

The Nurse's View of Operating Room Design and Function

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THE CARE OF PATIENTS in the operating room is the joint responsibility of all the team members, with each fulfilling certain obligations necessary for meeting the needs of individual patients. This philosophy is a guideline in the care of patients in the operating rooms of the University Hospitals of Cleveland. The professional nurse, as a member of the team responsible for the care of patients, must have the opportunity to share and cultivate her knowledge and expertise. My purpose in writing this paper is to share my first-hand knowledge with others involved in planning and designing well-functioning operating rooms.

The nursing staff is in the operating room area from eight to 24 hours per day, depending upon the staffing pattern. In planning new areas, it is important to consider their advice. Among other considerations, they will have more interest in helping to make the unit function smoothly if they have been involved in the planning.

Unfortunately, the planning of a new suite frequently does not involve nursing until after major decisions, *e.g.*, room layout including location, area, special facilities, x-ray facilities, patient transportation, recovery room layout, office space, storage space, clean-up work area, etc., have been made by the department of surgery, hospital administration and/or architects. Many times a poorly-designed unit indicates a lack of group participation by those functioning as a team in caring for patients undergoing surgery—surgeon, anesthesiologist and nurse. My experience as the nurse member of a planning committee for designing, building, equipping and opening a 26-room

suite provides the background for the views presented in this paper.

The planning group designing any operating room should include representatives from the departments of surgery, anesthesia, nursing, radiology, hospital administration, maintenance or construction and planning, and the architect. Many hours of work by the architect may be eliminated if each member of the committee has the opportunity to review all new blueprints before the group meets to discuss revisions. No changes should be made unless all members either agree with, or understand the rationale for, them.

Initially, the nurse, anesthesiologist or surgeon may not be conversant with specific building codes, but after active group work each will have acquired the knowledge necessary to understand and interpret to others why a certain design was included or excluded. The same may be true of the architect or administrator who does not understand the reason for, *e.g.*, the presence of a washer-sterilizer adjacent to each room.

It is important to spend enough time in the planning stage to insure a well-designed unit. We took six years to develop the plans for our new suite, and another three years for its construction. However, we believe the time and effort expended have made it a well-functioning department.

Recording notes of each meeting is extremely important. It not only puts in writing, for future use, the comments and decisions of the committee, but it enables the members to make necessary corrections. A familiar phrase at the bottom of each set of our notes read, "Please notify _____ in writing, within three days, of any items in the foregoing notes you consider incorrect, or if you have any comments you desire to make regarding them."

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The notes, recorded and distributed to all committee members, provided a wealth of information for new members, as well as resource material for others involved.

Everyone involved in planning must give serious consideration to the needs of the operating area 20 or more years hence. It is not realistic to think that one can anticipate all forthcoming changes, but a unit must offer an opportunity for expansion and/or revision. No one likes to have the plastered ceiling torn down after a year or two to replace a leaky valve, add a telepage speaker, etc. This will not often be necessary if the unit has been planned wisely.

One of the first decisions to be arrived at is the need for new or additional operating room facilities; usually this is determined jointly by a hospital planning committee and the controlling agency. Once this decision has been made, the planning committee is confronted with questions regarding general location, overall size of suite, number of rooms needed, specialty areas, locker facilities, x-ray requirements, sub-sterile room facilities, ambulatory patient surgery, and a variety of other questions. Each decision must relate to the individual institution. Some factors to be considered are the number of existing surgical beds, proposed increase of beds (over the next ten to 20 years), plan of the elective surgery schedule, plan for care of ambulatory patients requiring surgery, pattern of emergency surgery, anticipated changes in number of surgeons on staff, and proposals for changes in types of clinical specialties. I would strongly encourage the development and acceptance of policy statements as they are made in relation to planning the new facilities. This helps to insure agreement and/or understanding of all committee members and their respective staffs, thus enabling the group to plan facilities to meet the needs outlined in the policies.

An example of our early policy making was the decision to eliminate a Saturday elective surgery schedule. This enabled nursing to plan the staffing pattern for the new unit and to submit the proposed personnel budget two years prior to the opening of the new operating room suite. These primary decisions were important, as they formed the foundation for

a functional unit designed for the future, as well as the present.

The nurse who shares the responsibility for designing a new operating room must use extreme thought and judgment in each decision. In addition, she must be willing and able to support her decisions. There were many times when I found it difficult to understand why I was asked to repeat, for the third or fourth time, my rationale for a specific request, but I soon realized the importance of each decision in view of the overall plan.

Shortly after I arrived at the University Hospitals I was asked to review and approve the plans for the clean-up and sub-sterile rooms. When I found they were not consistent with the basic principles of good technique, it was not only necessary for me to challenge the thinking and work of the architects, but I had to convince hospital administration. I believed that my proposal was sound, and that it would serve as the foundation for the work flow pattern in the area. My plan ultimately was accepted, and I was given the responsibility for layout of all sub-sterile rooms and general work areas. In looking back, I now understand the position of hospital administration in their concern that a correct decision be made, as the decision involved major changes in the design of the operating room. In addition, this change added to the cost 50 to 60 thousand dollars for washer-sterilizers.

The nurse involved in operating room planning is concerned about many facets of design that other committee members may not recognize or believe is their concern. Far too frequently, these decisions are left to the discretion of the architect. If the nursing staff is not willing to provide him with the information needed to design a functional unit, then they must not be distressed when confronted with problems on moving into a new unit. (I remember that, when moving into a new suite several years ago, I was appalled to find no provision for storage of surgical instruments. Obviously, the suite had been planned with little or no nursing consultation.)

It is necessary to determine the flow of work and activities performed within the operating room suite. The next step involves planning for flow of supplies and equipment. To insure

TABLE 1. Considerations in Planning Flow and Storage of Linen

Delivery of sterile and non-sterile linen to OR.	Volume of linen to be delivered Kind of delivery cart Delivery system to be instituted How carts will enter restricted area of OR
Storage of linen in central work area	Volume of linen to be stored Amount of storage needed Use of reusable linen <i>vs.</i> disposable linen Shelving <i>vs.</i> portable-cart storage Fixed shelving <i>vs.</i> portable shelving Location of linen storage within central work area
Storage of sterile linen in operating room	Amount of sterile linen needed Use of reusable <i>vs.</i> disposable linen Closed cabinets <i>vs.</i> open cabinets Size of cabinet shelves Stainless steel cabinets <i>vs.</i> enamel
Storage of non-sterile linen in sub-sterile rooms	Amount of linen needed Type of non-sterile linen needed for patient use How would this linen supply be restocked Who would stock this area with linen

TABLE 2. Considerations in Planning the Sub-sterile Room

Functions	Arrangement and Facilities
1. Hand scrubbing	1. Scrub sinks adjacent to OR entrance
2. Three-minute instrument sterilization	2. Dirty areas away from scrub sinks
3. Terminal cleaning and sterilization of instruments and equipment from the OR	3. Mop closet closest to most active OR (when possible)
4. Emptying, cleaning and the sterilization of suction bottles	4. Double sink needed, because both washing and rinsing processes frequently are used
5. Warming irrigating saline solution for operative use	5. Hot and cold water over flush hopper to use in filling mop pails, rinsing suction bottles, etc.
6. Collection of empty drug bottles, saline and water flasks, used basins and other items to be returned to central work area	6. Flush hopper with a water level, rather than drain type, so a variety of materials (large blood clots, feces, soiled tissue from nasal discharges, emesis, etc.) can be disposed of in this area
7. Collection of soiled rubber gloves	7. Low-type flush hopper to enable easy emptying of heavy containers of refuse, mop pails, etc.
8. Collection of broken glass and trash from OR's	8. Space for movable cart near corridor exit for return of used material to central work area
9. Collection of soiled linen from OR and SS areas	9. Space for trash containers as near exit as possible
10. Storage of cleaning supplies needed between surgical procedures	10. High-speed sterilizer
11. Storage of a small supply of specimen containers	11. Instrument washer-sterilizer
12. Storage of stock solutions for use in restocking OR's	12. Solution warmer
13. Cabinet space for septic routine supplies	
14. Storage of clean suction bottles	
15. Storage of non-sterile linen used in OR	



FIG. 1. Cabinet designed for use by the anesthesiologist.

their cooperation and assistance, it is essential to work closely with members of the supporting services, *c.g.*, supply services, laundry, stores, housekeeping, and pharmacy. To plan

a functional unit one must know what is needed; how it arrives; how it is stored; how it is disposed of after use. An example of this is the flow of linen delivery and storage (table 1), which is given careful considerations before final plans are drawn. The same kind of work flow analysis should be done for each task or function performed in the area. Outlined in table 2 are the basic functions of the sub-sterile room and considerations for arrangement and facilities. This type of outline provides the architect with an idea of the design needs of the area. Errors in planning will be kept to a minimum if each function is given such consideration.

To provide optimum care for the surgical patient the unit should be designed for ease of housekeeping and maintenance. The funds available determine, to some degree, the cabinets, doors, wall covering, floors, baseboard, etc., used. It is better to eliminate items that can be added later, *c.g.*, an ultrasonic washer, and include items that are difficult to install later. A few examples which affect housekeeping are stainless steel door frames, coved baseboard, poured conductive flooring, and stainless steel cabinets in sub-sterile and operating rooms. Chipped paint on door frames makes a new suite look old within a short time, but stainless steel will look well-kept ten or 20 years after installation. Coved baseboard is essential, as it eliminates corners and crevices

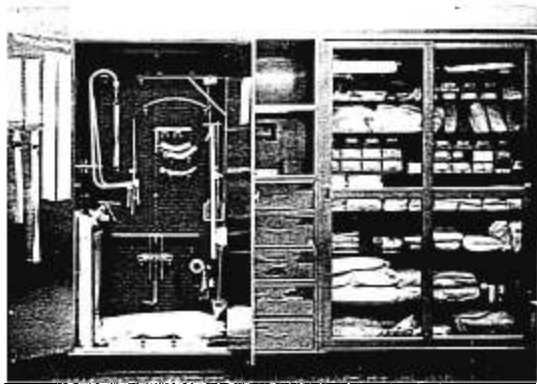


FIG. 2. Cabinets designed for use in the operating room for nursing supplies, operating room table attachments, sand bags, etc.

for collection of dirt and foreign materials. The sub-sterile room is an active area and may become extremely untidy. If stainless steel scrub sinks, cabinets and enclosures for sterilizers are provided, the housekeeping staff can make it look "like new," even after a hard day of use. The cabinets in the operating room must provide adequate storage space for both anesthesia and nursing. Figure 1 shows a cabinet unit designed for the anesthesiologist, and includes a pull-out writing shelf for use when he is seated. The top of the cabinet is open, to provide easy access to intravenous fluids and special equipment. The drawers are stocked with routine supplies he needs for care of the surgical patient. (Also shown in figure 1 is a 35-channel intercom providing two-way communication and emergency paging to other areas of the operating room and x-ray department.) Figure 2 shows supply cabinets in the operating room. The design includes closed cabinets with glass sliding doors, open shelves, drawers, and a peg-board-backed section with solid doors. This series of cabinets provides for all necessary storage of supplies, including table attachments, sand bags, and pillows. It eliminates storage outside the room or items hanging around the room. Figure 3 shows our design for sliding doors, used throughout the suite. We wanted sliding doors, but they usually are hard to clean. This door has an access door which opens full length on a piano hinge. With the access door open the pocket can be vacuumed and cleaned easily. These are only a few of



FIG. 3. Sliding door with access door for cleaning and maintenance of track and pocket area.

the items designed in part or completely by an operating room nurse interested in the design and function of a surgical suite. The nurse is only one cog in the wheel, but she may be the cog that makes the wheel go around when one desires to move forward.

Obstetrics and Pediatrics

COAGULATION DEFECT Intrauterine death of the fetus may precipitate hypofibrinogenemia. This is thought to result from a release of thromboplastin, with resultant intravascular clotting. Hypofibrinogenemia may be unresponsive to infusion of fibrinogen and epsilon-aminocaproic acid. Treatment with intravenous heparin increases the fibrinogen level. Heparin therapy results in prolongation of the clotting time; the drug should be neutralized if gross hemorrhage occurs or if surgical intervention is contemplated. (Jimenez, J. J., and Prichard, J. A.: *Pathogenesis and Treatment of Coagulation Defects Resulting from Fetal Death*, *Obstet. Gynec.* 32: 449 (Oct.) 1968.)