CHAPTER 18

OBSTETRIC LABOR SUITE

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Checklist

- Space considerations for obstetricians/midwives, neonatologists, nurses, and others?
- Locations where anesthesia will be administered?
- Equipment needs for anesthesia?
- Support space for the above?

The obstetric suite is a location in which various types of anesthesia are given. Thus, it is important that the anesthesiologist be actively involved in the planning of such a facility and understands the implications of design decisions. Hospitals everywhere are in a constant state of change, reconstruction, consolidation, downsizing or upsizing, renovation, or new construction. The anesthesia service can and should be a participant in planning any of these types of projects. Care of the obstetric patient is a team effort, perhaps even more so than in other parts of the hospital. Design considerations for the location in which those patients are cared for should reflect that team approach, and anesthesiologists involved in the planning process should consider their relationships with other members of the team. The specifics of that process are described elsewhere in this manual.

Design Considerations: Relationships With Other Care Providers

Obstetricians/Midwives

Consider all of the points of contact the anesthesiologist might have with the obstetric care providers and their activities. Antenatal anesthesia consults for high-risk patients are best performed near the obstetric suite to allow best utilization of manpower, especially if the service is small. Similarly, preoperative visits for elective Cesarean sections (C-sections) as well as preoperative testing would optimally be conducted on or near the obstetric suite. If there will be stress testing, or if external versions are planned, a location for these procedures in or near the obstetric suite would be useful to facilitate operative care if trouble arises. Depending on the size and nature of the service, multidisciplinary conference space may be desirable. If cerclages are to be performed in the operating rooms (ORs) in the obstetric suite, consider the route by which those patients will be admitted and recovered after anesthesia.

If the obstetric anesthesia team is to cover oocyte harvest for in vitro fertilization procedures, consider whether those patients are best served in the obstetric suite, around pregnant and delivering patients, or in a separate location. If the latter is true, there are manpower implications.

Neonatologists

Neonatal resuscitation is an important issue for the planning team. Who will be responsible for neonatal care, evaluation and resuscitation? The American Society of Anesthesiologists (ASA) Guidelines for Regional Anesthesia in Obstetrics state that qualified personnel other than the anesthesiologist attending the mother must be immediately available to attend to the newborn. This means that another anesthesiologist or other qualified personnel must be designated as responsible for the newborn. Many departments around the country have decided that a member of the neonatology or pediatric service should care for the baby. Therefore, in designing the obstetric suite, proximity to the neonatal nurseries, or neonatal intensive care unit (NICU) if there is one, should be a priority. This will allow for the quickest response to emergency calls and minimize the distance a sick neonate must be transported. The design team must decide where the neonatal resuscitation will be performed, in the delivery room on the infant warmer, in a separate but nearby resuscitation room, or in a nursery or NICU. Clearly, this decision must be made before the space is planned. If the hospital does not have a NICU, then there should be a place to stabilize and care for a sick infant until the baby can be transported to a NICU.

Nurses

Interaction with nurses is a very important concern in designing (and running) an obstetric suite. An attempt should be made to keep each labor room in touch with the main nurses' station, thereby facilitating communication. Consideration should be given to the communication system (e.g., overhead page) and the mechanism by which "stat", "urgent," and "nonurgent" requests for anesthesia help will be made. Many units have a labor board, listing each patient, stage of labor, gestational age, and special concerns. This is a valuable communication tool, and its location should be considered in the design of the unit. Will the board be replaced by a computer equivalent, and if so, where will terminals be placed? If the traditional board is used, will it be at the nurses' station, easily accessible to staff but not very private? If not, where will it be located?

Nursing expertise and management capabilities have implications for design. If the obstetric service will care for parturients who require invasive monitoring, nurses must be familiar with invasive lines and monitors. If so, labor rooms must be designed with the space and accessibility required for intensive care. Central station hemodynamic monitoring should be considered, since most labor rooms are intentionally private, often with doors closed. It is cheaper to wire for this while the unit is being built, although it is possible to retrofit with telemetry monitors. At the very least, an empty conduit should be placed for future monitoring needs. Most units will require one or more computer terminals in each labor room, as many hospitals have moved to electronic records for nursing, obstetrics, and anesthesia, and, of course, for laboratory data.

Emergency Room, ICU, Laboratory, and Blood Bank Personnel
When planning the obstetric suite, a decision must be made regarding the level of maternal intensive care to be provided on the labor floor. If there is a point at which a sick parturient will be transferred to the intensive care unit (ICU), consideration should be given to its distance from and accessibility to the labor floor. Pregnant patients in the ICU may require nurses familiar with labor and fetal monitoring. If so, nurses from the obstetric suite may have to accompany and stay with the patient. When such a patient delivers, it must be decided whether she will remain in the ICU or be transferred to the obstetric suite or the facility's main OR suite.

Consider accessibility from the emergency room, the route from the emergency room, and the time it will take to transport a bleeding or delivering patient to the labor floor. A keyed elevator for emergencies is often a good idea, and appropriate personnel should carry the key at all times.

Other concerns are the relationship to the blood bank and the laboratories, in particular the blood gas laboratory. How fast and by what route can blood samples be delivered to the laboratories and results returned? Some hospitals use vacuum-tube systems to rapidly transport blood and blood samples over significant distances; others use point-of-care testing for many tests.

Design Considerations: Anesthesia Specific

Anesthetizing Locations
During the planning process, the design team must decide what types of procedures and, therefore, anesthetics will take place in the obstetric suite. Some facilities will have dedicated obstetric ORs where C-sections, other operative deliveries, cerclage placements, postpartum procedures, and dilatation and curettages may be performed. Other facilities will plan to have some or all of these operative procedures performed in the main OR suite. If the latter arrangement is chosen, a plan must be elaborated for transport of obstetric patients to the main OR for emergencies.

The design team will decide whether to plan for a labor-deliver-recover (LDR) unit or a labor-deliver-recover-postpartum (LDRP) unit. In the LDR unit, the patient is admitted to a room in which she is expected to labor, deliver her baby, and recover from her delivery prior to being transferred to a postpartum room, usually outside the labor floor. In a LDRP unit, the patient's room is reconfigured after the delivery into a postpartum room, from which she will ultimately be discharged home. The LDR versus LDRP decision has implications for the anesthesia service. The LDRP unit will occupy a much greater geographic area than will the LDR unit. Depending on the size of the service, it may even be spread over two floors of the hospital. If so, where will the ORs be located? Should there be one on each floor, requiring duplication of anesthesia equipment? If the OR suite is on one floor, with some LDRPs on another, how will emergent C-sections be performed for the patients on the other floor? Will there be enough anesthesia personnel to cover two floors? Where will the anesthesia call room be located? Even if the LDRP unit is confined to one floor, how will communication among caregivers be facilitated in such a large space?

Irrespective of the specific type of unit planned (LDR or LDRP), space must be allocated for operating and recovery rooms. Some hospitals have created designated recovery rooms for all patients who have operative procedures. Thus, patients who have elective C-sections or cerclage placements would never use a labor room or LDRP room. In other facilities, all patients are admitted to an LDRP room following obstetric procedures. The substantial rise in the C-section rate in recent years has significant implications for the planning of operative and postoperative spaces in these units. In addition, since the Health Insurance Portability and Accountability Act was passed in 1996, there has been increased emphasis on patient privacy. This has led to the creation of much more private and, therefore, larger triage and recovery spaces in all operative settings, but especially on the labor floor. In fact, Guidelines for Perinatal Care in Obstetrics state that the room provided for a woman in labor should be private and that each woman should have access to a private toilet and handwashing area in her room, a departure from recommendations from even 15 years ago.

Administrators responsible for satisfying the requirements of state and other agencies will usually ensure that enough gas and electrical outlets are planned, that lighting is adequate, and that ventilatory standards are met. However, it is the responsibility of the anesthesia representative to ensure that there is an adequate number of wall oxygen and vacuum sources as well as electrical outlets and data jacks in each area where anesthesia will be administered. The anesthesia service should ensure that gas and electrical outlets are in locations that are appropriate to the manner in which the labor rooms and ORs will be used.

Work Force Implications

It is important to decide very early in the process how the labor floor will be staffed by the anesthesiology department. This issue must be included in the discussion of the placement of the labor floor within the hospital. If the obstetric suite is connected or very close to the general ORs, cross-coverage at some level may be possible, and the need for equipment purchases may be minimized. If a new obstetric service or the consolidation of existing services is planned, the department must decide whether to provide anesthesia services solely dedicated to the labor floor or to allow “on call” anesthesia from the main ORs or from home. The number of anesthesia providers must be determined; this is a complicated decision. It depends on the number of deliveries expected and on the acuity of the patients. It depends on the emergency backup available in the hospital to supplement the basic level of coverage for the unpredictable flurries of deliveries that are expected in obstetrics. It depends on whether residents or nurse anesthetists are part of the service and whether anesthesia providers are also simultaneously responsible for patient care elsewhere in the hospital.

Equipment Implications

In order to determine the impact that anesthesia equipment will have on the functional program, consideration must again be given to how independent the labor suite will be. If the suite will have its own OR(s), no matter what the expected size of the service, a basic amount of equipment will be necessary. If the labor floor is remote from the other anesthetizing locations in the hospital, American Institute of Architect guidelines mandates an anesthesia workroom. Some anesthesia equipment is bulky; some is less so. Some can be moved easily; some cannot.

In order to make rational decisions about room sizes, a number of determinations are necessary. How much of each type of equipment is necessary? Where should active and backup equipment be stored and how accessible must it be? Equipment needs are discussed further later in this chapter. Many anesthesiology departments have technician support, and this should be considered in planning the amount of storage necessary for basic equipment and disposables. If someone will frequently restock medications and the many disposables used in anesthesia, less of such items will be needed. If an anesthesia workroom is included in the obstetric suite, it should be near the ORs. If the ORs are in a substerile corridor, it may be preferable to arrange the suite so that there is access to the workroom from the substerile area.

Consideration must be given to the accessibility of the anesthesia workroom. In general, regulatory agencies, such as the Joint Commission and State Departments of Public Health, mandate restrictions in public access to syringes, needles, and biologicals. Therefore, if the workroom door is on the labor floor, it may have to be kept closed and locked. Clinical circumstances may arise in which it is necessary to send a nurse or other nonanesthesia personnel to urgently retrieve items from the workroom (e.g., emergency airway cart); in such instances, a locked workroom could add an unnecessary delay. On the other hand, the need for personnel to wear scrub suits and masks to access the workroom will add inconvenience to the delivery of supplies. Wherever it is placed, the anesthesia service should make sure that the room is sized to adequately accommodate the necessary equipment. The planning team must decide how pharmacy needs will be met. How will drugs be dispensed and stored? Perhaps an existing pharmacy substation can be used and no additional space will be needed. Perhaps an automatic drug delivery machine will be used, and an alcove that is centrally located for all users is all that is required. In many cases, a medication closet is planned at the nurses' station. Where will anesthesia medications, including narcotics, be stored? What about refrigeration? If medications for anesthesia use are to be kept in the anesthesia workroom, they can take up a surprising amount of shelf space and have a significant impact on the size of the room. On the labor floor, where rapid response to emergencies is a constant concern, there must be a balance between immediate access to necessary medications and equipment and the need to satisfy the regulations mandating that those medications are locked away from public access. Thus, central storage space for anesthesia equipment must be planned.

Support Space
Once the number of obstetric anesthesia staff and the staffing model are determined, many questions arise. Will the anesthesia staff require office space on or near the labor floor? Where will case records and textbooks be kept, and where will telephone and computer use take place? Is secretarial support necessary, and how is it accessible? Will prenatal and postnatal consultation be performed on the labor floor? How many call rooms will be necessary for the anesthesia service, and how close will they be to the labor floor? How many lockers will be necessary, specifically for the anesthesia personnel? Will showers and bathrooms be located in the locker rooms, near the call rooms, or both? If an anesthesia office or call room on the labor floor is planned, it should be situated to allow easy accessibility by nursing personnel and allow the staff to be aware of activity on the labor floor. It may be best to position the office near the OR to facilitate emergent C-sections.

Design Considerations: Equipment

Below is a skeleton list of equipment necessary in an OR in the obstetric suite. Elsewhere in this manual is a more complete discussion of OR equipment needs. They are essentially the same as those for a C-section room. In addition, some sort of device to achieve left uterine displacement should be available, whether it is a hip wedge or just a rolled-up blanket. A warming cabinet for fluids and blankets is desirable but not mandatory.

Anesthesia Equipment Needs for Labor and Delivery Suite

- Fixed C-section rooms:
  - Anesthesia machine, equipped with accurate vaporizers, oxygen analyzer, fail-safe device, and scavenging device
  - Monitors: Electrocardiogram, invasive pressure monitor, capnograph, pulse oximeter, temperature monitor, and nerve stimulator
  - Ancillary equipment: Laryngoscopes with various blades and short handles, endotracheal tubes and stylets, oral and nasal airways, fluid warmers, rapid infusion device, uterine displacement device, drugs as per any other OR plus those to increase uterine tone, stethoscope, syringes, intravenous catheters, oral/nasal gastric tubes, suction catheters, esophageal stethoscopes, laryngeal mask airways, etc., as per any OR
- Fixed labor rooms: Ambulatory bag and mask, oxygen saturation monitor, noninvasive blood pressure monitoring device, oxygen, and suction
- Emergency:
  - Extra anesthesia machine and monitors
  - Difficult airway cart: Fiberoptic laryngoscope, laryngeal mask airway, variety of airways, viscous and aerosolized local anesthetic, bougie, transtracheal jet ventilator, and cricothyrotomy kit
  - Tracheostomy instruments
  - Malignant hyperthermia kit
  - Latex allergy kit
  - Defibrillator

- Newborn:
  - Oxygen supply
  - Wall suction: Adjustable, with DeLee and bulb suction devices
  - Radiant heater with servomechanism
  - Laryngoscope with size 0 and 1 straight blades
  - Endotracheal tubes, sizes 2.0, 2.5, and 3.0
  - Oral airways, sizes 00 and 0
- Portable, nonemergency:
  - Regional anesthesia cart: Epidural and spinal trays, extra spinal and epidural needles, ephedrine, sterile gloves, and various types of tape
  - Epidural infusion pump
- Narcotics and sedatives: Nurse dispensed versus direct pharmacy distribution versus automated distribution device

Fixed Labor Rooms

At a minimum, labor rooms must have oxygen and suction outlets for both mother and baby, a resuscitation bag and mask, and a sphygmomanometer. Noninvasive automatic blood pressure apparatus and oxygen saturation monitors are not mandatory in each labor room but must be available, especially if labor epidurals will be performed in the room. If the labor room will also function as a recovery room, as in LDR or LDRP units, then provisions must be made for monitoring patients postoperatively. The ASA Guidelines for Regional Anesthesia in Obstetrics state that patients on the labor floor must be monitored after surgery in a manner equivalent to that in the hospital post-anesthesia care unit. In most hospitals, this will mean that postoperative patients need to have electrocardiographic (ECG), blood pressure, and oxygen saturation monitoring. Some fetal heart rate monitors also offer the ability to monitor the mother. Some provide oxygen saturation and noninvasive blood pressure measurements as well as fetal heart rate and tocodynamometry. Others provide a maternal ECG trace as well.

Emergency

If the labor floor is independent of the hospital's main OR suite, provision of an extra anesthesia machine should be considered. The suite should be designed so that the number of ORs is sufficient to conduct the anticipated number of surgical procedures. However, given the episodic and unpredictable nature of obstetrics, the day may come on which the carefully planned facilities are not enough. If an emergent C-section, postpartum hemorrhage, or retained placenta must be dealt with in a labor room, most anesthesiologists would be more comfortable managing the associated anesthetic with an anesthesia machine rather than a self-inflating resuscitation bag and mask. Some hospitals have decided that such overflow procedures should instead be performed in a nonobstetric OR; in such facilities, a well thought-out plan for emergency transport should be made, especially if the main ORs are located a distance from the labor floor.

At a minimum, extra monitors with invasive pressure capabilities should be available and stored so that they are easily accessible. Portable monitors will be necessary for postoperatively recovering patients, transporting patients, and the occasional high-risk patient who needs close monitoring.

An emergency airway cart should be kept and maintained on the labor floor, either in the anesthesia workroom or in the OR. Emergency airway devices, such as transtracheal jet ventilator and the laryngeal mask airway, should be kept in the OR. Instruments for the establishment of a surgical airway should be kept with the other surgical instruments. Kits for the management of malignant hyperthermia and latex allergy should be kept accessible. At least one defibrillator should be kept in the obstetric suite in a central location. The location in the hospital of defibrillators with external pacing capability should be known by anesthesia and nursing staff. Advanced cardiac life support protocols call for external pacing in some of the algorithms.

Newborn

There should be separate oxygen and suction wall outlets for the infant in both the labor rooms and C-section rooms. Suction outlets must be adjustable. For each infant, there should be a radiant heater with servomechanism, a noncompressible resuscitation device, and an examination mattress that allows access on three sides. Infant airway devices, such as a ventilation bag and mask for term and preterm neonates; laryngoscope with sizes 0 and 1 blades; endotracheal tubes, sizes 2.0, 2.5, and 3.0; and oral airways, sizes 00 and 0; must be available. Pediatric suction catheters, meconium suction apparatus, bulb suction devices, warm or at least dry towels, stethoscope, and vascular access catheters are all required. There should also be a wall clock.

Portable, Nonemergency

Portable equipment of interest to the obstetric anesthesiologist consists of epidural carts and epidural infusion pumps. Many busy obstetric anesthesia services use a cart that contains all of the supplies necessary to place an epidural or spinal catheter. Some are quite elaborate, and their design is a matter of preference. It may be advantageous to plan for one such cart for each labor room or a few that are stored in a central location. Each will require stocking and maintenance. Epidural infusions have become a popular form of anesthesia for labor. Syringe pumps are expensive and very portable and may be stolen or misplaced. Some are battery operated and may require recharging after a few hours of use. It may be desirable to have a pump attached to the wall or placed into a cabinet in each labor room. Doing so would prevent the loss of the device and allow it to be kept plugged. Such an arrangement would, however, inhibit the portability of the devices. Depending on the number of labor rooms, one pump for each room may mean a considerable capital outlay for their purchase.

Narcotics

As previously discussed, the method for dispensing medications must be chosen, and narcotics may be problematic, especially in an emergency, because they must be precisely accounted for and kept under lock and key. If the labor floor is too far from the main OR to use its pharmacy,

then a separate pharmacy substation may be necessary. If nurses dispense narcotics, then each time an anesthesiologist needs controlled drugs, he or she must involve a nurse. Depending on the exact mechanism adopted, this can be a major inconvenience and a point of contention regarding responsibility. Automated drug dispensing machines are available, but these may also be less than optimal in an emergency. The anesthesia staff could have control over their own supply of narcotics, although this would mean that the hospital pharmacy would have to monitor two separate groups of users of narcotics in the obstetric suite.

Summary

The aim of this chapter is to raise the questions that should be considered in the design and planning of an obstetric suite. The design of an obstetric suite is an iterative process. There is no unique solution, as many of the details are dependent on the specific needs of the hospital and the service. There are issues related to the anesthetic and obstetric practices, the expected patient volume, and the preexisting facilities. Future directions in health care must also be considered. Shortened lengths of stay, demechanization of parturition, and consumer-driven birth options are just some of the forces shaping obstetric care. Although designing for change is crucial, predicting change is difficult. Flexibility is the only hope.

Resources

1. American Academy of Pediatrics and The American College of Obstetrics and Gynecology. Guidelines for Perinatal Care, Sixth Edition. Elk Grove Village, IL: American Academy of Pediatrics; 2007.

2. The Facilities Guidelines Institute, The American Institute of Architects Academy of Architecture for Health. Guidelines for Design and Construction of Health Care Facilities. Washington, DC: AIA Press; 2006.

3. Perspectives in Perinatal and Pediatric Design. Columbus, OH: Ross Planning Associates; 1988.

4. Williams JK, Mervis MR. Use of the labor-delivery-recovery room in an urban tertiary care hospital. Am J Obstet Gynecol. 1990; 162(1):23-24.