

2.1.5 Work areas

- The laboratory should be divided into “functionally clean” and “potentially contaminated” areas, with the clean areas reserved for administrative and preparatory work. Access to the clean areas and the contaminated areas must be controlled and enforced by the laboratory’s manager.
- The laboratory should be kept neat, clean and free of materials and equipment not used for performing routine work. Equipment and materials that are not being used or that do not work should be removed from work areas.
- Work surfaces must be decontaminated after any spill of potentially infectious material and at the end of each work session. (See the section on spills in Chapter 8 for additional information.)

2.2 Equipment

Equipment should be selected to take certain general principles into account – that is equipment should be:

- designed to prevent or limit contact between the operator and the infectious material;
- constructed of materials that are impermeable to liquids and resistant to corrosion;
- fabricated to be smooth and without sharp edges and unguarded moving parts;
- designed, constructed and installed to facilitate simple operation, and provide for easy maintenance, cleaning, decontamination and certification testing; glassware and other breakable materials should be avoided, whenever possible.

In addition to the specific equipment needed for laboratories with different risk levels (described in Chapters 3, 4 and 5) more information on BSCs is given in Chapter 6, and information on other safety equipment is given in Chapter

7. In laboratories where the risk of infection is considered to be moderate or high, the BSC provides the primary containment of infectious aerosols generated by certain procedures.

2.3 Design and facilities

The proper design and construction of laboratory facilities contributes to the protection of all laboratory workers and provides a barrier that protects the community from TB aerosols that may be created within the laboratory. Specific features of the laboratory, including separated laboratory areas and a ventilation system, are secondary containment measures. The secondary barriers that are recommended for a laboratory depend on the procedures conducted and their associated risk of transmission.

In a low-risk TB laboratory, secondary barriers include separating the laboratory’s work area from the public, ensuring proper waste disposal, and providing hand washing facilities. In a high-risk TB laboratory, the presence of an anteroom separating the laboratory from public areas serves as an additional secondary barrier.

Laboratory managers are responsible for providing facilities commensurate with the laboratory’s functions and risk level.

When designing a TB laboratory, special attention should be paid to common issues that are known to pose safety problems, including the use of permeable surfaces, overcrowding in work areas, the ability of unauthorized people to enter the laboratory, the flow of personnel and patients near or inside the laboratory, and poorly designed workflow.

The following list identifies the basic recommended design features of a TB laboratory.

- Adequate ventilation and directional airflow are required.
- Ample space must be provided for the safe conduct of laboratory work, and for cleaning and maintenance.

- Walls, ceilings and floors should be smooth and easy to clean. Floors should be slip-resistant.
- Bench tops should be impervious to water, and resistant to the chemicals and disinfectants normally used in the laboratory; they should also be impervious to moderate heat.
- Illumination should be adequate for all activities. Undesirable reflections and glare should be avoided. Curtains must not be used.
- Laboratory furniture should be sturdy. Furniture should be made of impervious materials and able to be decontaminated easily. No cloth-covered furniture should be used.
- Open spaces between and under benches, cabinets and equipment should be accessible for cleaning.
- Storage space must be adequate to hold supplies for immediate use and prevent clutter on bench tops and in corridors outside the laboratory. Additional space for long-term storage should be provided and located conveniently outside work areas.
- An area for the safe preparation, handling and storage of acids, stains and solvents should be established.
- Facilities for storing outer garments and personal items should be provided outside work areas.
- Facilities for eating and drinking, and for rest, should be provided outside work areas.
- A sink for handwashing and soap should be provided in each room in the laboratory, preferably near the exit. Automated or hands-free taps are recommended. A dispenser for paper towels should be near the sink.
- Laboratory doors should have a glass window panel and appropriate fire ratings; they should be self-closing.
- There should be a reliable and adequate electricity supply.

2.4 Training

Human error and poor technique can compromise the best safeguards put in place to protect laboratory workers. Well informed, competent and safety-conscious staff are essential for preventing laboratory-acquired infections, incidents and accidents.

All staff should have safety training; this should include reviewing the code of practice and the practices and procedures incorporated into the safety manual. The laboratory manager should ensure that staff are trained, and that their technical competence in performing different procedures is evaluated. Training should always include information on safe practices to be followed to avoid or minimize risks of inhalation, ingestion and inoculation. Training should also include information on how to properly decontaminate and dispose of infectious material.

2.5 Waste handling

Waste-management procedures must comply with all pertinent local or national requirements and regulations. Waste is anything that is to be discarded. The overriding principle in minimizing risks from waste is that all infectious materials should be decontaminated, incinerated, prepared to be buried or autoclaved. Discard bags should be used to segregate waste. Most glassware, instruments and laboratory clothing will be reused or recycled.

The principal questions to be asked before any objects or materials are removed from a laboratory are:

- Have the objects or materials been effectively decontaminated or disinfected using proper procedures?
- If not, have they been packaged in a closed container or bag for immediate on-site incineration or autoclaving?