CHAPTER 15
FREE-STANDING AND OUTPATIENT SURGERY FACILITIES
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Checklist

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The Team

Although the surgical procedures and personnel for both hospital-based ambulatory surgery units (ASUs) and free-standing ambulatory surgery centers (ASCs) are often identical, the design process is typically very different. Early in the process, the team responsible for design and construction likely already exists within the existing institutional structure. Free-standing facilities must organize a team consisting of operational consultants, a health care attorney with specific knowledge of the legal and political structure for the state and region, an architect with past experience in designing ambulatory surgery units, a general contractor with positive references for on-time and on-budget successes in previous ASC structures, and an equipment planner for procurement and installation of fixed, mobile, capital, and disposable equipment. It is critical that all members of this team have knowledge and experience of federal, state, and county codes along with association and societal guidelines. In particular, the team should be very familiar with requirements of both the American Association for Accreditation of Ambulatory Surgery Facilities (AAAASF) and Accreditation Association for Ambulatory Health Care (AAAHC), the regulatory agencies that will provide accreditation. In addition, the building process is eased if this team has previously worked together and has worked in that geographic area so that they have positive working relationships with each other and local and state regulators.
Land Acquisition

The location of an ambulatory unit must be considered prior to construction and development, whether it is being built as an addition to an existing structure or a free-standing unit. The proximity of a free-standing surgery center to the supporting hospital is of upmost importance. In the case of a medical emergency, the patient should be able to be rapidly transported to the acute care part of the facility or a separate hospital by emergency medical services.

An environmental study of the land should be considered to ensure no contamination of the soil exists prior to building. Knowledge of water runoff and flooding should also be determined. In addition, the team will likely want to consider if the land is located in an area of population growth and if there are other similar facilities in close proximity. It is important to determine the patient market and whether these patients will travel to the proposed site. The area should be large enough to allow for parking adjacent to the facility, with at least some covered area for pick up and drop off of patients. In urban areas, the availability of convenient public transportation may be equally important. The owners of the ASU will want to consider if the land is available for purchase or lease.

Design

The National Association of Architects can provide a list of architects who have had experience with the design of ORs (ORs) and free-standing facilities. It is recommended to review the architect’s previous work to ensure that the needs for your facility can be met. In addition, the architect, through a contractual agreement, should ensure that the facility’s standards meet all state and federal regulations, Medicare and Medicaid regulations, and the accrediting body’s regulations. It is important that the final product be a state-of-the-art facility and comfortable to the patients that are treated at the facility. In addition, the construction should be attractive to the surgeons to aid in recruitment. Consideration should also be made for overbuilding to leave room for future expansion. The ultimate design goal is for a safe facility with high patient satisfaction and maximum efficiency.

Before facility design begins for either type of ASU, the potential types of surgery that will be performed must be clearly identified. Surgeons, anesthesiologists, OR nurses, and technologists with specific knowledge of these procedures are consulted in order to develop a room-by-room list of fixed and mobile equipment. This process is particularly important as rooms will be used for multiple purposes and multiple types of surgery. For example, storage and ready access to portable x-ray equipment may be necessary for a morning case followed by availability of an operating microscope in the afternoon. Complex electronics and optics do not tolerate extensive movement, so defining storage areas in proximity to ORs with ample space for supporting disposables is important to preserve equipment longevity.
Strategic supply specialists are helpful to direct positions of gas lines, water pipes, and electricity in consideration that the position of the OR table and anesthesia equipment may be moved to facilitate certain surgical procedures. Ultimately, the design should facilitate OR efficiency by allowing for multiplicity of use and ease of conversion of rooms. The ability to improve throughput of patients (from admission to discharge) should also be incorporated into the initial phases of design.

Finally, the entire design team should consider management of potential hazards to staff and patients, including noise, infection control, and standing water (and drainage). In addition, a philosophy for promoting environmental sustainability should be discussed early in the process along with an assessment of the impact of the facility on the existing community. The US Green Building Council has developed Leadership in Energy and Environmental Design Certification, which defines the “nationally accepted benchmark for the design, construction, and operation of green buildings.” In addition, the Green Guide for Healthcare provides specific guidelines promoting their three core values (economic, environmental, and social). More information on health care facilities and environmental sustainability is available in Chapter 4.

The operational consultant should be involved in the design process to ensure that completed facilities will meet standards for accreditation, as retrofitting is always more problematic and expensive. The three organizations that accredit ambulatory centers are the AAAASF, the AAAHC, and the Joint Commission (formerly JCAHO).

**Administration and Organization**

It is required in 43 states that free-standing ambulatory centers are licensed by that state. The licensee should have the overall authority for organizing the unit. This person must designate an administrator, medical director, and director of nursing of this ambulatory unit.

The administrator should verify that the unit is in compliance with all applicable federal, state, and local laws. The administrator should develop facility policies and annually evaluate their implementation. This person should also maintain staffing to meet the needs of the patients served.

The medical director’s responsibilities include responsibility for all operations and anesthetics delivered at the unit. This physician should maintain a quality improvement mechanism to identify problems at the institution and various ways of managing these issues. The director will coordinate and evaluate all procedures done at the facility. The physician will determine the type and amount of equipment needed at the facility to deliver the optimum care to the patients.

The director of nursing will maintain qualified health care givers that are under the supervision of nursing. This director will update nursing care policies and ensure documentation during perioperative care. The nursing director will ensure patient care policies during admission and discharge are followed.
Certification of an ambulatory unit by Centers for Medicare and Medicaid Services (CMS) is essential for any facility that wants to be reimbursed by Medicare and Medicaid for patient services. Accreditation of the facility is recommended to verify that the center meets the specific criteria that are indicative of high quality care.

Construction

Operating Rooms
The number and size of the ORs in the unit must be determined first. Each OR should have a substerile room adjacent for entry and scrub sinks in the immediate area. There should be one scrub sink per two ORs. In the OR, there should be sufficient space for sterile supplies and equipment as well as an anesthesia machine (if desired) and anesthesia supplies. In general, approximately 3000 sq ft of surgery center space is needed for each OR, with each OR providing 1000-1500 cases per year. In addition, three preoperative and three postoperative bays per OR should be included in the design for maximum efficiency. The OR size should range from 14 × 16 to 14 × 20 sq ft. Remaining open floor space is the most important factor after considering all equipment, plumbing, air conditioning, cabinets, etc. Selection of floor and wall coverings may impact costs of maintenance and cleaning. Iodine-based prepping solutions and various dyes may stain certain floors. Tile walls will facilitate terminal cleaning of ORs.

Preoperative Holding Areas
Two or three preoperative holding areas per OR are generally needed to keep adequate processing and flow of patients into the OR. There should be a planned restroom for the patients in this area for voiding prior to OR. There should be lockers available for the patients to secure their clothes and personal possessions.

Recovery Rooms
Two or three recovery room beds per OR are needed to achieve optimum efficiency of the facility. This area must be staffed by nursing for postoperative monitoring. It is acceptable to use the preoperative admitting rooms for second-phase recovery. Handwashing stations in the recovery room are essential. Support areas in the postanesthesia care unit for medication preparation, supply storage, soiled linen, and equipment storage must also be considered. Storage space, along with suction and oxygen, should also be available at each bay. Typically, all medications for the facility (particularly controlled substances) are kept in one area located within the recovery room as this area is readily available to staff and under continual observation. Individual lighting for each bay allows for optimal patient comfort. Some access to natural light while providing privacy (such as clerestory windows) also promotes a sense of wellbeing for patients and staff. In addition, recovery areas must have a designated “kitchen” area to provide oral intake for patients after surgery. Specific requirements for food preparation vary from state to state, so these laws should also be considered when designing the recovery area.
Operating Room Equipment Storage
An OR equipment storage area must be planned to store supplies and OR equipment (e.g., mayo stands, kick buckets, etc.). Obtaining the footprint for large storage items (e.g., cribs, mobile x-ray equipment, video towers, wheelchairs, lasers, microscopes, etc.) prior to design will help ensure that storage areas are sufficiently large for anticipated current use and potential expansion. Moving electronic equipment may cause expensive damage, so locating storage areas in close proximity to ORs both for efficiency and to minimize breakage is advised.

Additional Areas
Control center. It is advised to designate a central location in the OR suite where all activities in the ORs are monitored. The area must be situated to allow visualization of all pedestrian traffic entering the restricted area.

Soiled utility room. An area is required for dirty supplies and linens as well as providing a space for waste receptacles.

Sterilization center. There should be a separate area for cleaning and decontaminating instruments for sterilization. Space should be allotted for sterilizing equipment needed for the procedures.

Laboratory. It is desirable to have a small area located near the preoperative area for laboratory testing (e.g., blood glucose or pregnancy testing) that might need to be performed on the morning of surgery. In general, tests that do not require separate inspection and accreditation by the state should be selected. This list varies from state to state.

Anesthesia workroom. The workroom provides an area where all excess anesthesia supplies are stored. Extra monitoring equipment should be stored in case of breakage so that a patient’s heart rate, blood pressure, cardiogram, and oxygen saturation can always be monitored in the perioperative period.

Locker rooms. Areas for staff to change into scrubs must be available, with a bathroom and break or lunch room attached. This area should have direct contact to the surgical suite.

Bathrooms. The bathrooms should be located near the OR and recovery room. Handicap access to the restrooms is essential. An emergency call bell should be placed in each patient toilet.

Waiting rooms. There should be sufficient space planned for family waiting. This area should have an information counter and a restroom in the vicinity. A public telephone and accessibility to drinking water should be considered.

Office space. There should be adequate space for the business office, medical director’s office, and consultation room. There should also be an area for medical record storage.
Communications. Communication systems must be included in the design process. These include telephone and fax systems, emergency lights, call lights, paging systems, networking (both internal and Internet), and systems for electronic information management and billing.

Sterilization and Space Heating

Sterilization requires 60 psi of steam. Sterilizers may be purchased with self-contained electric heat or separate electric steam generators if an onsite boiler is not available. Most offsite ambulatory centers do not have an onsite steam boiler system since it requires maintenance staff, space, and steam-to-hot water converters. There are small, 60-psi natural gas boilers that are available for sterilization. The essential electrical system must serve the flash sterilizers. Space heating in most small offsite ambulatory centers is provided by hot water heating systems or electric duct reheating systems since little space and maintenance personnel are required for these systems. The essential electrical system must supply the HVAC space heating in the ORs.

HVAC and Humidification

The HVAC heating and supply, return, and exhaust ventilation in the OR is supplied by the essential electrical system. The HVAC system chosen for a facility requires special attention to space requirements, maintenance, installation costs, and temperature control. The HVAC controller involves locating a thermostat, a humidistat, and a recorder in the OR. Alternatively, the recorder may be located in a remote location outside of the OR. There should be, at a minimum, two exhaust air grills. If there are more than two exhaust grills, they should be centered on the walls of the OR. If there are only two exhaust grills, they should be located opposite each other. Humidifiers are required in the ORs and can be powered by any fuel source.

Medical Gas and Vacuum Systems

The National Fire Protection Association (NFPA) has set guidelines for electrical systems as well as medical gas and vacuum systems in the health care center. Their recommendations are the basis for a number of joint commission and CMS standards and regulations. Ambulatory ORs require level one or level two piped gas and vacuum systems. A level one system is one in which interruption of the piped gases and vacuum system would result in imminent danger of morbidity and mortality to the patient. A level two system is one in which interruption of the piped gases and vacuum systems would place patients at a manageable risk of morbidity and mortality. A level three system is one in which the interruption of the gas and vacuum supply would have no detrimental effects on the patient. Most free-standing centers would be either level one or two since the administration of general anesthesia frequently occurs. In addition, the use of supplemental oxygen usually accompanies regional anesthesia and monitored anesthesia care.
Level one systems have multiple pumps to ensure continued flow of the medical gases and vacuum systems. Another difference between the three systems is the alarm features, which are more sensitive in the level one system.

There is no code or requirement for the number of medical gas and vacuum outlets per OR. Guidelines have been set by the American Institute of Architects for the total number of outlets for medical gases and vacuum systems. The Joint Commission has made recommendations as well. General recommendations include one oxygen and one vacuum station for minor surgery ORs, two oxygen and two vacuum stations for intermediate surgery ORs, and two oxygen and three vacuum stations for major surgery OR stations. Each station must have an adequate flow rate for proper delivery to the patient and adequate functioning of connected equipment. The free-air allowance CFM (l ft3/min) at 1 atmosphere for “major A” OR (e.g., transplant and open heart) is 3.5 (100) per room, “major B” OR (all other major cases) is 2.0 (60) per room, and minor cases is 1.0 (30) per room. All medical piped gases must be identified by a color coding system. Color coding for piped medical gases in the United States is as follows: oxygen (green), nitrous oxide (blue), nitrogen (black), air (yellow), and vacuum (white).

Medical gas and vacuum piping can be delivered through surgical ceiling columns. They can be either rigid in design or retractable. When designing the facility, the ceiling columns should be placed at opposite ends of the OR table to provide easy access for the anesthesiologist. Extra electric outlets as well as grounding receptacles can be placed on these columns for convenience. Medical booms that descend from the ceiling typically include hoses for medical gases and suction as well as electrical outlets. The placement of these booms may critically impact patient throughput as well as safety for staff and patients. The anesthesia machine is routinely placed behind and slightly to the right of the OR bed, so the gas outlet and circuit is to the right of the anesthesiologist. Therefore, the boom should be located to the right and behind the anesthesia machine and the door to the OR to the left. With this configuration, neither the patient nor the staff need to walk through or around the boom to access the OR table or equipment.

The total oxygen needs and consumption for the facility must be calculated. One must consider the procedures done at the facility, number of oxygen stations, and the number of procedures to be performed monthly. In the acute care setting, consider oxygen utilization to be 1000 ft3 (28 m3)/bed/month. Any facility requiring more than 35,000 ft3/month must have a bulk storage system of oxygen. Those requiring less than 35,000 ft3/month can use a cylinder manifold system for oxygen supply. The common source for nitrous oxide is the cylinder manifold system. Nitrous oxide should not be stored in a cold environment, as the lack of heat for vaporization will occur, and it will be unable to maintain the line pressure. Medical compressed air can be delivered to the facility via a cylinder manifold or a medical air compressor system.
Essential Electrical Systems

The NFPA defines the need for a Type 1 essential electrical system as a facility with critical care areas or electrical life support systems. Any Type 1 essential electrical system must have emergency electrical power. The NFPA requires a minimum of three automatic transfer switches for any facility with an essential electrical load of more than 150 kVA. If the load on the essential electrical system is less than 150 kVA, the NFPA only requires one automatic transfer switch. Thus, a facility must project their kVA usage to determine the number of automatic transfer switches needed. The most common system of emergency power has been the engine-generator configuration. Whatever method of emergency power is used, the need for a supply of 60-HZ (AC) power to the essential electrical system must be established within 10 seconds of power failure. Battery-operated OR lights are required to prevent danger to a patient during the potential 10 seconds of darkness. For ambulatory units that do not have electric life support systems or critical care areas, the NFPA defines the need for a Type 3 essential electrical system. A Type 3 system would require power for life safety and the termination of the current procedures. Life safety is battery power for lights, fire alarm systems, and emergency exits. The NFPA requires that the life safety power remain for 1.5 hours after interruption of normal power.

Ground Fault Interrupters

Isolated power systems are essential in ORs that are considered wet areas, where the interruption of power is not acceptable to patient safety. Even routine procedures in the ambulatory setting have saline, urine, and a number of other fluids in the OR suite. These wet-procedure locations have the potential to have electrical equipment come in contact with the fluids and result in electrical shock.

Ground fault interrupters are used to prevent people from an electric shock in wet-procedure locations. The problem with ground fault interrupters is that once a fault current is detected, power to all downstream equipment is disrupted. This is of particular concern when that equipment is a ventilator or other type of patient life support. Isolated power systems contain the ground fault interrupter while maintaining the downstream power needed in critical care areas. A line isolation monitor will alarm at the first signs of a potential fault current and allow the problem to be addressed.

Equipment

Instruments and pieces of equipment for ambulatory ORs may number in the thousands and may require purchases from hundreds of manufacturers. Many capital purchases, including defining specifications, manufacturer, shipping, installation, biomedical certification, and training of personnel in use, require lead times of several months. Furthermore, equipment specifications should be given to architects, engineers, and contractors prior to beginning the design process so that appropriate electrical, plumbing, space needs, and building code requirements are addressed.
Whether free standing or attached, the initial phase of equipment procurement should be
determination of types of procedures, surgical specialties, and anticipated volume. Staff (i.e.,
surgeons, anesthesiologists, and nurses) should be queried as to preferences and minimum
quality required to meet standards. Cost and availability should also be considered. For ASUs
attached to larger facilities, a survey of existing equipment will help determine how much
additional equipment must be purchased.¹

**Emergency Equipment**

All facilities must meet the standards set by the NFPA in regards to fire safety. Fire
extinguishers and fire alarms should be placed in all facilities, and documented fire drills should
be performed. All ambulatory surgery facilities should be prepared for the management of life-
saving emergencies. All monitoring equipment, such as blood pressure, cardiac monitor,
thermometer, and pulse oximeter, should be present. A stethoscope, Ambu bag, oxygen, oral
airways, laryngoscope, and various sizes of endotracheal tubes should always be present.
Intravenous (IV) fluid and IV catheters should also be on hand. A defibrillator and crash cart
with all emergency drugs, including dantrolene, should be prepared and routinely checked for
expiration dates. All staff should be trained in advanced cardiac life support and pediatric
advanced life support if the facility treats children. The proximity of the facility should be within
minutes of a hospital that can accept any transfers.

**Amenities**

The single biggest draw for ASC/ASU facilities is the convenience and ease for patients and the
convenience and efficiency for surgeons. To this end, adding certain amenities to the facility as
part of the design process will contribute to the overall satisfaction of both patients and staff
and ultimately optimize center efficiency. Some of these issues are:

- A private, pleasant registration area that accommodates the patient and family with
  appropriate soundproofing to meet Health Insurance Portability and Accountability Act
  compliance
- Generalized soundproofing in patient and staff areas to decrease noise pollution
- Natural daylight in patient and staff areas to promote wellbeing, mood, and faster
  recovery
- Parking areas that are flat (i.e., no curbs), well lighted, and at least partially covered for
  patient pickup
- Hand washing stations that are readily visible to patients and conveniently located for
  staff
- A separate anesthesia office space that allows for storage of references and resources
  as well as some privacy for conferring with staff or colleague
Reference

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