

Australasian Health Facility Guidelines

Part D - Infection Prevention and Control D.0003 - Physical Environment

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Australasian Health Facility Guidelines

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03 PHYSICAL ENVIRONMENT

03.01 Air Conditioning, Ventilation and Water Systems

GENERAL

The control of infection is influenced by the design and effectiveness of the air conditioning and ventilation systems. Specialised areas of a healthcare facility (e.g. operating rooms, birthing rooms, negatively and positively pressured isolation rooms, burns unit, intensive care units, emergency departments and special treatment or procedural areas) should provide high quality air at all times.

The management of airflows and the creation of a turbulence-free environment are essential to the control of the spread of infection.

The provision of natural ventilation to patient care areas should be approached with caution. Non air conditioned spaces rely on natural airflows to achieve comfortable conditions. The natural airflows required to achieve comfortable conditions and the airflows generated by supplementary ventilation (e.g. fans that generate turbulence and unpredictable airflows) have the potential to spread infection from person to person. Sweep ceiling fans, portable fans (with the exception of blade-free fans) and evaporative cooling systems should not be installed or used. Ventilation equipment should maintain the temperature, humidity and purity of the air, plus the inflow of fresh air, all within prescribed limits.

Return air paths in clinical areas will be provided via dedicated return air ducting.

All supply air and return air registers and grills should be removable for regular scheduled cleaning. They should not be installed directly above a patient bed.

Resources that deal with air conditioning topics can be found at the following links:

- AHIA, 2010, AusHFG Part E: Building Services and Environmental Design;
- AHIA, 2015, AusHFG Part D: Section 830 Building Elements;
- CDC, 2003, Guidelines for Environmental Infection Control in Health-Care Facilities; and
- Standards Australia, 2002, AS 1668.2:2002 The Use of Ventilation and Airconditioning in Buildings, Part 2.

LEGIONELLA

Legionnaires' disease is a serious and potentially life threatening lung infection caused by the bacteria Legionella.

Transmission of Legionella pneumophila is through air by inhaling fine droplets of water contaminated with the organism, and are associated with warm water environments such as cooling towers, evaporative air conditioners, showers, warm water systems, spa pools, misting or droplet sprays and fountains. Legionella bacteria thrive at the optimum temperature of 37 o C and die at about 46 o C.

Plant and equipment, including air handlers, water cooled cooling towers, pipe work systems in warm water and domestic hot water systems should be designed, installed and maintained in accordance with all Federal, state/ territory regulations, standards and guidelines on cooling towers and hot and cold water services.

For more information see:

- AHIA, 2015, AusHFG Part D, Section 1000 - References and Further Reading;
- Heymann, D.L., 2014, Control of Communicable Diseases Manual, 20th Edition; and
- Standards Australia, 2011, AS/NZS 3666 Air-handling and Water Systems of Buildings Set.

WATER PIPES

'Dead legs' should not be designed or built into a new system. Pipe work should be designed to be as direct as possible, avoiding stretches that do not recirculate.

Consideration should be given to the removal of dead legs at every available opportunity when sites are undergoing renovations.

SPLIT SYSTEMS

The use of split system air conditioners is a common way of resolving local cooling problems in new developments or retrofitted facilities. Their use should be avoided in patient care areas due to infection prevention issues. The following need to be considered:

- routing of condensate drains;
- air flow and turbulence effects; and
- maintenance and adequacy of filters.

The use of split system air conditioners should be confined to process cooling for equipment such as computer rooms and MRI equipment rooms, staff only and non-patient care areas.

RETICULATED WATER SYSTEMS

For further information refer to the following documentation:

- ABCB, 2014, Plumbing Code of Australia (PCA); and
- Standards Australia, 2011, AS/NZS 3666.1:2011 Air-handling and Water Systems of Buildings - Microbial Control - Design, Installation and Commissioning.

THERMOSTATIC MIXING VALVES

Where thermostatic mixing valves are fitted, water temperature should be routinely checked to ensure warm water is maintained within the prescribed range. The valves should also be easily removed for maintenance purposes.

ICE-MAKING MACHINES

Ice intended for human consumption should be obtained from self-dispensing 'on-demand' ice machines rather than from a trough reservoir.

Ice intended for receptacles for therapeutic use or donor organs can be obtained from an ice-making machine located in a clean area. A clean utility room will not be suitable for storage of such a machine. Routine cleaning and maintenance should be incorporated into the equipment surveillance program.

See also:

- Standards Australia, 2014, AS/NZS 4187:2014 Reprocessing of Reusable Medical Devices in Health Service Organizations; and
- Standards Australia, 2003, HB 260:2003 Hospital Acquired Infections - Engineering Down the Risk.

03.02 Separation of Clean and Dirty Work Flows

Workflows are to be separated in rooms where both clean and dirty functions occur (e.g. dirty utility and clean-up rooms).

The cleaning area should be divided into a contaminated section and a clean section.

Work should flow from clean to contaminated areas, with care taken to avoid contaminated equipment re-entering clean work areas.

The contaminated section should include:

- adequate bench space for dismantling and working on equipment;

- at least one deep, stainless steel sink or trough for manual cleaning of instruments and other equipment;
- cleaning and disinfecting material and equipment including brushes; and
- mechanical disinfectant/ washer.

Cleaning sinks must be provided in addition and separate to clinical hand washing basins, and used only for disposal of fluids and equipment cleaning. Where filters are fitted to taps in place of anti-splash devices, they will be regularly cleaned.

The processing area should be carefully defined and protected from all vapours, splashing or aerosols produced during operating, hand-washing, equipment washing, disinfection and ultrasonic cleaning. The area should have adequate storage space and be used only for the storage of effectively covered or packaged, cleaned, disinfected and/or sterilized instruments and equipment.

Staff rooms and recreation areas must be separate from work areas and patient treatment areas.

Ideally, there should be separate loading docks or at least separate entries for food supplies, general clean supplies and linen, and for removal of waste and soiled linen.

For detailed requirements regarding separation of clean and dirty workflows refer to:

- Standards Australia, 2014, AS/NZS 4187:2014 Reprocessing of Reusable Medical Devices in Health Service Organizations; and
- Standards Australia, 2003, HB 260:2003 Hospital Acquired Infections - Engineering Down the Risk.

03.03 Storage

Sufficient storage space should be provided for:

- medical equipment;
- medical and administrative supplies;
- clean and dirty linen;
- medications;
- general and clinical waste; and
- spare beds.

All storage conditions should comply with any relevant Standards. Shelving materials used in storage areas are to be waterproof, impervious and easy to clean. See Standards Australia, 2003, HB 260:2003 Hospital Acquired Infections - Engineering Down the Risk.

STERILE SUPPLIES

Sterile supplies should be handled with care and stored in a manner that maintains the integrity of packs and prevents contamination from any source (dust, vermin, sunlight, water, condensation etc.).

Ensure temperature and light control to storage areas, and ensure that they are easily cleaned. Store supplies off the floor, with the lowest shelf at least 300 millimetres above floor level so as to avoid mechanical damage during cleaning. Refer to:

- AHIA, AusHFG Part B: HPU 190 Sterile Supply Unit; and
- Standards Australia, 2014, AS/NZS 4187:2014 Reprocessing of Reusable Medical Devices in Health Service Organizations.

03.04 Linen Handling

The following refers to linen handling in inpatient accommodation units and other patient care areas. Clean linen should be stored:

- in a dedicated space/bay with a ABHR dispenser located nearby;
- in a clean dry location that prevents contamination by aerosols, dust, moisture and/or vermin;
- on clean shelves and, if necessary, wrapped in a protective dust cover;
- separately from used/soiled linen; and
- in a manner that allows stock rotation.

The risk of disease transmission from soiled linen is negligible. However used/soiled linen should be handled as little as possible and with minimal agitation to prevent gross contamination of the air and the linen handlers, and should be placed into bags at the point of generation.

Refer to Standards Australia, 2000, AS/NZS 4146:2000 Laundry Practice.

03.05 Waste Management

Waste can generally be categorised as follows:

- clinical waste;
- chemical waste;
- radioactive waste;
- cytotoxic wastes
- recyclables;
- organic waste;
- liquid waste; and
- general waste.

Each requires its own disposal method and, very often, colour-coded receptacles.

Waste requirements should be assessed early in the project. In clinical areas waste holding needs should be carefully identified and appropriate space allocated for waste bins and other containers. Additional space may be required in dirty utility rooms for temporary holding of in-use waste bins (usually mobile) and in disposal rooms for holding full containers (including sharps bins) awaiting collection by environmental services staff. Central waste holding and loading docks are not addressed in this document. Specifications for these may be found in jurisdictional policies and guidelines.

All sharps bins should be positioned out of the reach of children at a height that enables safe disposal by all members of staff. Relevant Australian and New Zealand Standards include:

- Standards Australia, 1998, AS/NZS 3816:1998 Management of Clinical and Related Wastes;
- Standards Australia, 1992, AS/NZS 4031:1992 Reusable Containers for the Collection of Sharp Items used in Human and Animal Medical Applications; and
- Standards Australia, 1994, AS/NZS 4261:1994 Reusable Containers for the Collection of Sharp Items used in Human and Animal Medical Applications.

03.06 References

- ABCB, 2014, Plumbing Code of Australia (PCA), Australian Building Codes Board, Canberra, Australia.
- AHIA, 2010, AusHFG Part E: Building Services and Environmental Design, Australasian Health Facility Guidelines, Australasian Health Infrastructure Alliance (AHIA), Sydney, NSW.
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