clean clinical areas.

Bedpan washer-disinfectors/macerators

- 6.40 Where reusable bedpans are used, ward areas require adequate and suitable bedpan washer-disinfectors that comply with BS EN ISO standards 15883-Parts 1-3: 2009, IEC 610010-2-040: 2005 and SHTM 2030 Part 1, 2 and 3.
- 6.41 Where fitted, bedpan washer-disinfectors should be installed according to the Scottish Water Bylaws 2004 Part 2 (4) and using fittings listed on the Water Supply Regulations Advisory Scheme (WRAS) directory.
- 6.42 When considering installation of bedpan macerators, it should be established that both internal drains and the external sewerage system can cope with the model proposed.
- 6.43 Where recommended by the manufacturer reusable supports should be decontaminated in the washer disinfecter. Further advice should also be obtained from the Infection Prevention and Control team.

Medical gases and vacuum systems

- 6.44 Scottish Health Technical Memorandum 02-01 gives guidance regarding piped medical gases and vacuum systems and includes recommendations on: emergency procedures; power failure; access for cleaning contaminated vacuum systems; training and communication; maintenance and infection risk.

Pneumatic air tube transport systems

- 6.45 Guidance for the design and management of pneumatic transport systems can be found in Scottish Health Technical Memorandum 08-04.
- 6.46 The pneumatic piping system should be designed to permit cleaning and disinfection of the tubing.

Computer equipment

- 6.47 Prior to purchasing computers or hand held devices which are to be used in clinical areas it is important that these must be able to withstand cleaning and disinfection compatible with the device. As with other equipment this should be monitored for signs of damage.

7. Importance of maintenance

- 7.1 Good design and equipment selection will ensure future maintenance is easy and cost effective. A planned maintenance system should be set up to start at the same time as handover or occupancy. A record of Planned Preventive Maintenance needs to be kept. Regular reviews of the building fabric should be undertaken as accidental damage to smooth surfaces makes effective decontamination difficult to achieve. The use of soft, difficult to decontaminate fabrics must be, as far as possible, avoided.

Access for maintenance

- 7.2 There should be adequate space to allow maintenance work to be carried out. Measures such as locating isolating or regulating valves or ventilation ductwork dampers and access panels outwith clinical or patient occupied areas (e.g. corridors) will reduce the need for unwanted intrusion by estates staff.

Reference should be made to SHTM 03-01 and SHTM 04-01.

8. Demolition

- 8.1 Work of this type will require a building warrant and a Decommissioning Team should be established. The Decommissioning Team usually needs to include a CDM Co-ordinator and consideration should be given to the likely spread of dust/dirt which the works will cause. Issues such as limitation of airborne fungal contamination need to be considered. (The role of CDM coordinator is currently under review by the Health & Safety Executive).

Decontamination of buildings and equipment

- 8.2 Reference should be made to records containing asbestos survey data before commencement of any activities. Buildings should be thoroughly cleaned after all furniture etc has been removed. Airborne decontamination methods should be considered to minimise the risk prior to demolition. Equipment should be decontaminated prior to reuse elsewhere or final disposal. The Decommissioning Team will have to risk assess health and safety issues with the advice of the CDM Co-ordinator and NHS Board's Health & Safety department.

Effect upon adjacent healthcare premises

- 8.3 There are health and safety issues which the Decommissioning Team will have to risk assess and consider with the advice of the CDM Co-ordinator. Additional cleaning may be required due to the additional dust likely to be caused. Ventilation filters in areas likely to be subject to a high airborne dust load should be checked and changed if necessary, prior to demolition works starting. An overloaded filter can collapse and cause contamination. Filters should also be checked and changed if necessary once work is complete.

Planning for demolition works

- 8.4 Prevailing wind direction and the distance of the demolition works from occupied areas are key considerations when planning demolition works.
- 8.5 The demolition Project Plan should contain details of measures to be taken to minimise contamination of other areas. The person responsible for each control measure should also be named.
- 8.6 On completion of the work, the success or otherwise of the control outcomes should be formally assessed and the lessons learned disseminated widely, including outwith the organisation, for the benefit of colleagues involved in similar projects.
- 8.7 There have been instances where hospital sites with dangerous materials such as healthcare waste and asbestos have disposed of these within the hospital site. Decontamination of the site intending to be disposed of is the responsibility of the owner, eg healthcare body. Contaminated land may need

to be disposed of as special waste and can be extremely expensive as the soil removed must also be classified as special waste.

Appendix 1: Equipment groups

Equipment supplied for new building schemes can be one of four categories:

Group 1 items are specified at the design stage and are supplied and fixed under the terms of the building/engineering contract and funded within the works cost. These are generally fixtures and fittings or plant/equipment which are permanently wired/installed, e.g.

- sanitary fittings;
- specialised equipment items best suited to central purchasing arrangements;
- cupboards, worktops, shelving;
- excluded from this Group will be large medical equipment/fixtures and items subject to late selection or procurement by the NHS Board e.g. CT Scanners, Linear Accelerators, Autoclaves.

Group 2 Items are installed under the terms of building/engineering contracts, but are supplied or purchased by the NHS Board under a separate equipment budget. They may have implications in respect of space or building services e.g.

- paper towel dispensers;
- soap/scrub dispensers;
- washer/disinfectors;
- washing machines.

Group 3 Items are purchased directly by the Client and may have implications in respect of space, construction or engineering services e.g.

- small refrigerators;
- loose furniture;
- monitors;
- trolleys.

Group 4 Items may have storage implications but otherwise have no impact on space or engineering services e.g.

- small medical devices;
- computers, laptops;
- small loose equipment.

Appendix 2: Glossary

(Applicable to all parts of this Guidance)

Airborne (aerosol) transmission: The spread of infection from one person to another by airborne particles (aerosols) containing infectious agents.

Airborne particles (aerosols): Very small particles that may contain infectious agents. They can remain in the air for long periods of time and can be carried over long distances by air currents. Airborne particles can be released when a person coughs or sneezes, and during aerosol generating procedures (AGPs).

Aspergillosis: A fungal infection caused by *Aspergillus* spp., commonly found in soil, decaying vegetable matter, damp cellars, building materials and ventilation systems. The most common mode of transmission is by the airborne route, for example dispersal of contaminated aerosol. In fact, airborne *aspergillosis* is a risk to patients with highly compromised immunity.

Cleaning: The process of physically removing contamination including soil, dust, large numbers of micro-organisms and the organic matter that protects them.

Cohorting: Placing a group of two or more patients (a cohort) with the same confirmed infection in the same room or area.

Cohort Nursing: Use of a dedicated team of healthcare staff to care for a cohort of patients, and who do not care for any other patients.

Contact transmission: The spread of infectious agents from one person to another by contact. This can be either direct contact, or indirect contact (via a contaminated object/fomite).

Contamination: The presence of an infectious agent on a body surface; also on or in clothes, bedding, toys, surgical instruments or dressings, or other inanimate articles or substances including water and food.

Cross-infection: The transmission of infection from one person to another.

Dead-legs: In a water supply and distribution system, pipes that are capped off or rarely used, or regions of pipework which are not scavenged by flow.

Disinfection: The reduction of the number of micro-organisms to a safe or relatively safe, level but not usually the destruction of spores.

Healthcare associated infections (HAI): Infections that occur as a result of medical care, or treatment, in any healthcare setting.

Heat labile: That which is likely to be damaged or destroyed by the normal heat disinfection process.

Immunocompromised patient: Any person whose immune response is impaired or deficient, usually because they have a disease or are undergoing treatment. People who are immunocompromised are more vulnerable to infection.

Indirect contact: A mode of transmission of infection involving fomites or vectors.

Non-touch (taps): Includes elbow/wrist operated or infrared sensor taps.

Pathogen: A bacterium, virus, or other micro-organism that can cause disease.

Reservoir (of infection): Any person, animal, plant, soil or substance, or a combination of these, in which an infectious agent can live and multiply, on which it depends primarily for survival, and where it reproduces itself in such a manner that it can be transmitted to a susceptible host: the natural habitat of an infectious agent.

Single room/En-suite single room/Isolation room/Bay: For the purposes of this document, the following terminology is used:

- a. **Multi-bed room** is a room that contains more than one bed. It is best practice for these to have both en-suite toilet with shower, clinical wash-hand basin and doors to the main ward area;
- b. **Single-bed room** is a room with space for one patient and usually contains as a minimum: a bed; locker/ wardrobe; and clinical wash-hand basin. **(NB: single-bed rooms without en-suite sanitary facilities are not recommended.);**
- c. **En-suite single-bed room** is the same as 'b' but with en-suite shower, WC and wash-hand basin. . (In new build, space for a social support zone for overnight stay and a clinical support zone is also provided);
- d. **Enhanced Single room (with en-suite facilities)** this is the same as 'c' but with a ventilation system that prevents uncontrolled escape of infectious aerosols from the room to adjacent areas. It can also provide a degree of dilution of infectious aerosols in the room for the safety of staff and visitors. The room should have extract ventilation that exceeds its supply, such that gaps in its fabric leak inwards not outwards;
- e. **Enhanced Single room (with en-suite facilities and ventilated lobby)** this is the same as 'd' but with a lobby having positive pressure ventilation.

Spore: Some species of bacteria, particularly those of the genera *Bacillus* and *Clostridium*, which are significant cause of infection in humans, develop highly resistant structures called spores when they are exposed to adverse conditions, such as a lack of nutrients or water. Spores are resistant to disinfectants and to high or low temperatures. They may remain viable for many years until environmental conditions improve, the spores germinate and the bacterial cell inside starts to multiply again.

Sterilisation: The process of removing or destroying micro-organisms including spores, usually by heat or chemical means.

Thermostatic mixing valves: Valves that mix the hot and cold water of the system to provide water at a predetermined temperature.

Appendix 3: Infection control in Community Care facilities, Mental Health units, custodial facilities and accommodation for patients with learning disabilities.

- 3/1 The need to minimise the risk of cross-infection remains important in accommodation of these types, but other factors such as maintaining a homely ambience, ligature risks and the creation of a positive therapeutic environment will need to be taken into consideration.
- 3/2 The IPC requirements for those using mental health environments should be made in conjunction with health and safety teams, risk management teams and clinicians when advising on the built environment. Specific design guidance for mental health units comprises SHPN 35, Health Building Note 03-01 – ‘Adult acute mental health units’. Additionally, the Department of Health’s Environmental Design Guide: Adult Medium Secure Services should also be consulted.
- For dementia settings, additional considerations are discussed in the “dementia design checklist” (Health Facilities Scotland, 2007). The University of Stirling’s Dementia Services Development Centre has also produced guidance on Design Features to assist patients with dementia in general hospitals and emergency departments.

Recommendations

- 3/3 Creating/maintaining a non clinical feel to the environment can be achieved by using furnishings and fittings that are manufactured especially for this setting, and are easy to clean and maintain. For example, wood-effect vinyl can be used to create a less clinical environment, but cleanliness can be maintained. Vinyl is easy to maintain and will require less frequent replacement.
- 3/4 In some specialties for example where there is a potential for self harm, vitreous china (porcelain) basins and toilets would present a risk to a vulnerable patient; alternatives such as resin or stainless steel should be considered. Cleaning of these materials should, however, be considered carefully.
- 3/5 There should be sufficient access to hand hygiene facilities for staff. Siting of clinical wash-hand basins should be carefully considered and may need to be restricted to supervised areas such as the clean utility room, treatment rooms and dirty utility room. In addition, the provision of staff-held hand gel is essential. Where necessary, the use of patient wash-hand basins in en suite rooms can be used with care to avoid recontamination of hands.
- 3/6 Where required in the likes of secure mental health units, hand dryers or vandal-proof integral hand-wash dryers in communal toilets may provide a safer option for hand hygiene while encouraging those in the service to clean hands.

- 3/7 Where single rooms are used for source isolation, risk assessment should inform the storage of protective clothing, soap and paper towels, healthcare waste receptacles etc. Risk assessment will determine the need for fixtures and fittings to be of the anti-ligature type. It should be noted that where rooms are used for isolation it is acceptable for the room to contain only a healthcare waste receptacle. Receptacles (bins) for other streams such as recyclates and residual waste are not required and should be discouraged.
- 3/8 Assessment of the need for a macerator or bedpan washer-disinfector should be undertaken. If a specific dirty utility room is not required, alternative procedures should be in place.
- 3/9 DH's 'Environmental design guide: adult medium secure services' advises on floor coverings to reduce risk of harm to self or others.
- 3/10 Consideration should be given to the use of underfloor heating where patients are susceptible, vulnerable or of low sensitivity. There is a need, however, to allocate space to accommodate above-floor manifolds and such systems can be slow to react to changes in temperature requirements due to inherent inertia.
- 3/11 Design guidance on storage space for Patients belongings can be found in SHPN 04, SHPN 35 and HBN 03-01.

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