

removal particulates in the size range of 1 to 5 microns is recommended for this room.

The media room, essentially a kitchen, should be ventilated to remove odors and steam.

Infectious disease and virus laboratories, found only in large hospitals, require special treatment. A ventilation rate of 10 room volumes of air per hour is recommended for these laboratories, which should have a negative air pressure relative to any other area in the vicinity to prevent the exfiltration of any airborne contaminants from them. The exhaust air from fume hoods or safety cabinets in these laboratories will require sterilization before being exhausted to the outdoors. This may be accomplished by the use of electric or gas-fired heaters, placed in series in the exhaust systems, and designed to heat the exhaust air to 600 F. A more common and less expensive method of sterilization of exhaust is to use ultra-high efficiency filters in the system. These filters are equipped with integral electric resistance wiring. The integral electrical systems provide a means of sterilizing the filters prior to removal for replacement, as a protection for maintenance personnel.

Pathology department. The areas of the pathology section which will require special attention are the autopsy room and in larger hospitals the animal quarters.

Autopsy rooms are subject to heavy bacterial contamination and odor. A minimum ventilation rate of 10 room air volumes per hour is recommended, with no recirculation. The exhaust system should discharge the air above the roof of the hospital. A negative air pressure relative to the air pressure of adjoining areas should be provided in the autopsy room to prevent the spread of this contamination. For smaller hospitals where the autopsy room is used infrequently, it may be desirable to provide local control of the ventilation system.

Animal quarters, principally because of odor, will require a ventilation rate equivalent to 15 room volumes of air per hour with no recirculation and a mechanical exhaust system which will discharge the contaminated air above the hospital roof. To prevent the spread of odor or other contaminants from the animal quarters to other areas, a negative air pressure of not less than 0.1 in. of water relative to the air pressure of adjoining areas must be maintained. Throwaway-type filters should be installed on the exhaust grilles in animal quarters to prevent animal hair from entering the exhaust system. Depending upon the type of work performed in the animal quarters, sterilization of outboard exhaust similar to that recommended for infectious disease laboratories may be required. Air movement within the rooms must be carefully controlled to prevent drafts because of the adverse effects upon most animals. A temperature range of 70 to 80 F with a relative humidity of 50 percent should be available for all animal rooms. Individual temperature control must be provided in each room to ensure the proper temperature for the species of animals housed.

Radiology department. Fig. 3 illustrates a radiology department for a hospital of approximately 100 beds. The fluoroscopic, radiographic, therapy, and dark room areas will require special attention.¹⁴ Among conditions which make positive ventilation mandatory in these areas are the odorous characteristics of certain clinical conditions treated, special construction designed to prevent ray leakage, and lightproof window shades which reduce any natural light infiltration to the fluoroscopic area.

Fluoroscopic, radiographic, and deep therapy rooms will require a minimum ventilation rate of 6 room volumes of air per hour with temperatures of 75 to 80 F and humidity of 40

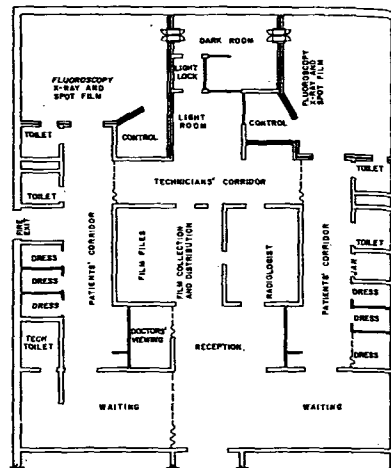


Fig. 3 . . . Radiology Department for a 100-bed Hospital¹⁴

to 50 percent. A negative pressure should be maintained in these rooms. Because of the odor problem, the air from these rooms should not be recirculated during the time the rooms are in use, unless provision for adequate odor removal is incorporated in the ventilation system. For economical operation, where odor control is not used, provision should be made for recirculation of the air during idle periods.

Depending upon the location of air supply outlets and exhaust intakes, lead lining may be required in supply and return ducts at the points of entry to the deep therapy treatment area to prevent ray leakage to other areas.

The darkroom will require a minimum ventilation rate of 10 room air volumes with no recirculation. As the darkroom will normally be in use for longer periods than the X-ray rooms, an independent system to exhaust the air to the outdoors should be provided. The exhaust from the film dryer may be connected into the darkroom exhaust.

Physical therapy department. The cooling load of the electrotherapy section will be affected by the short-wave diathermy, infrared, and ultraviolet equipment used in this area. The hydrotherapy section, with its various water treatment baths, will generally be maintained at temperatures up to 80 F. The potential latent heat build-up in this area should not be overlooked. The exercise section will require no special treatment and temperatures and humidities may be within the comfort zone. As bacterial contamination is not a hazard in these areas, air may be recirculated but the systems should include medium-grade filters.

Occupational therapy department. In this department, spaces for activities such as weaving, braiding, artwork, and sewing will require no special ventilation treatment. Recirculation of air using medium-grade filters is permissible.

Larger hospitals or those specializing in rehabilitation will

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have a greater diversification of skills and crafts, such as carpentry, metalwork, plastics, photography, ceramics, and painting.

The air conditioning and ventilation requirements of the various sections should conform to normal practice for such areas and to the code requirements relating to them. Temperatures and humidities should be maintained within the comfort zone.

Pharmacy. The pharmacy should be treated for comfort and will require no special ventilation.

Nursery

Air conditioning will be required for nurseries in most areas of the United States to provide the constant temperature and humidity conditions essential to care of the newborn. In addition, the air-conditioning system through its ventilating features will remove odor and will materially reduce the bacterial contamination of the environment.

A minimum ventilation rate of 12 room volumes of air per hour should be provided for all nurseries, with air movement patterns carefully designed to reduce possibility of drafts.¹⁵ The systems should include high-efficiency filters of 90 to 95 percent efficiency in the removal of particulates in the 1 to 5 micron size range. It should be emphasized that the air of other areas of the hospital should not be circulated through the nurseries.

The use of ultraviolet lights exposed in the nurseries is not recommended because of their limited effectiveness, the maintenance required to keep them effective and the false sense of security which they engender.

Full-term nursery. A temperature of 75 F and a relative humidity of 50 percent are recommended for the full-term nursery, examination room, and work space.¹² Similar conditions must be maintained in all of these areas as the care of full-term infants requires that they be moved periodically from the nursery to the work space and examination room. The maternity nursing section should be treated similarly, to protect the infant during visits with the mother. The nursery should have a positive air pressure relative to the work space and examination room and the rooms usually interposed between the nurseries and the corridor should be similarly pressurized relative to the corridor. This will prevent the infiltration of contaminated air from outside areas.

Premature nursery. The premature nursery will require a temperature of 80 F and a relative humidity range of 55 to 65 percent.¹³ Although this nursery is equipped with individual incubators that provide close regulation of temperatures and humidities, these conditions should be maintained in the nursery proper to accommodate the infant who may require removal from the incubator and for those infants not placed in incubators. The pressurization of these nurseries should correspond to that of the regular nurseries.

Observation nursery. The observation nursery will require a temperature of 75 F and a relative humidity of 50 percent.¹⁴ Because infants in these nurseries have unusual clinical symptoms, the air from this area should not enter other nurseries. A negative air pressure relative to the air pressure of the work room should be maintained in the nursery, and the work room usually interposed between the nursery and the corridor should be pressurized relative to the corridor.

Nursing Department

Patient rooms. Because of the ever-present possibility of cross-infection, particularly of the respiratory tract, and to prevent the spread of odors, air circulation should be confined

to the individual rooms. This confinement of the air of patient rooms is particularly desirable in nursing units where the rooms may be used for isolation of infected patients or for patients with odorous conditions such as burns. Central fan-coil systems with recirculation of air are considered acceptable for patient rooms if high-efficiency filters are used in these systems and if the individual patient rooms will not be used for isolation.

Where room unit type systems are used, it is common practice to exhaust an amount of air equal to the amount brought into the room for ventilation through the adjoining toilet room. The ventilation of toilets, bedpan closets, bathrooms, and all interior rooms should conform to applicable codes.

A temperature of 75 F with a relative humidity of 40 to 50 percent and a minimum ventilation rate of 1½ room volumes of air per hour are recommended.

Isolation unit. The air exhaust system serving individual rooms in the isolation unit should be designed to permit the outboard exhaust of all air when the rooms are used for contagious or odorous cases. Where use of these rooms for isolation patients may be infrequent, the system should be designed to permit switching over to recirculation of air when the rooms are used for other types of patients.

A minimum ventilation rate of 4 room volumes of air per hour with a negative air pressure relative to the air pressure of adjoining areas should be provided. Temperatures and humidities should correspond to those of other patient rooms.

Treatment rooms. Patients are brought to these rooms for special treatments, that cannot be conveniently performed in the patient rooms. To accommodate the patient, a temperature of 80 F and relative humidity of 50 percent should be provided. A minimum ventilation rate of 4 room volumes of air with a negative air pressure should be provided for these rooms because they will be highly contaminated at times.

Utility rooms. The clean utility room serves as a storage and distribution center for clean supplies and will require no special ventilation treatment. It should be air conditioned for comfort, and a positive pressure relative to the corridor should be provided.

The soiled utility room serves primarily as a collection point for soiled utensils and materials. It is considered a contaminated room and for this reason should have a negative air pressure relative to the air pressure of adjoining areas. A ventilation rate of 3 room volumes of air per hour is recommended with temperatures and humidities within the comfort range.

Floor pantry. Ventilation requirements of this area will depend upon the type of food service adopted by the hospital. Where bulk food is dispensed and dishwashing facilities are provided in the pantry, the use of hoods over equipment, with exhaust to the outdoors is recommended. Small pantries used for between-meal feedings will require no special ventilation. The air pressure of the pantry should be in balance with that of adjoining areas to reduce the movement of air into or out of it.

Surgical Department

No area of the hospital requires more careful control of the aseptic condition of the environment than does the surgical department. The systems serving the operating rooms, including cytoscopic and fracture rooms, will require careful design to reduce to a minimum the concentration of airborne organisms in these rooms. It has been established that the greatest amount of the bacteria found in the operating room