



## Designing operating theatres

**T**he function of the operating theatre is to receive patients after diagnosis, to anaesthetise them either before or after transfer to the operating table, to operate and to supervise their post-operative condition before returning them to their rooms or wards.

### The structure of the OT suite

The OT department consists of one or more operating suites which share ancillary accommodation such as staff changing and rest rooms, arrangement for the reception of patients, and facilities for the disposal of soiled material. The suites may also share a unit for the supply of sterile material and instruments. Each operating suite normally consists of a theatre, an anaesthetic room, a preparation room and a scrub-up.

The operating suite can be regarded as a sandwich in which the center consists of the theatre, the anaesthetic room, the scrub-up in which those working in the theatre can wash and gown, and the supply, preparation or lay-up room through which instruments and materials are passed into the theatre. This center is flanked on one side by a clean area from which patients, staff and sterile supplies reach the centre, and on the other side by a dirty area or disposal route through which soiled or infected material leaves it. Theatre staff enter the clean area through changing rooms.



## The need for pure air

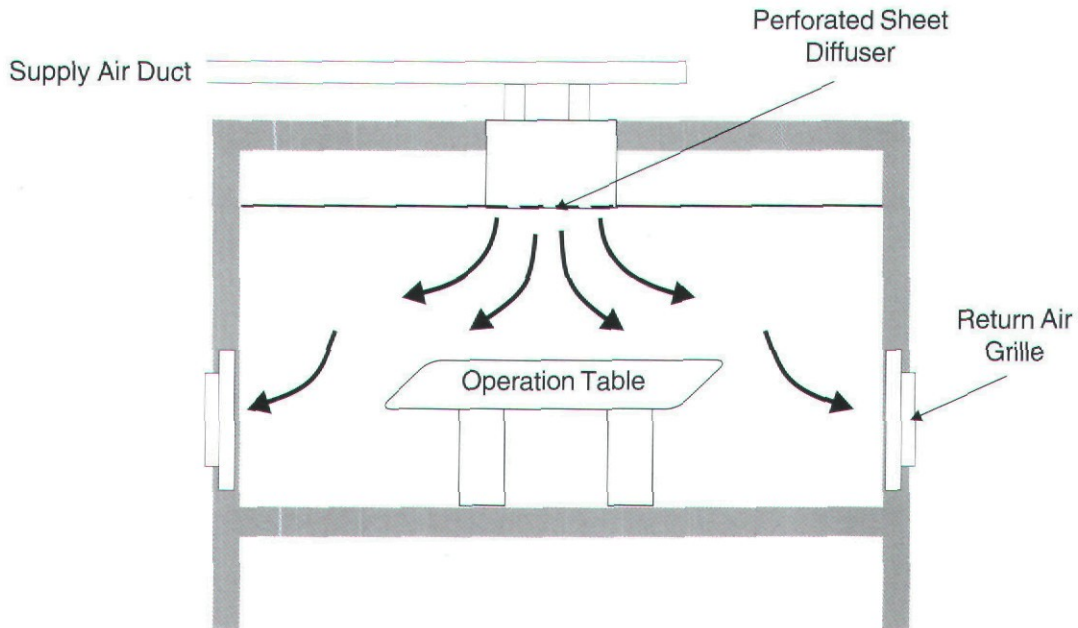
No area of the hospital requires more careful control of the aseptic condition of the environment than does the operating or surgical suite. **The airconditioning systems serving the operating rooms require careful design to reduce to a minimum the concentration of airborne organisms.**

The greatest amount of bacteria found in the operating room comes from the surgical team and is a result of their activities during surgery. During an operation, most members of the surgical team are in the vicinity of the operating table, creating the undesirable situation of 'concentration contamination' in this highly sensitive area.

## Air flow control

To protect the patient on the operating table from the harmful effects of bacteria from the surgical team, airconditioning engineers borrowed the design of air distribution systems used in industrial 'clean' rooms where high precision electronic components such as chips are manufactured.

Supply of cool, filtered, air from the ceiling of the operating theatre, in a **flat, downward movement, called 'laminar flow'**, to several exhaust outlets located on opposite walls at a low level near the floor, is probably the most effective air movement pattern for maintaining the concentration of contamination around the patient at an acceptable level.



**Fig 5.** Typical Laminar Flow design in an OT.

Completely perforated ceilings, partially perforated ceilings and ceiling mounted laminar flow perforated diffusers have been successfully used to create this air distribution pattern.

## A positive air pressure

To prevent infiltration of air of questionable quality into the operating rooms from adjoining rooms, **air pressure inside the OT must be maintained at a positive level** with respect to any adjoining room by supplying 15% excess air over the exhaust air. The air distribution system must be carefully balanced after installation to ensure that air movement is from clean to dirty areas and not the reverse.





## 24-hour duty

Since operating room suites are typically in use no more than 8 to 12 hours per day, many hospitals tend to switch off the air handling units supplying air to the OTs in order to conserve energy. It is advisable to keep these systems running at reduced levels and to maintain positive pressures to ensure sterile conditions on start up the next day.

## Temperature control

The temperature to be maintained in the OT is critical and should be adjustable by the surgical staff in the range of 20-23°C. These low temperatures are needed since the surgical team is covered from head to toe, exposed to powerful surgical lights, working under intense pressure, often for several hours at a stretch and must be kept comfortable at all times.