

EDITORIAL

DESIGNING AND PLANNING AN OPERATING ROOM COMPLEX

Operating room (OR) complexes are constructed in new hospitals, or alternatively these may be constructed to cope up with the increased workload; in which case these may either be an entirely new undertaking or an extension of the existing system. The basic responsibility of planning and designing this complex lies with the architect. The ordinary architects may not be able to fully comprehend the needs and requirements sought out of hospital building and especially an operating room complex, so there is a special breed of architects called healthcare architects. These architects know the basic functioning of the complex, including the expected workload, the function of the main operating room and the utility area, the number of operating surgeons, the direction which the patient flow will take, the flow of the operating trolley's, the waste disposal system, so and so on.

There are a number of guidelines available to design an operating room suite or complex, however the basic principles remain the same no matter where it is built. Before embarking upon the designing phase the architect must carry out a thorough survey of the existing area and the lay out of the existing or proposed hospital building. Frequent meetings with the hospital authorities including the users, e.g. the anaesthetists, the surgeons and the paramedical staff are mandatory to get an insight into their assumptions as well as requirements. The anaesthetists are definitely not the architects and nor they should be vested this responsibility, however by virtue of their day-to-day experience they are the best suitable persons to help and assess the suggested plan. The suggested lay out should again be discussed and analyzed. Simple line diagrams often fail to highlight the exact dimensions and fail to convey the feel of the function ability of the complex. Computer generated three dimensional models are better suited to analyze the practical problems before hand. These models may comprise of empty building and also equipped models. The users could then be better able to comprehend the practical aspects of it.

Every complex comprises of three basic areas. Clean area usually consists of main operating rooms, sterilization rooms and a small sitting area for the surgeons and the anaesthetist. It has restricted entry and no body is allowed without operating dress or proper gowns, caps and masks. The surfaces of the walls, floors and the ceilings of this area need more attention in detail. The surfaces must be nonporous and impervious, so that scrupulous disinfection can be frequently carried out. The developed countries have adopted stainless steel surfaces for this purpose, including floors and ceilings. These are expensive and need specialized technical skills. Less developed countries may opt for less expensive alternatives. These may comprise of aluminum panels for the ceiling and walls. The floors may be made of straight-cut ceramic tiles, marble tiles or chips mosaic with frequent polishing. The conventional round edged tiles leave cleavage between adjacent tiles, where dirt could accumulate. Special cements are available which allow easy replacement of defective, cracked or scarred tiles. The second area may be called semi-clean area. It comprises of drug store, instrument stores, autoclave room, dirty linen room, instrument washing and packing area and staff rooms. Electro-medical repair area is also housed in this category. This room may be adjacent to the main OR's for easy transport of heavy electro-medical equipment for repair. The entry to this area is less restricted; however street clothes and shoes are not allowed. The third area is non-clean area and patients waiting rooms, pre-anaesthesia clinic, pain clinic, staff changing rooms, duty room and waste disposal area are included in it. All these three areas are essentially interdependent, still care must be taken to separate them from one another by suitable partitions.

Some commodities need further deliberations and must be suitably placed, for example gas bank and recovery may be placed within clean area or semi-clean area. Either case has some merits and some demerits. Placing recovery adjacent to main operating rooms allows easy access to the busy anaesthetists, who are in short supply; whereas in semi-clean area it allows easy access to the patients' attendants, who are often very helpful in reassuring the patient in this critical period. It also improves approach of the ward staff responsible for wheeling the patient out of the operating room complex to their respective wards or post-operative ward. Large complexes may need to house a conference room, to be used for teaching purposes, surgical and anaesthesia audits and administrative conferences. In the semi-clean area it offers easy acceptability to in-house staff, whereas in the non-clean area it is suitable for outsiders in street clothes. Whatever the case may be the whole matter needs to

be thoroughly discussed on merits.

The complex must take into account the available surgical specialties in the hospital. The plan must also take into account the future expansion with the growing needs. It is a rough estimate that two operating rooms may have to be increased every fifteen years. . Big hospitals may allocate separate operating room/s for emergencies. It will save us from frequent disturbance of the operating lists, and allow better disinfection of the main operating rooms.

The plan must be patient friendly. A congenial and comfortable waiting area is a must. The pre-anaesthesia visit to a well-furnished pre-anaesthesia clinic may serve to allay most of the anxiety of the patients. Also the flow of the patient must be carefully calculated, so that the distance from waiting room to the operating room and from operating room to the recovery is optimum. The transit phase may be very crucial for some patients. Similarly, a comfortable induction room serves to take away from the patient the most horrifying sights of operating lights, huge electro medical equipment, trolleys and gowned operating staff. The patient goes to sleep in peace.

Similarly, the plan must also be staff friendly. Preferably separate entrances should be provided for the patients and for the staff. A compact design will reduce the need for long walking distances within the complex. Sisters' desks and central monitoring areas suitably demarcated. Notes writing area may also be planned adjacent to a set of operating rooms for the surgeons and anaesthetists. Sitting rooms should be comfortable and arrangements for light refreshments catered for. Separate toilet areas be provided for the female staff, for the surgical and paramedical staff. A duty room for the night duty staff requires to be well-furnished, comfortable; and suitable entertainment facilities e.g. a television set provided.

The route of clean operating trolley's to the operating rooms and dirty trolley's from operating rooms to the washing area should be carefully charted, and no overlapping of the two be allowed. The waste disposal deserves to take more emphasis than it is given currently. The disposal room should be housed away from the clean area, and separate disposal channels be provided for infective and non-infective material. The arrangements be made so that the OR sweepers do not have to get out of the area for disposal of the waste.

Air-conditioning also needs a lot more emphasis. The main operating area must be provided with HVAC system with HEPA (High Efficiency Particulate Air) filters. It must allow constant temperature and humidity to be maintained besides providing recommended air changes. This is an essential feature for the safety of the patients as well for the staff. The semi-clean and non-clean areas maybe provided with less ideal air-conditioning, e.g. split type air-conditioners. Again it is desirable that semi-clean area be provided with reversible air-conditioners; the non-clean area may have cooling type air-conditioners along with other heating arrangements.

The electrical outlets must be hospital grade, allowing ground connection. The outlets in clean area must allow frequent washing / scrubbing without posing hazards of electrocution to the staff. Further, some outlets in the floor of the operating room near the operating table will avoid long drawn cables on the floor. A better approach is to go for hanging type of outlets.

Thorough planning will facilitate simultaneous execution of various technical services, saving valuable time, money and effort. For example leaving suitable vents in the walls for air-conditioning ducts and pipes will prevent frequent breakage of the walls. Similarly electrical ducting and fixing of operating lights as well as central gas piping prior to the fitting of false ceiling will be beneficial. In fact whole project must be undertaken under a strictly laid down plan with tight time frame. Periodical review of the progress and assessment of the completed work by a committee comprising of the architect, the supervising staff, the concerned contractors, the hospital management and the representatives of the users, preferably from the anaesthesia department will greatly facilitate the sound and sane construction of OR complexes.

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