CHAPTER 14

POSTANESTHESIA CARE UNITS

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Checklist

- Location with respect to the operating room (OR)?
- Number of postanesthesia care unit (PACU) beds required?
- Patient, family, and staff traffic patterns?
- Equipment needed at each bedside?

Attention has been increasingly focused on the PACUs since the 1990s, in part because of the dramatic improvement in patient safety in the OR. In the past, when unrecognized esophageal intubations and ventilator disconnects were more common than they are today, most of the problems that occurred in the PACU seemed small by comparison (with the exception of inadequate ventilation caused by residual muscle relaxant medication). Now that major intraoperative catastrophes directly attributable to anesthesia care are extraordinarily rare, events in the immediate postanesthesia period receive more attention than they have in the past. Accordingly, attention to the basic issues involving the PACU raised here, as well as the warnings about common PACU critical incidents (i.e., developments in a patient's course that, if not treated, will result in patient injury) is warranted.

Status of the PACU

The first dedicated recovery room for postsurgical patients was opened in 1942 at the Mayo Clinic. Previously, patients were simply taken directly from the OR to the regular hospital room from which they came. Today, a PACU associated with an OR is considered standard in US facilities where surgery involving general or regional anesthesia is performed. Interestingly, as recently as the mid-1980s, the lack of a standard PACU-type facility was reported to be associated with an increased incidence of anesthesia-related complications in France.1 These data were used as a strong justification for the French surgery/anesthesia community to work toward the universal availability of such units. Today, in other "first-world" countries, there are still a few examples of facilities lacking PACU-type units. However, the real issue is the so-called second- and third-world countries where surgery and anesthesia do not yet consistently meet the most basic standards. This is compounded by the lack of PACU facilities matching the level of sophistication of their associated OR suites.

Purpose of the PACU

In contrast to the older practice of returning patients directly from the operating table to their ward beds, the PACU allows centralization of care by a group of specially trained nurses who are expert in interpreting and responding to the events of the brief but intense period immediately following a procedure requiring anesthesia. The PACU has highly specialized facilities and essentially functions as an intensive care unit (ICU). This is appropriate since all

patients who enter a PACU face some type of threat or danger to their lives. Furthermore, the immediate proximity of the PACU to the OR is critical because it provides instant access to essential resources, including supplies and equipment, but even more importantly, the surgical and anesthesia personnel who recently cared for the patient. This immediate availability allows timely intervention and treatment of any significant problems during the immediate postsurgical period. Finally, the nursing care required by immediate postsurgical patients has become increasingly specialized and is now a recognized subspecialty of nursing. Availability of this specialized nursing expertise is one of the main reasons that PACUs exist.

PACU Location

Ideally, the PACU should be directly contiguous to the OR area from which the greatest number of patients come. While this is certainly preferable, it may not always be possible due to constraints of preexisting architecture or construction imperatives in a new facility. Then the question arises: How far away is too far? There are no published standards on this, leaving the issue to the so-called “rule of reason.” One key point is to avoid elevator trips as a routine part of a transfer from the OR to the PACU if at all possible. Elevator transport simply introduces both a delay and a potential for great vulnerability if the patient were to experience an untoward development while in the elevator. Assuming that the PACU is relatively nearby and on the same floor as the OR, the ease of negotiating the hallways (e.g., straight path versus multiple turns) is just as important as the actual distance. The time it would take to travel from the most distant OR to the PACU door while pushing a stretcher and several intravenous (IV) poles with infusion pumps should be estimated through actual time trials before construction plans are finalized. The responsible anesthesiologists should determine if this time is reasonable, or alternatively, should strongly lobby for a closer PACU location.

Independent of its location, it is very important that the orientation of the PACU facilitate the flow of patients. There should be a direct entrance to the PACU from an OR corridor and a separate exit, preferably to a main hospital corridor. This places the PACU between the OR and the ultimate destination of the routine patient, whether that is a hospital bed or a Stage II recovery area for outpatients. Constructing the PACU so that the same door is used for both entrance and exit will inevitably lead to traffic jams and potentially dangerous situations. For example, a patient leaving the PACU may prevent the rapid entrance of a new patient who is having a problem (e.g., airway obstruction) during transport. Both the entrance and exit doors must be extra wide to guarantee the smooth and safe passage of the widest equipment. A full-sized hospital bed with an intra-aortic balloon pump console and people pushing IV poles on both sides should serve as the standard. It is remarkable to witness the irritation and expense associated with knocking out parts of walls to replace doors that were installed with only a standard-sized hospital stretcher in mind. Automatic opening of the doors operated by a push button on the wall or by motion sensors is a modern convenience added in newer facilities.

Number of PACU Bed Slots

The appropriate number of PACU bed slots will vary with the surgical case mix, the length of the cases (e.g., will first cases likely be discharged from the PACU before second cases are finished?) and the usual turnover time of both the OR and PACU beds. A high turnover of outpatients or a significant number of long-stay ICU patients will create a need for more PACU bed slots. In the past, the suggested guideline was that the number of PACU bed slots should equal the number of rooms in the OR suite. This idea has been replaced by a newer algorithm that recommends there should be one and a half to two PACU slots for each room in the OR suite. The factors described above and any other unusual issues for that particular PACU could impact such calculations. The important point is to involve all relevant personnel and departments (including support services, such as respiratory therapy and housekeeping) very early in the decision-making process. Their input can impact the decision as to how many bed slots to build.

PACU Floor Plan

Obviously, the realities of either the existing building or the construction-related imperatives in a new facility must be accommodated in determining the PACU design. However, when possible, it is critical to maximize effectiveness of care in a thoughtfully planned PACU. For example, a traditional design is a square floor plan with one wall accommodating the nurses' desk and support areas (e.g., medication carts or cabinets, seating area for order writing or dictation, equipment and supply storage, linen carts, etc.) and the other three walls having patient bed slots. This design offers direct sight lines to the patients and the shortest distance between points in the PACU. An open-ward design facilitates simultaneous observation of all patients. While traditional, in part because of the utilities coming from the wall by the patient's head, there is no requirement that all patient bed slots be lined up along a wall. Many alternative innovative designs are possible. One involves "pods" of four beds at 90° angles located in the middle of a large space. Utilities drop from the ceiling or come up into a tower-like structure (a "utility tree") at the center of the four patients' heads. The rationale is that one or two nurses can stand in or near the small area defined by the heads of the four patients and have immediate access to deliver care with little time or energy lost walking from bed to bed up and down a traditional row of stretchers along a wall. Supplies that normally are stored on shelves or in baskets on the head wall in the traditional design are usually placed on rolling carts in the "pod" configuration, and sometimes the carts are exchanged after each patient discharge so that the turnover of a bed space can be accomplished in as short a time as possible.

As a routine guideline, it is wise to budget a total of about 150-200 sq ft for each patient slot (this includes the bed space, open space, nurses' station, etc.). This total does not include allocation of central storage space for equipment and supplies, which will significantly vary based on the type of patients served.

Dividing a PACU into subsections for administrative and clinical purposes and including these subsections in the floor plan is certainly reasonable and should be considered at the earliest possible planning stages. Lines of sight are critical. Corners that block the line of sight of someone working at the desk or attending another patient invite untoward clinical events or demand increased nursing staff.

The design of the PACU must accommodate certain necessities. If an anesthesia machine is to be kept in the PACU for emergencies (at one time, a relatively common practice), it needs an out-of-the-way storage area where it is unlikely to attract attention to its supply of nitrous oxide. Permanent and prominent places for emergency carts (resuscitation, airway, and surgical, if indicated for that patient population) need to be incorporated into the original design. Significant storage space is necessary and must be included in the plans; the amount truly required is usually significantly greater than what is generally allocated by architects and hospital designers. Failure to allow sufficient storage at the outset will result in a cluttered and eventually dysfunctional PACU in the long run.

At least one enclosed patient space is desirable for patients needing isolation for infection control. The issue of patient isolation is one that will always be debated. Ideally, there should be at least one isolation or “side” room that has a wide door connecting with the PACU main area and another door in a “border wall” opening out to a hospital corridor. This will allow patients with resistant infections, for example, to receive PACU care but also remain segregated from the other PACU patients. Likewise, severely immunocompromised patients should be separated from the general PACU population for their own protection. Thus, the isolation room could serve two important functions. If it is likely that both purposes will be served in one room, it can be constructed (at some additional expense) with an air-handling system that can be changed literally with the push of a button from the usual negative pressure flow of an isolation room (protect the other patients) to a positive pressure flow (protect the patient in the room from outside infectious threats).

PACU Traffic

The PACU should be constructed so that patients directly enter from the OR and then exit from the other end into a corridor on the way to their next destination. All of the patient portals should be standard “automatic” double doors that are activated by push buttons on the wall, pressure-sensitive floor mats, or “electric eyes” above the door. Very important and often overlooked is the need for enough open space and wide aisles to allow movement of stretchers and beds without disruption of care to the other patients in bed slots. Optimally, there should be enough room around to each bed slot for a regular hospital bed with a full set of suspension traction to make a 360° turn.

Another often overlooked issue is the desirability of having a separate "pedestrian entrance" distinct from the doors used for patient entrance and exit. This facilitates movement of staff and visitors and minimizes traffic jams and "whooshing" of the large automatic doors that could be distracting as well as conducive to the introduction of contaminated air from other parts of the facility. Associated with this is the need to consider whether patients' family members will be visiting them in the PACU; this is now very common with children and increasingly so with adult patients. If this will be the case, then the design should allow foot traffic in and out of each bed space with minimal exposure to patients in other spaces.

PACU Bed Spaces

All of the bed slots should be identical. This facilitates the delivery of care, especially in difficult or emergency circumstances, since equipment, supplies, and functions will always be in the same place. Patient privacy is an important concern. The Joint Commission on Accreditation of Healthcare Organizations has increasingly emphasized this point in recent years. It is possible to place hard partitions between bed spaces in a PACU, but its practicality has been questioned. Ceiling-to-floor privacy curtains (with mesh netting above eye level to facilitate hearing and verbal communication from behind a closed curtain) are more practical. There should be at least 100-120 sq ft of floor space to the actual bed slot itself. This means the nurses should be able to work around all four sides of a full-sized hospital bed with at least 3 ft of clearance. On the head wall, or possibly on a rolling cart, there should be at least 12 sq ft of shelf space for supplies and equipment, and there should be writing surfaces nearby (many PACUs use the rolling tray tables found in most hospitals). While IV poles are acceptable, ceiling-track–mounted IV poles are extremely versatile and convenient. Finally, each bed slot needs a pull-chain emergency nurse call buzzer. This can be given to a patient when his or her nurse must step away from the side of the stretcher for a moment, or it can be used by the PACU personnel to call attention in an emergency without yelling and alarming other patients in the room.

General Features of the PACU

A number of important, seemingly self-evident points can easily be overlooked. Two fire exits at opposite ends of the room are recommended, and, naturally, compliance with all applicable fire and building codes is mandatory. There should be a nonslip tile floor in one neutral color (patterns make finding dropped objects, such as a needle, difficult). Light, neutral, "warm" colors are best for the walls. There should be multiple clocks (all synchronized to the same time) readily visible from all locations in the room. A handwashing sink for each six or so bed slots is strongly recommended. A medication room or area (whether for a cabinet or carts) will be required.

The Joint Commission requires that clean and dirty storage be separated. Therefore, two separate utility rooms with storage areas should be incorporated into the plan. A very large blanket warmer should be available in the clean area. The dirty utility area should be on a border wall if at all possible, with a separate door to an outside corridor, allowing trash, contaminated waste, and dirty linen to be removed without carrying it past patients in the PACU. Also, the dirty area needs three separate sinks for regular use, instrument washing, and flushing.

Staff support space is important. There needs to be adequate space for staff possessions. The number of staff lavatories will be determined by the size of the staff, but these need to be separate from any patient facilities. A break area for staff in the PACU is a necessity and will be especially valuable if patients can be observed and alarms heard while staff members are on break. There must be adequate desk space for physicians and support staff, such as secretaries, to write notes or dictate. Also, if there is a computerized information system, then an adequate number of terminals must be allotted for physicians and nursing staff. Office space for the head nurse is another highly desirable addition that will facilitate both function and communication.

Staff

The PACU is a division of the anesthesiology department, and there is always an anesthesiologist assigned to be responsible for final medical decisions in the PACU. Usually, however, a charge nurse, who also acts as a backup care nurse when the PACU gets busy, supervises the minute-to-minute operation. In at least one hospital with a large PACU, an advanced practice nurse with advanced cardiac life-support expertise has been specifically trained to direct the PACU, under the supervision of the anesthesiology department.2 Each patient's postoperative care remains under the direction of the operating anesthesiologist, who makes decisions related to the patient's vital functions (i.e., respiration, circulation, fluid, and metabolic balance) and analgesia. The operating surgeon is responsible for decisions about the results of the operation.

PACU Nurses

Skilled nurses provide the direct postoperative patient care in a PACU. PACU nurses should be trained in airway management, basic life support, and the special needs of postoperative patients emerging from anesthesia. They should also be adept at caring for acute surgical wounds and a variety of drainage catheters. For each PACU, a health care professional trained in advanced cardiac life support should always be available.

Patients are more likely to have medical difficulties as they begin to emerge from anesthesia than later in their recovery; therefore, for the initial 15 minutes in the PACU, it is necessary to have one nurse caring exclusively for that patient. After about 15 minutes, patients who are conscious and stable can usually be monitored by a nurse who is simultaneously watching one or even two other similar patients.

Patients who are stable, conscious, and uncomplicated and who have been in the PACU for more than 30 minutes can be watched even less closely. On the other hand, patients who are unstable or who have airway complications (e.g., artificial airways or mechanical ventilation) require constant close monitoring, no matter how long they have been in the PACU.3 PACU nurses estimate that it takes at least 60 minutes to admit a patient, manage the patient's recovery, get the patient ready for discharge from the PACU, and complete all the paperwork.

Special Considerations for Pediatric PACUs

Anesthesiologists and Physician Staff

In order to apply specific expertise in the provision of pediatric anesthesia services, an anesthesiologist or other physician trained and experienced in pediatric perioperative care, including the management of postoperative complications and the provision of pediatric cardiopulmonary resuscitation, may be made immediately available to evaluate and treat any child in distress. Pediatric advanced life support or advanced pediatric life support certification is recommended.

Pediatric Anesthesia Equipment and Drugs

In order to provide immediate availability of specialized pediatric equipment and drugs, these supplies should be stored and available in the PACU. Every child admitted to the PACU should have his or her vital signs monitored. Suction equipment and oxygen should be available at each bedside. A respiratory oxygen delivery system should be available for use in the transport of infants and children from the OR to the PACU and/or ICU.

PACU Lighting

It is desirable to have some daylight visible to patients in the PACU. Beyond that, the standard bright fluorescent lights will be used in ceiling fixtures in the general common areas. Each bed space needs three levels of lighting that can be individually controlled within the bed space. There needs to be a low-level nightlight for observation of a sleeping patient when the unit is otherwise quiet, particularly for "overnighters." There must be a standard fluorescent fixture centered in the ceiling. Also, each bed space needs at least one "procedure light" or bright spotlight in the ceiling over the bed space in the event of a development requiring maximum light for diagnosis or treatment. In addition, the PACU should have at least one portable light that can be moved to any bed slot to facilitate procedures.

PACU Environment

The average temperature in a PACU should be about 75°F. While cooler temperatures might be favored by some of the staff, patients would then have difficulty recovering from the OR-induced hypothermia that is so common. The relative humidity should be maintained at 40%-60%. In general, it is recommended that the heating, ventilation, and air conditioning system of the PACU be set so that there is a slight positive air pressure in the room, discouraging outside bacteria from entering the room and potentially infecting PACU patients. There should be a minimum of six air changes per hour, two of which are fresh outside air.

In addition to verification of this air-handling system by heating, ventilation, and air conditioning system engineers, there should be testing for compliance with all OR standards on waste and trace gases.

Electrical Power
There should be at least six to eight regular outlets on the head wall or on the utility center (hanging or ascending) for each bed space. At least two (preferably all) of the outlets should be connected to an emergency power system that has a kick-in time of less than 10 seconds following a power failure. These outlets should be clearly marked with red face plates. Ventilators and infusion pumps for vasoactive drugs should always be plugged into emergency outlets. If the OR has electric plugs and outlets of a different design (e.g., "Hubble" no-spark electric plugs), then each bed space needs one or two of these so that OR electrical equipment can function in the PACU. Lastly, there should be several 240-volt plugs to allow the use of portable x-ray machines.

Medical Gases
Extensive regulations for all medical gas installations must be observed for any medical gas system and outlet installations (see Resources). For the PACU, there should be at least two and preferably three oxygen outlets (one having a flow meter installed at all times) on the head wall or utility tree for each bed slot. Most importantly, there should be three to five suction outlets at the head of each bed slot. One should have a tracheal suction regulator and bottle installed at all times, and another should have a gastrointestinal suction regulator and bottle, likewise at all times. The other outlets are for chest tubes, drains, and emergencies (airway or surgical). Finally, there should be one compressed air outlet at each bed space to allow the use of a blender for certain respiratory therapy procedures or a ventilator.

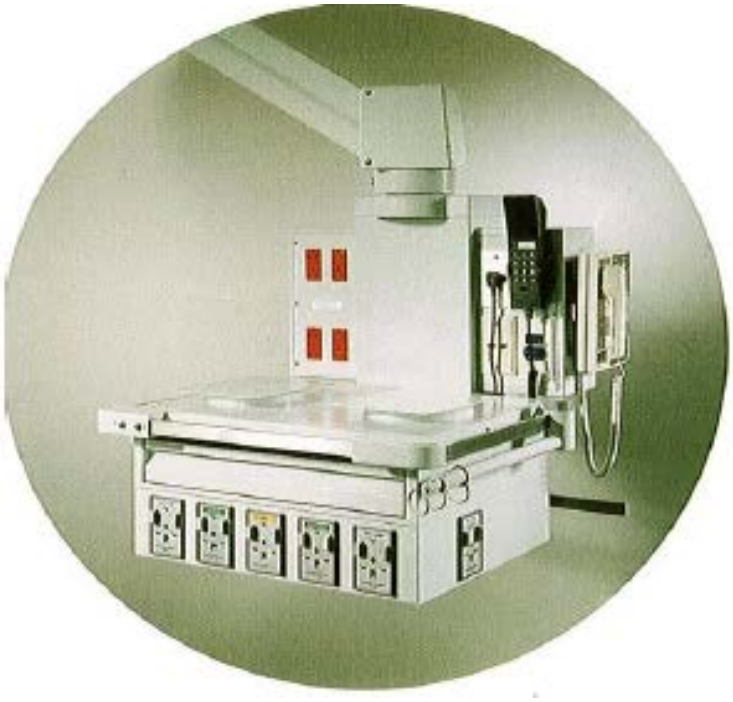
PACU Communications

A common problem of many PACUs is an inadequate number of telephones. The best suggestion is to seek advice from a consultant as to how many telephones would be appropriate and then install double that number. Cordless telephones can be quite useful, since they allow the nurse to talk on the telephone without leaving the bedside. Obviously, the main telephone at the unit secretary or coordinator's desk needs to be as free as possible for incoming calls. It is advisable to have a telephone number that is different from the main number and used only by OR circulating nurses (and posted on the wall in each OR as its only listing) to call the PACU to advise of impending patient transfers from the OR to the PACU. A potential redundancy for this function arises when the utility of an intercom system is considered. Some PACU staff find that, no matter how good the intentions, the regular facility telephone system is not reliable enough for necessary incoming information and, more importantly, outgoing calls for help. Therefore, a dedicated intercom system exclusive to the surgical suite area is a viable alternative.

Terminals should be placed in each OR, at the OR front desk and any inside central scheduling location, in the anesthesiology departmental office and break room, and in the PACU. This will allow instant two-way voice communication that will not be “busy” and also a broadcast capability to send out a general call for help in the event of a severe untoward patient development. This may or may not tie into the overhead paging system that is found in most OR suites. If the PACU is large enough, it may need its own paging system with loudspeakers in the ceiling that can be used to call the attention of staff working at some distance from the central desk.

Increasingly, there has been a proliferation of wireless networks in the hospital, and this has started to change the way people have interacted with each other. There are devices now on the market that allow instant two-way voice communication utilizing the wireless network, voice recognition, and wearable equipment. This may allow the nurse to continue to take care of the patient at the bedside without a cordless phone. It may allow PACU personal to find and communicate with each other instantly, or during an emergency/disaster situation, mobilize the necessary personnel no matter where they are in the hospital.

Finally, even with elaborate and sophisticated communication systems, it seems wise to still recommend that there be yet another dedicated alarm system that would summon help in a crisis (e.g., code situation). This involves a large (often red) button under a clear plastic cover at the desk or on the wall in a central location in the PACU connected to a light and bell alarm on the wall in the OR and, often, in the place most likely to be populated by anesthesia personnel who can respond immediately.



Central Equipment in the PACU

Several sets of basic equipment are required in each PACU. A full resuscitation or "code" cart is an obvious necessity. Whether more than one is needed will depend on the size of the unit and the type of patients served. Associated with this should be complete pacing setups, including both external and transvenous pacing electrodes and generators. Respiratory equipment is important. How many spirometers and negative inspiratory force meters are required will again depend on local factors, but there must be enough so that they are readily available when needed. This type of equipment is distinct from the difficult airway cart that should be in every PACU and duplicate the cart in the OR that contains a complete array of airway equipment, including a fiberoptic scope and light source. When this equipment is needed in the PACU, the time frame will be too short to allow obtaining one from the OR. Consultation with respiratory therapy personnel will be necessary to determine if a mechanical ventilator should be permanently kept in the PACU, ready for rapid deployment when needed.

The number of surgical trays and supplies to keep in the PACU will depend on patient factors. However, it seems prudent to have, at a minimum, a thoracostomy tray, tracheostomy tray, and cut-down set at all times. In a crisis, there is usually not enough time to have them brought in from the OR. Warming devices above and beyond the traditional heated blankets are gaining acceptance in the PACU. These frequently have rolling consoles for the heat source and would need to be stored in the PACU. Another useful addition is a "tube system." This is a series of vacuum tubes that can be used to send paperwork around the hospital or specimens to the laboratory. If this system is installed in the hospital, then space must be allocated for it in the PACU. Whatever disinfection apparatus, if any, will be used should be added to the list of equipment for the PACU. Lastly, there needs to be a supply of flashlights and battery-powered lanterns, because there is always the remote possibility of a power failure in which the emergency power also fails, resulting in total darkness.

Essential Equipment for Each Bed Space

How the supply and storage of stretchers is organized will vary among facilities, but it is very important that all stretchers used for patients coming to and residing in the PACU be capable of a head-down position. Usually, having one stretcher per bed space is not enough, because once the stretcher leaves with the discharged patient, it is unlikely to be returned in time to be cleaned and prepared for the next patient to be transferred from the OR to that bed space.

On the head wall or utility tree (or adjacent cart dedicated to the respective bed space), many key pieces of equipment must be stored for immediate availability. There must be oxygen tubing and associated oxygen delivery devices, such as nasal cannulae, regular face masks, and rebreathing masks. A flashlight is required for both routine use and help in a power failure.

Nasal and oral airways as well as tracheal suction catheters go here. If the bed space does not have a capnograph as part of the electronic monitoring system, it is reasonable for one of the colorimetric filter paper indicators of expired carbon dioxide to be placed with the routine PACU equipment in the bed space. There must be a self-inflating resuscitator bag near the head of each bed space at all times; this will allow ventilation by mask or tube, even in the event of a loss of piped oxygen. Other items that should be immediately at hand include a pressure bag for rapid IV infusion, blood tubes, blood gas kits, basic nursing equipment (e.g., emesis basin, gauze, gloves, eye protectors, pads, tape, IV equipment, etc.), tools (e.g., scissors, a clamp set, possibly a suture set, etc.), and a variety of other related items that will vary according to the specific circumstances of that unit.

Patient Monitoring

Beyond the requirement that a "quantitative method of assessing oxygenation, such as pulse oximetry, be employed in the initial phase of recovery"4 , there are no specific promulgated standards for patient monitoring in the PACU that would be analogous to American Society of Anesthesiologists' Standards for Basic Anesthetic Monitoring. A pulse oximeter must be available for all newly admitted PACU patients. Many units have simply installed a pulse oximeter at each bed slot, and it is often left on and functioning throughout the patient's stay. Alternatively, if the plan is to have pulse oximeters on rolling stands that are moved from patient to patient, there must be enough of them so that one is not removed and shifted to a new patient when it is still needed on the original patient.

It has become a de facto standard of care that there be a physiologic monitor for each PACU patient. At a minimum, this includes an electrocardiogram monitor. Most of these monitors will also have noninvasive blood pressure modules. Whether some or all of these monitors should have invasive pressure channels will depend on the patients and procedures in that facility. Most acute care hospitals in which major surgery is done will have pressure measurement capabilities at most, if not all, PACU bed spaces. These devices can be freestanding so that they can be moved to the patients who need them most. The availability and use of noninvasive blood pressure devices does not eliminate the need for a standard, classic sphygmomanometer and stethoscope in each bed space. There needs to be a way to accurately measure temperature. There are a variety of rapid-acting electronic thermometers, but old-style mercury thermometers should be available, too. The question of capnography as a patient monitor has been repeatedly raised with regard to the PACU. It certainly seems wise to have at least one capnograph immediately available to monitor ventilation in a seriously ill patient or verify correct intubation and adequacy of ventilation. If there is the likelihood of many ventilated or severely ill patients, it may be reasonable to have a capnograph in the physiologic monitor at many or even all bed spaces.

There has been an increase in the number of malpractice lawsuits against anesthesiologists involving PACU reintubations. It has been suggested that the same standard for verification of correct tracheal tube placement by identification of expired carbon dioxide as applies in the OR should be applied to any intubation in the PACU. This seems a prudent course. Individual circumstances will vary, of course, but these concepts must be appreciated by the staff personnel involved in dealing with PACU problems. If pulmonary artery catheters are used in the unit, a dedicated cardiac output computer must be available. There should be at least one peripheral nerve stimulator with train-of-four and double-burst capability in the PACU at all times in order to evaluate patients for residual muscle relaxation.

Computerized patient data management systems have been widely touted. Many have a PACU component into which data can be entered by either direct capture of monitor signals or entry by PACU personnel or physicians. If such a system is contemplated, all those involved must carefully plan to be certain that appropriate hardware and software is purchased and then thoroughly tested after installation but before its use.

PACU Patient Safety Concerns

There is a new emphasis, particularly by plaintiffs' lawyers, on adverse events occurring in the PACU. Airway obstruction appears to be the most common untoward event reported in immediate postsurgical patients. Aspiration of vomitus is much discussed but comparatively rare in actuality. Inadequate ventilation from residual medication, either muscle relaxants specifically or anesthetics in general, is a significant concern, but there are not good data indicating its incidence.

A corollary is oversedation from pain medication administered in the PACU once the patient has emerged enough to complain. This can contribute to airway obstruction, aspiration, or hypoventilation as well as the adverse consequences of each.

Step-Down Recovery

The step-down recovery area or predischarge area (synonyms are phase II recovery, short-stay recovery unit, and secondary recovery area) may share a space with the preoperative area for ambulatory surgical patients or may be a separate area. Here, patients are physiologically stable, awake, and oriented, with a postoperative pain control plan already implemented. They are tolerating oral intake yet still have the IV catheter in place upon arrival. Nurse-to-patient ratio is much lower in this area, and family is often allowed to participate in the recovery process. The patient may be in a semirecumbent position or sitting position in a lounge-type chair, and activities such as nutrition, voiding, ambulation, dressing, and predischarge instruction are carried out at this time. Staff must be prepared to treat pain, nausea, and emesis and continue to evaluate patients for late development of postoperative complications.[5]

Cross-Training of Staff

Efforts are being made to better utilize recovery room staff and appropriately match staffing to actual patient care needs. These include frequently updated staffing analyses based on patient numbers and acuity, as well as cross-training staff to handle other groups of patients, such as patients recovering from radiology, catheterization laboratory, or gastrointestinal procedures.

Criteria-Based Recovery

The concept of criteria-based recovery has emerged along with the availability of short-acting anesthetic drugs. As compared to arbitrary time-based recovery, in which patients stay in each phase of the recovery process a minimum amount of time, criteria-based recovery allows patients to move through the recovery process at their own speed, determined by their meeting specified criteria for each transition. Patients who have received short-acting anesthetics; are awake, alert and responsive; have stable vital signs; are able to ambulate with minimal assistance; and have manageable pain and nausea may pass to step-down recovery after a very short stay in the phase I recovery area or move directly from the OR to phase II recovery (fast tracking).[5]

Summary

Outlined above are both general issues and specific points to be considered regarding the needs and designs of an optimal PACU. Careful planning of the precise location and floor plan before construction or renovation can dramatically improve the work environment for the staff and improve the care received by the patients. Suggestions for equipment and functional design are intended to anticipate the needs of the patient in the PACU and help optimize the care delivered there.

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