

● Postoperative Nursing Management

LEARNING OBJECTIVES ●

On completion of this chapter, the learner will be able to:

1. Describe the responsibilities of the postanesthesia care unit nurse in the prevention of immediate postoperative complications.
2. Compare postoperative care of the ambulatory surgery patient and the hospitalized surgery patient.
3. Identify common postoperative problems and their management.
4. Describe the gerontologic considerations related to postoperative management of patients.
5. Describe variables that affect wound healing.
6. Demonstrate postoperative dressing techniques.
7. Identify assessment parameters appropriate for the early detection of postoperative complications.

The postoperative period extends from the time the patient leaves the operating room until the last follow-up visit with the surgeon. This period may be as short as 1 week or as long as several months. During the postoperative period, nursing care focuses on reestablishing the patient's physiologic equilibrium, alleviating pain, preventing complications, and teaching the patient self-care. Careful assessment and immediate intervention assist the patient in returning to optimal function quickly, safely, and as comfortably as possible. Ongoing care in the community through home care, clinic visits, office visits, or telephone follow-up facilitates an uncomplicated recovery.

The Postanesthesia Care Unit

The **postanesthesia care unit (PACU)**, also called the postanesthesia recovery room, is located adjacent to the operating rooms. Patients still under anesthesia or recovering from anesthesia are placed in this unit for easy access to experienced, highly skilled nurses, anesthesiologists or anesthesiologists, surgeons, advanced hemodynamic and pulmonary monitoring and support, special equipment, and medications (Litwack, 1999; Meeker & Rothrock, 1999).

The PACU is kept quiet, clean, and free of unnecessary equipment. This area is painted in soft, pleasing colors and has indirect lighting, a soundproof ceiling, equipment that controls or eliminates noise (eg, plastic emesis basins, rubber bumpers on beds and tables), and isolated but visible quarters for disruptive patients. The PACU should also be well ventilated. These features benefit the patient by helping to decrease anxiety and promote comfort. The PACU bed provides easy access to the patient, is safe and easily movable, can be readily placed in position to facilitate use of measures to counteract shock, and has features that facilitate care, such as intravenous (IV) poles, side rails, wheel brakes, and a chart storage rack.

PHASES OF POSTANESTHESIA CARE

Postanesthesia care in some hospitals and ambulatory surgical centers is divided into two phases (Litwack, 1999; Meeker & Rothrock, 1999). In the **phase I PACU**, used during the immediate recovery phase, intensive nursing care is provided. The **phase II PACU** is reserved for patients who require less frequent observation and less nursing care. In the phase II unit, the patient is prepared for discharge. Recliners rather than stretchers or beds are standard in many phase II units, which may also be referred to as step-down, sit-up, or progressive care units. Patients may remain in a phase II PACU unit for as long as 4 to 6 hours, de-

pending on the type of surgery and any preexisting conditions of the patient. In facilities without separate phase I and phase II units, the patient remains in the PACU and may be discharged home directly from this unit.

Both phase I and phase II PACU nurses have special skills. The phase I PACU nurse provides frequent (every 15 minutes) monitoring of the patient's pulse, electrocardiogram, respiratory rate, blood pressure, and pulse oximeter value (blood oxygen level). In some cases, end-tidal carbon dioxide (ETCO₂) levels are monitored as well. The patient's airway may become obstructed because of the latent effects of recent anesthesia, and the PACU nurse must be prepared to assist in reintubation and in handling other emergencies that may occur. The nurse in the phase II PACU must possess strong clinical assessment and patient teaching skills.

ADMITTING THE PATIENT TO THE PACU

Transferring the postoperative patient from the operating room to the PACU is the responsibility of the anesthesiologist or anesthesiologist. During transport from the operating room to the PACU, the anesthesia provider remains at the head of the stretcher (to maintain the airway), and a surgical team member remains at the opposite end. Transporting the patient involves special consideration of the incision site, potential vascular changes, and exposure. The surgical incision is considered every time the postoperative patient is moved; many wounds are closed under considerable tension, and every effort is made to prevent further strain on the incision. The patient is positioned so that he or she is not lying on and obstructing drains or drainage tubes. Serious orthostatic hypotension may occur when a patient is moved from one position to another (eg, from a lithotomy position to a horizontal position or from a lateral to a supine position), so the patient must be moved slowly and carefully. As soon as the patient is placed on the stretcher or bed, the soiled gown is removed and replaced with a dry gown. The patient is covered with lightweight blankets and warmed. The side rails are raised to guard against falls.

The nurse who admits the patient to the PACU reviews the following information with the anesthesiologist or anesthesiologist:

- Medical diagnosis and type of surgery performed
- Pertinent past medical history and allergies
- Patient's age and general condition, airway patency, vital signs
- Anesthetics and other medications used during the procedure (eg, opioids and other analgesic agents, muscle relaxants, antibiotic agents)

Glossary

dehiscence: partial or complete separation of wound edges

visceration: protrusion of abdominal organs through the surgical incision

first-intention healing: method of healing in which wound edges are surgically approximated and integumentary continuity is restored without granulation

Phase I PACU: area designated for care of surgical patients immediately after surgery

and patients whose condition warrants close monitoring

Phase II PACU: area designated for care of surgical patients who have been transferred from a phase I PACU because their condition no longer requires the close monitoring provided in a phase I PACU

postanesthesia care unit (PACU): area where postoperative patients are monitored as they recover from anesthesia; for-

merly referred to as the recovery room or postanesthesia recovery room

second-intention healing: method of healing in which wound edges are not surgically approximated and integumentary continuity is restored by the process known as granulation

third-intention healing: method of healing in which surgical approximation of wound edges is delayed and integumentary continuity is restored by apposing areas of granulation

- Any problems that occurred in the operating room that might influence postoperative care (eg, extensive hemorrhage, shock, cardiac arrest)
- Pathology encountered (if malignancy is an issue during surgery, the nurse needs to know whether the patient and/or family have been informed)
- Fluid administered, estimated blood loss and replacement fluids
- Any tubing, drains, catheters, or other supportive aids
- Specific information about which the surgeon, anesthesiologist, or anesthetist wishes to be notified (eg, blood pressure or heart rate below or above a specified level)

NURSING MANAGEMENT IN THE PACU

The nursing management objectives for the patient in the PACU are to provide care until the patient has recovered from the effects of anesthesia (eg, until resumption of motor and sensory functions), is oriented, has stable vital signs, and shows no evidence of hemorrhage or other complications.

Assessing the Patient

Frequent, skilled assessments of the blood oxygen saturation level, pulse rate and regularity, depth and nature of respirations, skin color, level of consciousness, and ability to respond to commands are the cornerstones of nursing care in the PACU. The nurse performs a baseline assessment, then checks the surgical site for drainage or hemorrhage and makes sure that all drainage tubes and monitoring lines are connected and functioning.

After the initial assessment, vital signs are monitored and the patient's general physical status is assessed at least every 15 minutes. Patency of the airway and respiratory function are always evaluated first, followed by assessment of cardiovascular function, the condition of the surgical site, and function of the central nervous system. The nurse needs to be aware of any pertinent information from the patient's history that may be significant (eg, patient is hard of hearing, has a history of seizures, has diabetes, or is allergic to certain medications or to latex).

Maintaining a Patent Airway

The primary objective in the immediate postoperative period is to maintain pulmonary ventilation and thus prevent hypoxemia (reduced oxygen in the blood) and hypercapnia (excess carbon dioxide in the blood). Both can occur if the airway is obstructed and ventilation is reduced (hypoventilation). Besides checking the physician's orders for and administering supplemental oxygen, the nurse assesses respiratory rate and depth, ease of respirations, oxygen saturation, and breath sounds (Litwack, 1999; Meeker & Rothrock, 1999).

Patients who have experienced prolonged anesthesia usually are unconscious, with all muscles relaxed. This relaxation extends to the muscles of the pharynx. When the patient lies on his or her back, the lower jaw and the tongue fall backward and the air passages become obstructed (Fig. 20-1A). This is called hypopharyngeal obstruction. Signs of occlusion include choking, noisy and irregular respirations, decreased oxygen saturation scores, and within minutes a blue, dusky color (cyanosis) of the skin. Because movement of the thorax and the diaphragm does not necessarily indicate that the patient is breathing, the nurse needs to place the palm of the hand at the patient's nose and mouth to feel the exhaled breath.

NURSING ALERT The treatment of hypopharyngeal obstruction involves tilting the head back and pushing forward on the angle of the lower jaw, as if to push the lower teeth in front of the upper teeth (Figs. 20-1B, C). This maneuver pulls the tongue forward and opens the air passages.

The anesthesiologist or anesthetist may leave a hard rubber or plastic airway in the patient's mouth (Fig. 20-2) to maintain a patent airway. Such a device should not be removed until signs such as gagging indicate that reflex action is returning. Alternatively, the patient may enter the PACU with an endotracheal tube still in place and may require continued mechanical ventilation. The nurse assists in initiating the use of the ventilator and in the weaning and extubation processes. Some patients, particularly those who have had extensive or lengthy surgical procedures, may be transferred from the operating room directly to the intensive care unit or may be transferred from the PACU to the intensive care unit while still intubated and on mechanical ventilation.

Respiratory difficulty can also result from excessive secretion of mucus or aspiration of vomitus. Turning the patient to one side allows the collected fluid to escape from the side of the mouth. If the teeth are clenched, the mouth may be opened manually but cautiously with a padded tongue depressor. The head of the bed is elevated 15 to 30 degrees unless contraindicated, and the patient is closely observed to maintain the airway as well as to minimize the risk of aspiration. If vomiting occurs, the patient is turned to the side to prevent aspiration and the vomitus is collected in the emesis basin. Mucus or vomitus obstructing the pharynx or the trachea is suctioned with a pharyngeal suction tip or a nasal catheter introduced into the nasopharynx or oropharynx. The catheter can be passed into the nasopharynx or oropharynx safely to a distance of 15 to 20 cm (6 to 8 inches). Caution is necessary in suctioning the throat of a patient who has had a tonsillectomy or other oral or laryngeal surgery because of risk for bleeding and discomfort.

Maintaining Cardiovascular Stability

To monitor cardiovascular stability, the nurse assesses the patient's mental status; vital signs; cardiac rhythm; skin temperature, color, and moisture; and urine output. Central venous pressure, pulmonary artery pressure, and arterial lines are monitored if the patient's condition requires such assessment. The nurse also assesses the patency of all IV lines. The primary cardiovascular complications seen in the PACU include hypotension and shock, hemorrhage, hypertension, and dysrhythmias.

HYPOTENSION AND SHOCK

Hypotension can result from blood loss, hypoventilation, position changes, pooling of blood in the extremities, or side effects of medications and anesthetics; the most common cause is loss of circulating volume through blood and plasma loss. If the amount of blood loss exceeds 500 mL (especially if the loss is rapid), replacement is usually indicated.

Shock, one of the most serious postoperative complications, can result from hypovolemia. Shock may be described as inadequate cellular oxygenation accompanied by the inability to excrete waste products of metabolism. Hypovolemic shock is characterized by a fall in venous pressure, a rise in peripheral resistance, and tachycardia. Neurogenic shock, a less common cause of shock in the surgical patient, occurs as a result of decreased arterial resistance caused by spinal anesthesia. It is characterized by a fall in blood

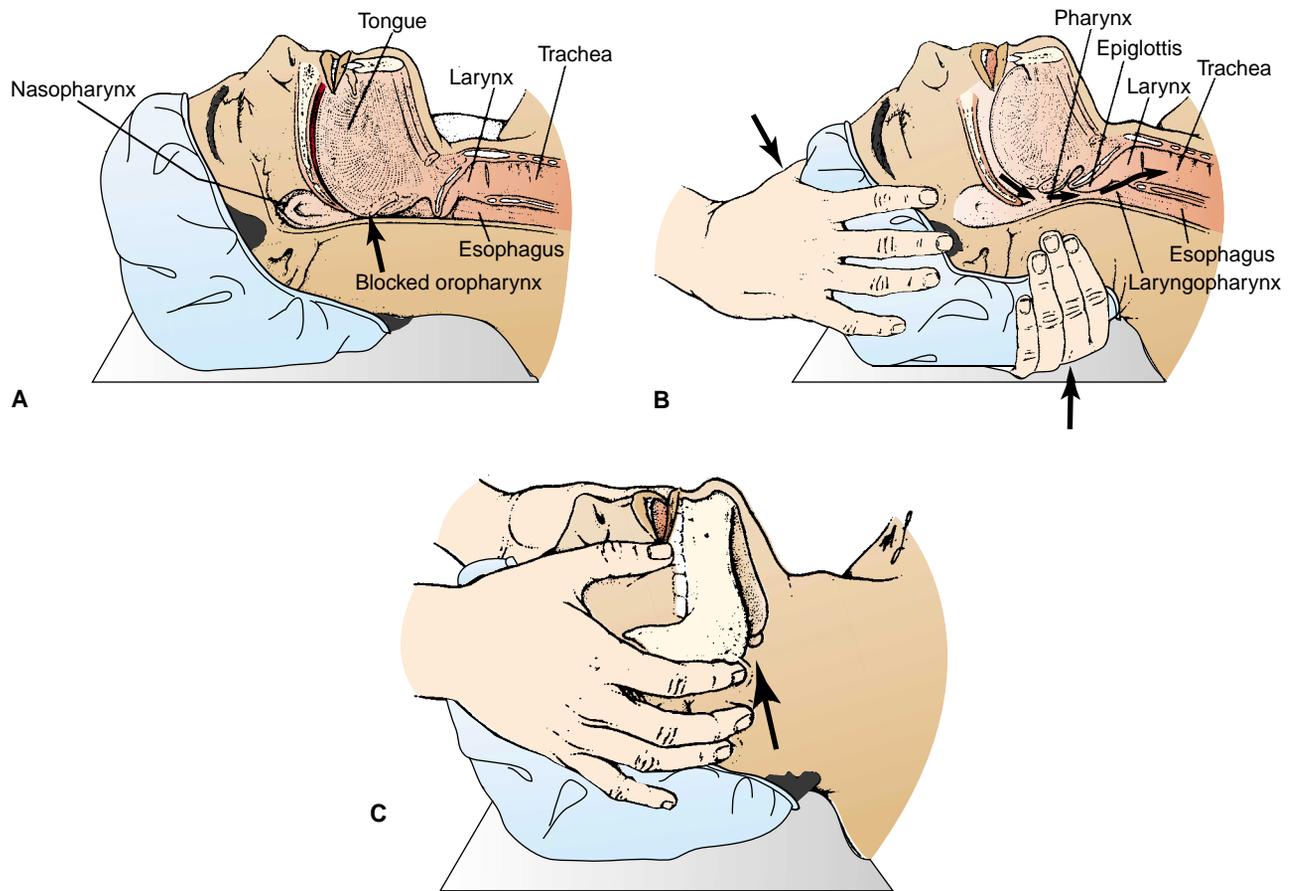


FIGURE 20-1 (A) A hypopharyngeal obstruction occurs when neck flexion permits the chin to drop toward the chest; obstruction almost always occurs when the head is in the midposition. (B) Tilting the head back to stretch the anterior neck structure lifts the base of the tongue off the posterior pharyngeal wall. The direction of the arrows indicates the pressure of the hands. (C) Opening the mouth is necessary to correct valvelike obstruction of the nasal passage during expiration, which occurs in about 30% of unconscious patients. Open the patient's mouth (separate lips and teeth) and move the lower jaw forward so that the lower teeth are in front of the upper teeth. To regain backward tilt of the neck, lift with both hands at the ascending rami of the mandible.

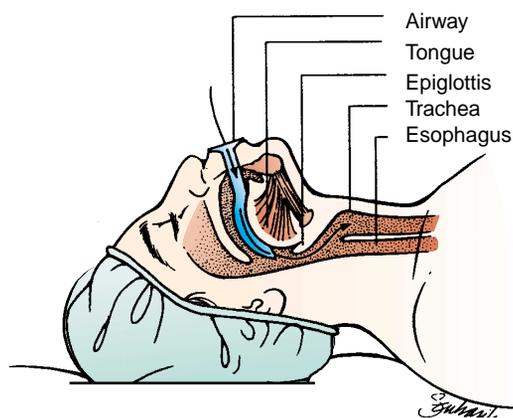


FIGURE 20-2 Use of an airway to prevent respiratory difficulty after anesthesia. The airway passes over the base of the tongue and permits air to pass into the pharynx in the region of the epiglottis. Patients often leave the operating room with an airway in place. The airway should remain in place until the patient recovers sufficiently to breathe normally. As the patient regains consciousness, the airway usually causes irritation and should be removed.

pressure due to pooling of blood in dilated capacitance vessels (those with the ability to change volume capacity). Cardiogenic shock is unlikely in the surgical patient except if the patient has severe preexisting cardiac disease or experienced a myocardial infarction during surgery. See Chapter 15 for a detailed discussion of shock.

The classic signs of shock are:

- Pallor
- Cool, moist skin
- Rapid breathing
- Cyanosis of the lips, gums, and tongue
- Rapid, weak, thready pulse
- Decreasing pulse pressure
- Low blood pressure and concentrated urine

Hypovolemic shock can be avoided largely by the timely administration of IV fluids, blood, blood products, and medications that elevate blood pressure. Other factors may contribute to hemodynamic instability, and the PACU nurse implements multiple measures to manage these factors. Pain is controlled by making the patient as comfortable as possible and by using opioids

judiciously. Exposure is avoided, and normothermia is maintained to prevent vasodilation.

Volume replacement is the primary intervention for shock. An infusion of lactated Ringer's solution or blood component therapy is initiated. Oxygen is administered by nasal cannula, face-mask, or mechanical ventilation. Cardiotonic, vasodilator, and corticosteroid medications may be prescribed to improve cardiac function and reduce peripheral vascular resistance. The patient is kept warm while avoiding overheating to prevent cutaneous vessels from dilating and depriving vital organs of blood. The patient is placed flat in bed with the legs elevated. Respiratory and pulse rate, blood pressure, blood oxygen concentration, urinary output, level of consciousness, central venous pressure, pulmonary artery pressure, pulmonary capillary wedge pressure, and cardiac output are monitored to provide information on the patient's respiratory and cardiovascular status. Vital signs are monitored continuously until the patient's condition has stabilized.

HEMORRHAGE

Hemorrhage is an uncommon yet serious complication of surgery that can result in death (Finkelmeier, 2000). It can present insidiously or emergently at any time in the immediate postoperative period or up to several days after surgery (Table 20-1). When blood loss is extreme, the patient is apprehensive, restless, and thirsty; the skin is cold, moist, and pale. The pulse rate increases, the temperature falls, and respirations are rapid and deep, often of the gasping type spoken of as "air hunger." If hemorrhage progresses untreated, cardiac output decreases, arterial and venous blood pressure and hemoglobin level fall rapidly, the lips and the conjunctivae become pallid, spots appear before the eyes, a ringing is heard in the ears, and the patient grows weaker but remains conscious until near death.

Transfusing blood or blood products and determining the cause of hemorrhage are the initial therapeutic measures. The surgical site and incision should always be inspected for bleeding. If bleeding is evident, a sterile gauze pad and a pressure dressing are

applied, and the site of the bleeding is elevated to heart level if possible. The patient is placed in the shock position (flat on back; legs elevated at a 20-degree angle; knees kept straight). If the source of bleeding is concealed, the patient may be taken back to the operating room for emergency exploration of the surgical site.

NURSING ALERT When IV fluids are given in cases of hemorrhage, it is important to remember that unless the hemorrhage has been well controlled, giving too large a quantity or administering the IV fluid too rapidly may raise the blood pressure enough to start the bleeding again.

Special considerations must be given to patients who decline blood transfusions, such as Jehovah's Witnesses and those who identify specific requests on their advance directives or living will.

HYPERTENSION AND DYSRHYTHMIAS

Hypertension is common in the immediate postoperative period secondary to sympathetic nervous system stimulation from pain, hypoxia, or bladder distention. Dysrhythmias are associated with electrolyte imbalance, altered respiratory function, pain, hypothermia, stress, and anesthetic medications. Both conditions are managed by treating the underlying causes.

Relieving Pain and Anxiety

Opioid analgesics are administered judiciously and often intravenously in the PACU (Meeker & Rothrock, 1999). Intravenous opioids provide immediate relief and are short-acting, thus minimizing the potential for drug interactions or prolonged respiratory depression while anesthetics are still active in the patient's system. In addition to monitoring the patient's physiologic status and managing pain, the PACU nurse provides psychological support in an effort to relieve the patient's fears and concerns. The nurse checks the medical record for special needs and concerns of the patient. When the patient's condition permits, a close member of the family may visit in the PACU for a few moments. This often decreases the family's anxiety and makes the patient feel more secure.

Controlling Nausea and Vomiting

Nausea and vomiting are common problems in the PACU. The nurse should intervene at the patient's first report of nausea to control the problem rather than wait for it to progress to vomiting.

Many medications are available to control nausea and vomiting without oversedating the patient; they are commonly administered during surgery as well as in the PACU (Meeker & Rothrock, 1999). Intravenous or intramuscular administration of droperidol (Inapsine) is common, especially in the ambulatory setting. Other medications such as metoclopramide (Reglan), prochlorperazine (Compazine), and promethazine (Phenergan) are commonly prescribed (Karch, 2002; Meeker & Rothrock, 1999). Although it is costly, ondansetron (Zofran) is a frequently used, effective antiemetic with few side effects.

NURSING ALERT At the slightest indication of nausea, the patient is turned completely to one side to promote mouth drainage and prevent aspiration of vomitus, which can cause asphyxiation and death.

Table 20-1 • Classifications of Hemorrhage

CLASSIFICATION	DEFINING CHARACTERISTIC
Time Frame	
Primary	Hemorrhage occurs at the time of surgery.
Intermediary	Hemorrhage occurs during the first few hours after surgery when the rise of blood pressure to its normal level dislodges insecure clots from untied vessels.
Secondary	Hemorrhage may occur some time after surgery if a ligature slips because a blood vessel was insecurely tied, became infected, or was eroded by a drainage tube.
Type of Vessel	
Capillary	Hemorrhage is characterized by a slow, general ooze.
Venous	Darkly colored blood bubbles out quickly.
Arterial	Blood is bright red and appears in spurts with each heartbeat.
Visibility	
Evident	Hemorrhage is on the surface and can be seen.
Concealed	Hemorrhage is in a body cavity and cannot be seen.

Gerontologic Considerations

The elderly patient, like all other patients, is transferred from the operating room table to the bed or stretcher slowly and gently. The effects of this action on blood pressure and ventilation are monitored. Special attention is given to keeping the patient warm because the elderly are more susceptible to hypothermia. The patient's position is changed frequently to stimulate respirations and to promote circulation and comfort.

Immediate postoperative care for the elderly patient is the same as that for any surgical patient, but additional support is given if there is impaired cardiovascular, pulmonary, or renal function. With invasive monitoring, it is possible to detect cardiopulmonary deficits before signs and symptoms are apparent. The elderly patient has less physiologic reserve, and physiologic responses to stress are diminished or slowed. These changes reinforce the need for close monitoring and prompt treatment of hypotension, shock, and hemorrhage. Because of monitoring and improved individualized preoperative preparation, many older adults tolerate surgery well and have an uneventful recovery.

Postoperative confusion is common in older patients. The confusion is aggravated by social isolation, restraints, anesthetics and analgesics, and sensory deprivation. Reorienting the patient to the environment and using smaller amounts of sedatives, anesthetics, and analgesics may help prevent confusion. However, unrelieved pain, particularly pain at rest, may increase the risk for delirium and must be addressed (Lynch, Lazor, Gellis et al., 1998). Hypoxia can present as confusion and restlessness, as can blood loss and electrolyte imbalance. Excluding all other causes of confusion must precede the assumption that confusion is related to age, circumstances, and medications.

Determining Readiness for Discharge From the PACU

A patient remains in the PACU until he or she has fully recovered from the anesthetic agent (Meeker & Rothrock, 1999). Indicators of recovery include stable blood pressure, adequate respiratory function, adequate oxygen saturation level compared with baseline, and spontaneous movement or movement on command. Usually the following measures are used to determine the patient's readiness for discharge from the PACU:

- Stable vital signs
- Orientation to person, place, events, and time
- Uncompromised pulmonary function
- Pulse oximetry readings indicating adequate blood oxygen saturation
- Urine output at least 30 mL/h
- Nausea and vomiting absent or under control
- Minimal pain

Many hospitals use a scoring system (eg, Aldrete score) to determine the patient's general condition and readiness for transfer from the PACU (Quinn, 1999). Throughout the recovery period, the patient's physical signs are observed and evaluated by means of a scoring system based on a set of objective criteria. This evaluation guide, a modification of the Apgar scoring system used for evaluating newborns, allows a more objective assessment of the patient's condition in the PACU (Fig. 20-3). The patient is assessed at regular intervals (eg, every 15 or 30 minutes), and the score is totaled on the assessment record. Patients with a score lower than 7 must remain in the PACU until their condition im-

proves or they are transferred to an intensive care area, depending on their preoperative baseline scores.

The patient is discharged from the phase I PACU by the anesthesiologist or anesthesiologist to the critical care unit, the medical-surgical unit, the phase II PACU, or home with a responsible family member (Quinn, 1999). Patients being discharged directly to home require verbal and written instructions and information about follow-up care.

Promoting Home and Community-Based Care

To ensure patient safety and recovery, expert patient teaching and discharge planning are necessary when a patient undergoes same-day or ambulatory surgery. Because anesthetics cloud memory for concurrent events, instructions should be given to both the patient and the adult who will be accompanying the patient home (Quinn, 1999).

TEACHING PATIENTS SELF-CARE

The patient and caregiver (eg, family member or friend) are informed about expected outcomes and immediate postoperative changes anticipated in the patient's capacity for self-care (Fox, 1998; Quinn, 1999). Written instructions about wound care, activity and dietary recommendations, medication, and follow-up visits to the same-day surgery unit or the surgeon are provided. Written instructions (designed to be copied and given to patients) about the postoperative care following many types of surgery are usually provided (Economou & Economou, 1999). The patient's caregiver at home is provided with verbal and written instructions about what to observe the patient for and about the actions to take if complications occur. Prescriptions are given to the patient. The nurse or surgeon's telephone number is provided, and the patient and caregiver are encouraged to call with questions and to schedule follow-up appointments (Chart 20-1).

Although recovery time varies depending on the type and extent of surgery and the patient's overall condition, instructions usually advise limited activity for 24 to 48 hours. During this time, the patient should not drive a vehicle, drink alcoholic beverages, or perform tasks that require energy or skill. Fluids may be consumed as desired, and smaller-than-normal amounts are eaten at mealtime. The patient is cautioned not to make important decisions at this time because the medications, anesthesia, and surgery may affect his or her decision-making ability.

CONTINUING CARE

Although most patients who undergo ambulatory surgery recover quickly and without complications, some patients require referral for home care. These may be elderly or frail patients, those who live alone, and patients with other health care problems that may interfere with self-care or resumption of usual activities. The home care nurse assesses the patient's physical status (eg, respiratory and cardiovascular status, adequacy of pain management, the surgical incision) and the patient's and family's ability to adhere to the recommendations given at the time of discharge. Previous teaching is reinforced as needed. The home care nurse may change surgical dressings, monitor the patency of a drainage system, or administer medications. The patient is assessed for any surgical complications. The patient and family are reminded about the importance of keeping follow-up appointments with the surgeon. Follow-up phone calls from the nurse or surgeon may also be used to assess the patient's progress and to answer any questions (Fox, 1998; Marley & Swanson, 2001).

Post Anesthesia Care Unit:
MODIFIED ALDRETE SCORE

Patient: _____ Final score: _____
 Room: _____ Surgeon: _____
 Date: _____ PACU nurse: _____

Area of Assessment	Point Score	Upon Admission	After		
			1 h	2 h	3 h
<u>Muscle Activity:</u>					
Moves spontaneously or on command:					
• Ability to move all extremities	2				
• Ability to move 2 extremities	1				
• Unable to control any extremity	0				
<u>Respiration:</u>					
• Ability to breathe deeply and cough	2				
• Limited respiratory effort (dyspnea or splinting)	1				
• No spontaneous effort	0				
<u>Circulation:</u>					
• BP \pm 20% of preanesthetic level	2				
• BP \pm 20%–49% of preanesthetic level	1				
• BP \pm 50% of preanesthetic level	0				
<u>Consciousness Level:</u>					
• Fully awake	2				
• Arousable on calling	1				
• Not responding	0				
<u>O₂ Saturation:</u>					
• Able to maintain O ₂ sat >92% on room air	2				
• Needs O ₂ inhalation to maintain O ₂ sat >90%	1				
• O ₂ sat <90% even with O ₂ supplement	0				
<u>Totals:</u>					

Required for discharge from Post Anesthesia Care Unit: 7–8 points

_____ Signature of nurse

_____ Time of release

FIGURE 20-3 Post anesthesia care unit record; Modified Aldrete Score. (O₂ sat = oxygen saturation.)

The Hospitalized Postoperative Patient

The patient admitted to the clinical unit for postoperative care has multiple needs. Seriously ill patients or those who have undergone major cardiovascular, pulmonary, or neurologic surgery

are admitted to specialized intensive care units for close monitoring and advanced interventions and support. The care required by these patients in the immediate postoperative period is discussed in specific chapters. Postoperative care for the surgical patient returning to the general medical-surgical unit is discussed below.



Chart 20-1

Home Care Checklist • Discharge From Surgery

At the completion of the home care instruction, the patient or caregiver will be able to:

	Patient	Caregiver
• Name the procedure that was performed and identify any permanent changes in anatomic structure or function.	✓	✓
• Describe ongoing postoperative therapeutic regimen, including medications, diet, activities to perform (such as walking and breathing exercises) and to avoid (such as driving a car or contact sports), adjuvant therapies, dressing changes and wound care, and any other treatments.	✓	✓
• Describe signs and symptoms of complications.	✓	✓
• State time and date of follow-up appointments.	✓	✓
• Identify interventions and strategies to use in adapting to any permanent changes in structure or function.	✓	✓
• Relate how to reach health care provider with questions or complications.	✓	✓
• State understanding of community resources and referrals (if any).	✓	✓
• Describe pertinent health promotion activities (eg, weight reduction, smoking cessation, stress management).	✓	✓

RECEIVING THE PATIENT IN THE CLINICAL UNIT

The patient's room is readied by assembling the necessary equipment and supplies: IV pole, drainage receptacle holder, emesis basin, tissues, disposable pads (Chux), blankets, and postoperative charting forms. When the call comes to the unit about the patient's transfer from the PACU, the need for any additional items that may be needed is communicated. The PACU nurse reports the baseline data about the patient's condition to the receiving nurse. The report includes demographic data, medical diagnosis, procedure performed, comorbid conditions, allergies, unexpected intraoperative events, estimated blood loss, the type and amount of fluids received, medications administered for pain, whether the patient has voided, and information that the patient and family have received about the patient's condition. Usually the surgeon speaks to the family after surgery and relates the general condition of the patient. The receiving nurse reviews the postoperative orders, admits the patient to the unit, performs an initial assessment, and attends to the patient's immediate needs (Chart 20-2).

NURSING MANAGEMENT AFTER SURGERY

During the first 24 hours after surgery, nursing care of the hospitalized patient on the general medical-surgical unit involves continuing to help the patient recover from the effects of anes-

thesia, frequently assessing the patient's physiologic status, monitoring for complications, managing pain, and implementing measures designed to achieve the long-range goals of independence with self-care, successful management of the therapeutic regimen, discharge to home, and full recovery. In the initial hours after admission to the clinical unit, adequate ventilation, hemodynamic stability, incisional pain, surgical site integrity, nausea and vomiting, neurologic status, and spontaneous voiding are primary concerns. The pulse rate, blood pressure, and respiration rate are recorded at least every 15 minutes for the first hour and every 30 minutes for the next 2 hours. Thereafter, they are measured less frequently if they remain stable. The temperature is monitored every 4 hours for the first 24 hours.

Patients usually begin to feel better several hours after surgery or after waking up the next morning. Although pain may still be intense, many patients feel more alert, less nauseous, and less anxious. They have begun their breathing and leg exercises, and many will have dangled their legs over the edge of the bed, stood, and ambulated a few feet or been assisted out of bed to the chair at least once. Many will have tolerated a light meal and had IV fluids discontinued. The focus of care shifts from intense physiologic management and symptomatic relief of the adverse effects of anesthesia to regaining independence with self-care and preparing for discharge. Despite these gains, the postoperative patient is still at risk for complications. Atelectasis, pneumonia, deep vein thrombosis, pulmonary embolism, constipation, paralytic ileus, and wound infection are ongoing threats for the postoperative patient (Fig. 20-4).

Chart 20-2

Standard Postoperative Nursing Interventions

Once the patient leaves the PACU and is admitted to the unit, immediate nursing interventions include the following:

- Assess breathing and administer supplemental oxygen, if prescribed.
- Monitor vital signs and note skin warmth, moisture, and color.
- Assess the surgical site and wound drainage systems.
- Assess level of consciousness, orientation, and ability to move extremities.
- Connect all drainage tubes to gravity or suction as indicated and monitor closed drainage systems.
- Assess pain level, pain characteristics (location, quality) and timing, type, and route of administration of last pain medication.
- Administer analgesics as prescribed and assess their effectiveness in relieving pain.
- Position patient to enhance comfort, safety, and lung expansion.
- Assess IV sites for patency and infusions for correct rate and solution.
- Assess urine output in closed drainage system or the patient's urge to void and bladder distention.
- Reinforce need to begin deep-breathing and leg exercises.
- Place call light, emesis basin, ice chips (if allowed), and bedpan or urinal within reach.
- Provide information to patient and family.

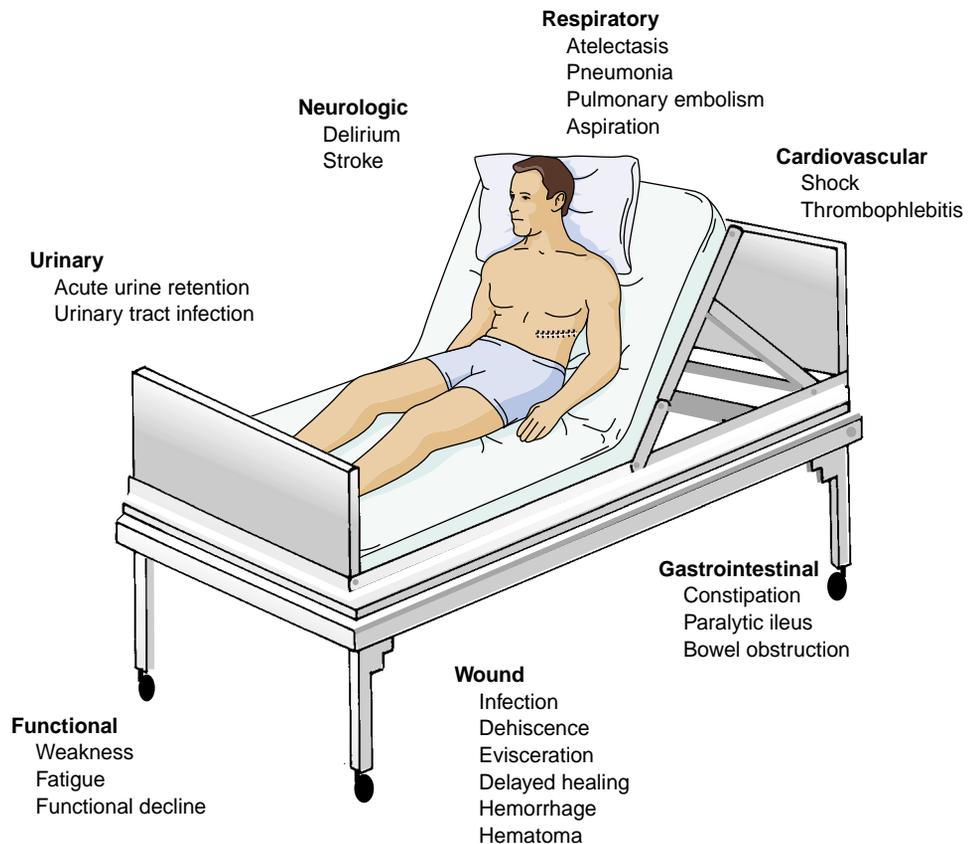


FIGURE 20-4 The postoperative patient is subject to a number of potential complications.

NURSING PROCESS: THE HOSPITALIZED PATIENT RECOVERING FROM SURGERY

The Perioperative Nursing Data Set (PNDS) is a helpful model used by nurses in the postoperative phase of care (see Chap. 18, Fig. 18-1). Phenomena of concern to nurses on the clinical unit in the postoperative phase of care include nursing diagnoses, interventions, and outcomes for patients and their families. Additional areas of concern include collaborative problems and expected goals.

Assessment

Assessment of the hospitalized postoperative patient includes monitoring vital signs and completing a review of the systems upon arrival of the patient to the clinical unit and thereafter (see Chart 20-2).

Respiratory status is important because pulmonary complications are among the most frequent and serious problems encountered by the surgical patient. The nurse observes for airway patency and the quality of respirations, including depth, rate, and sound. Chest auscultation verifies that breath sounds are normal (or not normal) bilaterally, and the findings are documented as a baseline for later comparisons. Often, because of the effects of pain medications, respirations are slow. Shallow and rapid respirations may be due to pain, constricting dressings, gastric dilation, or obesity. Noisy breathing may be due to obstruction by secretions or the tongue.

The nurse assesses the patient's pain level using a verbal or visual analog scale and assesses the characteristics of the pain. The

patient's appearance, pulse, respirations, blood pressure, skin color (adequate or cyanotic), and skin temperature (cold and clammy, warm and moist, or warm and dry) are clues to cardiovascular function. When the patient arrives in the clinical unit, the surgical site is observed for bleeding, type and integrity of dressing, and drains.

Also assessed when the patient arrives on the clinical unit are the patient's mental status and level of consciousness, speech, and orientation in comparison with preoperative baseline measures. Although a change in mental status or postoperative restlessness may be related to anxiety, pain, or medications, it may also be a symptom of oxygen deficit or hemorrhage. These serious causes must be investigated and excluded before other causes are pursued.

General discomfort resulting from lying in one position on the operating table, the surgeon's handling of tissues, the body's reaction to anesthesia, and anxiety are also common causes of restlessness. These discomforts may be relieved by administering the prescribed analgesics, changing the patient's position frequently, and assessing and alleviating the cause of anxiety. If tight, drainage-soaked bandages are causing discomfort, reinforcing or changing the dressing completely makes the patient more comfortable. The bladder is palpated for distention because urinary retention can also cause restlessness.

Diagnosis

NURSING DIAGNOSES

Based on the assessment data, major nursing diagnoses may include the following:

- Risk for ineffective airway clearance related to depressed respiratory function, pain, and bed rest

- Acute pain related to surgical incision
- Decreased cardiac output related to shock or hemorrhage
- Activity intolerance related to generalized weakness secondary to surgery
- Impaired skin integrity related to surgical incision and drains
- Risk for imbalanced body temperature related to surgical environment and anesthetic agents
- Risk for imbalanced nutrition, less than body requirements related to decreased intake and increased need for nutrients secondary to surgery
- Risk for constipation related to effects of medications, surgery, dietary change, and immobility
- Risk for urinary retention related to anesthetic agents
- Risk for injury related to surgical procedure or anesthetic agents
- Anxiety related to surgical procedure
- Risk for ineffective management of therapeutic regimen related to insufficient knowledge about wound care, dietary restrictions, activity recommendations, medications, follow-up care, or signs and symptoms of complications

COLLABORATIVE PROBLEMS/ POTENTIAL COMPLICATIONS

Based on the assessment data, potential complications may include the following:

- Deep vein thrombosis
- Hematoma
- Infection
- Wound dehiscence or evisceration

Planning and Goals

The major goals for the patient include optimal respiratory function, relief of pain, optimal cardiovascular function, increased activity tolerance, unimpaired wound healing, maintenance of body temperature, and maintenance of nutritional balance. Further goals include resumption of usual pattern of bowel and bladder elimination, identification of any perioperative positioning injury, acquisition of sufficient knowledge to manage self-care after discharge, and absence of complications.

Nursing Interventions

PREVENTING RESPIRATORY COMPLICATIONS

Respiratory depressive effects of opioid medications, decreased lung expansion secondary to pain, and decreased mobility combine to put the patient at risk for common respiratory complications, particularly atelectasis (incomplete expansion of the lung), pneumonia, and hypoxemia (Finkelmeier, 2000; Meeker & Rothrock, 1999). Atelectasis remains a risk for the patient who is not moving well or ambulating or who is not performing deep-breathing and coughing exercises or using an incentive spirometer. Signs and symptoms include decreased breath sounds over the affected area, crackles, and cough. Pneumonia is characterized by chills and fever, tachycardia, and tachypnea. Cough may or may not be present and may or may not be productive. Hypostatic pulmonary congestion, caused by a weakened cardiovascular system that permits stagnation of secretions at lung bases, may develop; it occurs most frequently in elderly patients who are not mobilized effectively. The symptoms are often vague, with perhaps a slight elevation of temperature, pulse, and respiratory rate

and a cough. Physical examination reveals dullness and crackles at the base of the lungs. If the condition progresses, the outcome may be fatal.

The types of hypoxemia that can affect postoperative patients are subacute and episodic. Subacute hypoxemia is a constant low level of oxygen saturation, although breathing appears normal. Episodic hypoxemia develops suddenly, and the patient may be at risk for cerebral dysfunction, myocardial ischemia, and cardiac arrest. Patients at risk for hypoxemia include those who have undergone major surgery (particularly abdominal), are obese, or have preexisting pulmonary problems. Hypoxemia can be detected by pulse oximetry, which measures blood oxygen saturation. Factors that may affect the accuracy of pulse oximetry readings include cold extremities, tremors, atrial fibrillation, acrylic nails, and black or blue nail polish (these colors interfere with the functioning of the pulse oximeter; other colors do not).

Preventive measures and timely recognition of signs and symptoms help avert pulmonary complications. Strategies to prevent respiratory complications include use of an incentive spirometer and deep-breathing and coughing exercises. Crackles indicate static pulmonary secretions that need to be mobilized by coughing and deep-breathing exercises. When a mucus plug obstructs one of the bronchi entirely, the pulmonary tissue beyond the plug collapses, and a massive atelectasis results.

To clear secretions and prevent pneumonia, the nurse encourages the patient to turn frequently and take deep breaths at least every 2 hours. Coughing is also encouraged to dislodge mucus plugs. These pulmonary exercises should begin as soon as the patient arrives on the clinical unit and continue until the patient is discharged. Even if he or she is not fully awake from anesthesia, the patient can be asked to take several deep breaths. This helps to expel residual anesthetic agents, mobilize secretions, and prevent alveolar collapse (atelectasis). Careful splinting of abdominal or thoracic incision sites helps the patient overcome the fear that the exertion of coughing might open the incision. Analgesic agents are administered to permit more effective coughing, and oxygen is administered as prescribed to prevent or relieve hypoxia. To encourage lung expansion, the patient is encouraged to yawn or take sustained maximal inspirations to create a negative intrathoracic pressure of -40 mm Hg and expand lung volume to total capacity. Chest physical therapy may be prescribed if indicated.

Coughing is contraindicated in patients who have head injuries or who have undergone intracranial surgery (because of the risk for increasing intracranial pressure), as well as in patients who have undergone eye surgery (risk for increasing intraocular pressure) or plastic surgery (risk for increasing tension on delicate tissues). In patients with an abdominal or thoracic incision, the nurse teaches the patient how to splint the incision while coughing.

Most postoperative patients, especially the elderly and those with an abdominal or thoracic incision, are given an incentive spirometer to use. In incentive spirometry, the patient performs sustained maximal inspirations and can see the results of these efforts as they register on the spirometer. Such feedback encourages the patient to continue to take deep breaths to maximize voluntary lung expansion. A target is established for each patient. The patient first exhales, then places the lips around the mouthpiece and slowly inhales, trying to drive the piston on the device to a marked goal. Using a spirometer has several advantages: it encourages the patient to participate actively in treatment; it ensures that the maneuver is physiologically appropriate and is repeated; and it is a cost-effective way of preventing complications. A common recommendation for use of the incentive spirometer is 10 deep

breaths every hour while awake. Refer to Chapter 25 for additional discussion of incentive spirometry.

Early ambulation increases metabolism and pulmonary aeration and, in general, improves all body functions. The patient is encouraged to be out of bed as soon as possible (ie, on the day of surgery, or no later than the first postoperative day). This practice is especially valuable in preventing pulmonary complications in older patients.

RELIEVING PAIN

Most patients experience some pain after a surgical procedure (Meeker & Rothrock, 1999). Many factors (motivational, affective, cognitive, and emotional) influence the pain experience. Research findings have led to a better understanding of how perception, learning, personality, ethnic and cultural factors, and environment can affect anxiety, depression, and pain response (Schafheutle, Cantrill & Noyce, 2001; Watt-Watson, Stevens, Garfinkel et al., 2001). The degree and severity of postoperative pain and the patient's tolerance for pain depend on the incision site, the nature of the surgical procedure, the extent of surgical trauma, the type of anesthetic agent, and how the agent was administered. The preoperative preparation received by the patient (including information about what to expect as well as reassurance and psychological support) is a significant factor in decreasing anxiety, apprehension, and even the amount of postoperative pain.

The reasons for controlling pain are compelling. There is a well-known correlation between frequency of complications and localization of pain (Moline, 2001). Intense pain stimulates the stress response, which adversely affects the cardiac and immune systems. When pain impulses are transmitted, muscle tension increases, as does local vasoconstriction. The ischemia in the affected area causes further stimulation of pain receptors. When these noxious impulses travel centrally, sympathetic activity is compounded, which increases myocardial demand and oxygen consumption. Research has shown that cardiovascular insufficiency occurs three times more frequently, and the incidence of infection is five times greater, in people with poor postoperative pain control (Moline, 2001; Schafheutle et al., 2001; Watt-Watson et al., 2001). The hypothalamic stress response is also responsible for an increase in blood viscosity and platelet aggregation. This can lead to phlebothrombosis and pulmonary embolism.

Often the physician has prescribed different medications or dosages to cover various levels of pain. The nurse should discuss these options with the patient to determine the best medication. Then the nurse should assess the effectiveness of the medication periodically, beginning 30 minutes after administration or sooner if the medication is being delivered by patient-controlled analgesia.

Opioid Analgesics

About one third of patients report severe pain, one third moderate pain, and one third little or no pain. These statistics do not mean that the patients in the last group have no pain; rather, they appear to activate psychodynamic mechanisms that impair the registering of pain ("gate closing" theory and nociceptive transmission). See Chapter 13 for a more detailed discussion of pain and the factors influencing the pain experience.

Opioid analgesics are commonly prescribed for pain and immediate postoperative restlessness. A preventive approach rather than an "as needed" (PRN) approach, is more effective in relieving pain. With a preventive approach, the medication is administered at prescribed intervals rather than when the pain becomes severe or unbearable. Many patients (and some health



NURSING RESEARCH PROFILE 20-1

Inadequate Pain Relief Following Cardiac Surgery

Watt-Watson, J., Stevens, B., Garfinkel, P., Streiner, D., & Gallup, R. (2001). Relationships between nurses' pain knowledge and pain management outcomes for their postoperative cardiac patients. *Journal of Advanced Nursing*, 36(4), 535–545.

Purpose

Although studies have examined nurses' knowledge and perceived barriers to pain management, few studies have examined the relationship of nurses' knowledge and their actual implementation of pain management strategies. This Canadian study investigated the relationship between nursing pain knowledge and pain management outcomes for postoperative coronary artery bypass graft (CABG) patients.

Study Sample and Design

This was a descriptive, correlational, mixed between-within subjects design. A convenience sample of 94 nurses from four cardiovascular units in three university-affiliated hospitals were interviewed, along with 225 of their assigned patients. The nurses included 86 women and 8 men. The patients included 52 women and 173 men. Instruments used with the patients included the McGill Pain Questionnaire-Short Form (MPQ-SF), the present pain intensity (PPI) scale, and a visual analog scale (VAS); analgesic prescription and administration data were obtained by chart review. The Toronto Pain Management Inventory (TPMI) was used to measure pain knowledge in the nurses. The social desirability scale (SDS) was also used with the nurses.

Findings

The majority of patients reported moderate to severe pain during the previous 24 hours (86%) and at the time of interview while moving around (68%). The mean total score on the MPQ-SF, which has a range of possible scores from 0 to 45, was 11.8 ± 7 . Chart review data indicated undermedication of patients for pain, with patients receiving only 47% of their prescribed analgesia. The nurses' scores on the TPMI indicated moderate pain knowledge, with the majority of nurses (53%) scoring 69% or less and only 15% scoring 75% or greater on the inventory. While hospital policy required documentation of pain as a fifth vital sign, charting of pain was minimal and high pain ratings did not result in an increase in analgesics administered.

Nursing Implications

Nurses caring for postoperative CABG patients need further education about pain management. Nurses also need to be aware that patients are undermedicated following CABG surgery and need to be more aware of patients' needs for medication, administer prescribed doses, and advocate for patients when pain medication is not prescribed.

care providers) are overly concerned with the risk of drug addiction in the postoperative patient. This risk, however, is negligible with the use of opioid medications for short-term pain control.

Patient-Controlled Analgesia

Given the negative impact of pain on recovery, nurses need to think "pain prevention" rather than sporadic pain control and should encourage the use of patient-controlled analgesia (PCA). Patients recover more quickly when adequate pain measures are used, and PCA permits patients to administer their own pain

medication when needed (Quinn, 1999). The amount of medication delivered by the IV or epidural route and the time span during which the opioid medication is released are controlled by the PCA device. Self-administration promotes patient participation in care, eliminates delayed administration of pain medications, and maintains a therapeutic drug level.

Most patients are candidates for PCA. The two requirements for PCA are an understanding of the need to self-dose and the physical ability to self-dose. Upon sensing pain, the patient activates the medication-delivering pump with a hand-held button. PCA enables the patient to move, turn, cough, and take deep breaths with less pain, thus reducing postoperative pulmonary problems.

Epidural Infusions and Intrapleural Anesthesia

For thoracic, orthopedic, obstetric, and major abdominal surgery, certain opioid analgesics may be administered by epidural or intrathecal infusion. Epidural infusions produce a more profound analgesia. Epidural infusions are used with caution in chest procedures because the effect of the analgesic may ascend along the spinal cord and affect respiration. Intrapleural anesthesia involves the administration of local anesthetic by a catheter between the parietal and visceral pleura. It provides sensory anesthesia without affecting motor function to the intercostal muscles. This anesthesia allows more effective coughing and deep breathing in conditions such as cholecystectomy, renal surgery, and rib fractures in which pain in the thoracic region would interfere with these functions.

A local opioid or a combination anesthetic (opioid plus local anesthetic agent) is used in the epidural infusion. Other local anesthetic methods may be used to provide analgesia and anesthesia. Intrapleural anesthesia has fewer adverse effects than systemic or spinal opioids and a lower incidence of urinary retention, vomiting, and pruritus when compared with thoracic epidural opioids (Moline, 2001; Quinn, 1999).

Other Pain Relief Measures

For pain that is difficult to control, a subcutaneous pain management system may be used. This is a silicone catheter that is inserted at the affected area. The catheter is attached to a pump that delivers a continuous amount of local anesthetic at a specific amount determined and prescribed by the physician (Fig. 20-5).

Complete absence of pain in the area of the surgical incision may not occur for a few weeks, depending on the site and nature of surgery, but the intensity of postoperative pain gradually subsides on subsequent days. However, pain control continues to be an important concern for the patient and the nurse. Effective pain management allows the patient to participate in care, perform deep-breathing and leg exercises, and tolerate activity. As stated previously, poor pain control contributes to postoperative complications and increased length of stay. The nurse continues to assess the pain level, the effectiveness of pain medication, and factors that influence pain tolerance (eg, energy level, stress level, cultural background, meaning of pain to the patient). The nurse explains that taking pain medication before the pain becomes intense is more effective and offers pain medication at intervals rather than waiting for the patient to request medication. Non-pharmacologic pain relief measures, such as imagery, relaxation, massage, application of heat or cold (if prescribed), and distraction, can be used to supplement medications (Seers & Carroll, 1998). Changing the patient's position, using distraction, applying cool washcloths to the face, and rubbing the back with a soothing lotion may be useful in relieving general discomfort

FIGURE 20-5 Subcutaneous pain management system comprises a pump, filter, and catheter that delivers a specific amount of prescribed local anesthetic at a rate determined by the physician. With permission from I-Flow Corporation, Lake Forest, CA.

temporarily and rendering medication more effective when it is administered.

PROMOTING CARDIAC OUTPUT

If signs and symptoms of shock or hemorrhage occur, treatment and nursing care are implemented as described in the discussion of care in the PACU.

NURSING ALERT A systolic blood pressure of less than 90 mm Hg is usually considered reportable at once. However, the patient's preoperative or baseline blood pressure is used to make informed postoperative comparisons. A previously stable blood pressure that shows a downward trend of 5 mm Hg at each 15-minute reading should also be reported.

Although most patients do not hemorrhage or go into shock, changes in circulating volume, the stress of surgery, and the effects of medications and preoperative preparations all affect cardiovascular function. Intravenous fluid replacement is standard for up to 24 hours after surgery or until the patient is stable and tolerating oral fluids. Close monitoring is indicated to detect and correct conditions such as fluid volume deficit, altered tissue perfusion, and decreased cardiac output, all of which can increase the patient's discomfort, place him or her at risk for complications, and prolong the hospital stay. Some patients are at risk for fluid

volume excess secondary to existing cardiovascular or renal disease, advanced age, or the release of adrenocorticotrophic hormone and antidiuretic hormone as a result of the stress of surgery. Consequently, fluid replacement must be carefully managed, and intake and output records must be accurate.

Nursing management includes assessing the patency of the IV lines and ensuring that the appropriate fluids are administered at the prescribed rate. Intake and output, including emesis and output from wound drainage systems, are recorded separately and totaled to determine fluid balance. If the patient has an indwelling urinary catheter, hourly outputs are monitored and rates of less than 30 mL/h are reported; if the patient is voiding, an output of less than 240 mL per 8-hour shift is reported. Electrolyte levels and hemoglobin and hematocrit levels are monitored. Decreased hemoglobin and hematocrit levels can indicate blood loss or dilution of circulating volume by IV fluids. If dilution is contributing to the decreased levels, the hemoglobin and hematocrit rise as the stress response abates and fluids are mobilized and excreted.

Venous stasis from dehydration, immobility, and pressure on leg veins during surgery put the patient at risk for deep vein thrombosis. Leg exercises and frequent position changes are initiated early in the postoperative period to stimulate circulation. Patients should avoid positions that compromise venous return, such as raising the bed's knee gatch or placing a pillow under the knees, sitting for long periods, and dangling the legs with pressure at the back of the knees. Venous return is promoted by elastic compression stockings and early ambulation. Early ambulation has a significant effect on recovery and the prevention of complications and can begin, in many instances, the evening of surgery. Postoperative activity orders are checked before getting the patient out of bed. Sitting up at the edge of the bed for a few minutes may be all the patient can tolerate at first.

ENCOURAGING ACTIVITY

Most surgical patients are encouraged to be out of bed as soon as possible. Early ambulation reduces the incidence of postoperative complications, such as atelectasis, hypostatic pneumonia, gastrointestinal discomfort, and circulatory problems (Meeker & Rothrock, 1999). Ambulation increases ventilation and reduces the stasis of bronchial secretions in the lung. It also reduces postoperative abdominal distention by increasing gastrointestinal tract and abdominal wall tone and stimulating peristalsis. Thrombophlebitis or phlebotrombosis occurs less frequently because early ambulation prevents stasis of blood by increasing the rate of circulation in the extremities. Pain is often decreased when early ambulation is possible, and the hospital stay is shorter and less costly, a further advantage to the patient and the hospital.

Despite the advantages of early ambulation, patients may be reluctant to get up the evening of surgery. Reminding them of the importance of early mobility in preventing complications may help them overcome their fears. One concern when the patient is to get out of bed for the first time is orthostatic hypotension, also called postural hypotension. Orthostatic hypotension is an abnormal drop in blood pressure that occurs as the patient changes from a supine to a standing position. It is common after surgery because of changes in circulating volume and bed rest. Signs and symptoms include a 20-mm Hg decrease in systolic blood pressure or a 10-mm Hg decrease in diastolic blood pressure, weakness, dizziness, and fainting. Older adults are at increased risk for

orthostatic hypotension secondary to age-related changes in vascular tone. To detect orthostatic hypotension, the nurse assesses the patient's feelings of dizziness and his or her blood pressure first in the supine position, after the patient sits up, again after the patient stands, and 2 to 3 minutes later. Gradual position change gives the circulatory system time to adjust. If the patient becomes dizzy, he or she should be returned to the supine position, and getting out of bed should be delayed for several hours.

To assist the postoperative patient in getting out of bed for the first time after surgery, the nurse performs the following actions:

1. Help the patient to move gradually from the lying position to the sitting position until dizziness passes. This can be achieved by raising the head of the bed.
2. Position the patient completely upright (sitting) and turned so that both legs are hanging over the edge of the bed.
3. Assist the patient to stand beside the bed.

When accustomed to the upright position, the patient may start to walk. The nurse should be at the patient's side to give physical support and encouragement. Care must be taken not to tire the patient; the extent of the first few periods of ambulation varies with the type of surgical procedure and the patient's physical condition and age.

Whether or not the patient can ambulate early in the postoperative period, bed exercises are encouraged to improve circulation. Bed exercises consist of the following:

- Arm exercises (full range of motion, with specific attention to abduction and external rotation of the shoulder)
- Hand and finger exercises
- Foot exercises to prevent deep vein thrombosis, foot drop, and toe deformities and to aid in maintaining good circulation
- Leg flexion and leg-lifting exercises to prepare the patient for ambulation
- Abdominal and gluteal contraction exercises

Hampered by pain, dressings, IV lines, or drains, many patients cannot engage in activity without assistance. Prolonged inactivity may lead to pressure ulcers, deep vein thrombosis, atelectasis, or hypostatic pneumonia. Helping the patient increase his or her activity level on the first postoperative day is an important nursing function. One way to increase the patient's activity is to have the patient perform as much routine hygiene care as possible. Setting up the patient to bathe with a bedside wash basin or, if possible, assisting the patient to the bathroom to sit in a chair at the sink not only gets the patient moving but helps restore a sense of self-control and prepares the patient for discharge.

To be safely discharged to home, patients need to be able to ambulate a functional distance (length of the house or apartment), get in and out of bed unassisted, and be independent with toileting. Patients can be asked to perform as much as they can and then to call for assistance. The patient and the nurse can collaborate on a schedule for progressive activity that includes ambulating in the room and hallway and sitting out of bed in the chair. Assessing the patient's vital signs before, during, and after a scheduled activity helps the nurse and patient determine the rate of progression. By providing physical support, the nurse maintains the patient's safety; by communicating a positive attitude about the patient's ability to perform the activity, the nurse pro-

motes the patient's confidence. The nurse should make sure the patient continues to perform bed exercises, wears pneumatic compression or thigh-high elastic compression stockings when in bed, and rests as needed.

PROMOTING WOUND HEALING

Ongoing assessment of the surgical site involves inspection for approximation of wound edges, integrity of sutures or staples, redness, discoloration, warmth, swelling, unusual tenderness, or drainage. The area around the wound should also be inspected for reactions to tape or trauma from tight bandages.

Nursing interventions to promote wound healing also include management of surgical drains and dressings. Wound drains are tubes exiting the peri-incisional area into either a portable wound suction device (closed) or into the dressings (open). The principle involved is to allow the escape of blood and serous fluids that can otherwise serve as a culture medium for bacteria. In portable wound suction, the use of gentle, constant suction enhances drainage of these fluids and collapses the skin flaps against the underlying tissue, thus removing "dead space." Types of wound drains include the Penrose, Hemovac, and Jackson-Pratt drains (Fig. 20-6). Output from wound drainage systems and all new drainage is recorded. The amount of bloody drainage on the surgical dressing is assessed frequently. Spots of drainage on the dressings are outlined with a pen, and the date and time of the outline are recorded on the dressing so that increased drainage can be easily seen. A certain amount of bloody drainage in a wound drainage system or on the dressing is expected, but excessive amounts should be reported to the surgeon. Increasing amounts of fresh blood on the dressing should be reported immediately. Some wounds are irrigated heavily before closure in the operating room, and open drains exiting the wound may be embedded in the dressings. These wounds may drain large amounts of blood-tinged fluid that saturate the dressing. The dressing can be reinforced with sterile gauze bandages; the time that they were reinforced should be documented. If drainage continues, the surgeon should be notified so that the dressing can be changed. Multiple similar drains are numbered or otherwise labeled (eg, left lower quadrant, left upper quadrant) so that output measurements can be reliably and consistently recorded.

Surgical wound healing occurs in three phases: the inflammatory, proliferative, and maturation phases (Table 20-2). Wounds also heal by different mechanisms, depending on the condition

of the wound. These mechanisms include first-, second-, or third-intention wound healing (Meeker & Rothrock, 1999).

First-Intention Healing

Wounds made aseptically, with a minimum of tissue destruction, and properly closed heal with little tissue reaction by first intention (primary union) (Fig. 20-7). When wounds heal by **first-intention healing**, granulation tissue is not visible and scar formation is minimal. Postoperatively, many of these wounds are covered with a dry sterile dressing. If a cyanoacrylate tissue adhesive was used to close the incision without the use of sutures, a dressing is contraindicated (Vargas & Reiger, 2000).

Second-Intention Healing

Second-intention healing (granulation) occurs in infected wounds (abscess) or in wounds in which the edges have not been approximated. When an abscess is incised, it collapses partly, but the dead and the dying cells forming its walls are still being released into the cavity. For this reason, drainage tubes or gauze packing are inserted into the abscess pocket to allow drainage to escape easily. Gradually, the necrotic material disintegrates and escapes, and the abscess cavity fills with a red, soft, sensitive tissue that bleeds easily. This tissue is composed of minute, thin-walled capillaries and buds that later form connective tissue. These buds, called granulations, enlarge until they fill the area left by the destroyed tissue (see Fig. 20-7). The cells surrounding the capillaries change their round shape to become long, thin, and intertwined to form a scar (cicatrix). Healing is complete when skin cells (epithelium) grow over these granulations. This method of repair is called healing by granulation, and it takes place whenever pus is formed or when loss of tissue has occurred for any reason. When the postoperative wound is allowed to heal by secondary intention, it is usually packed with saline-moistened sterile dressings and covered with a dry sterile dressing.

Third-Intention Healing

Third-intention healing (secondary suture) is used for deep wounds that have either not been sutured early or that break down and are resutured later, thus bringing together two apposing granulation surfaces. This results in a deeper and wider scar. These wounds are also packed postoperatively with moist gauze and covered with a dry sterile dressing.

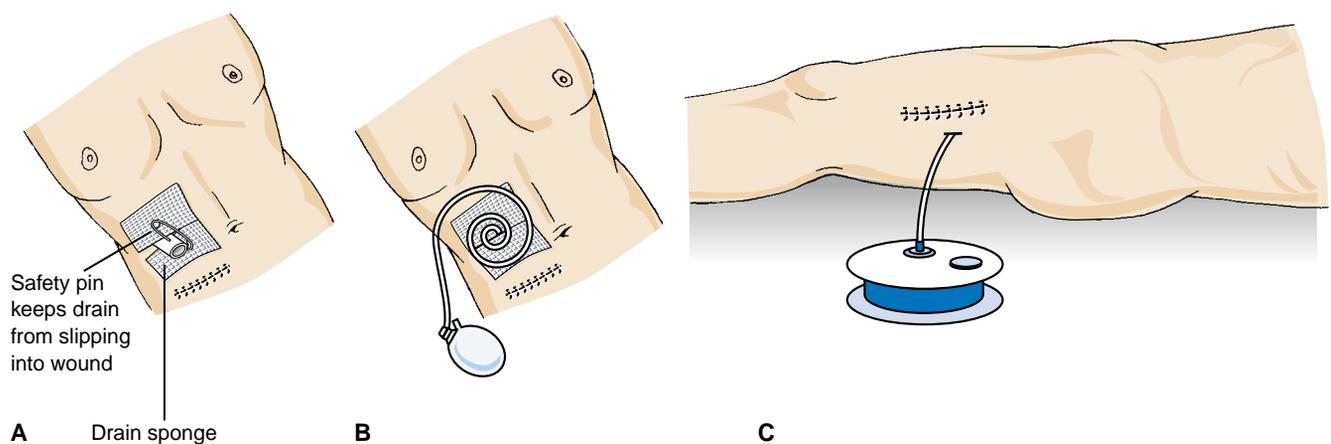


FIGURE 20-6 Types of surgical drains: (A) Penrose, (B) Jackson-Pratt, (C) Hemovac.

Table 20-2 • Phases of Wound Healing

PHASE	DURATION	EVENTS
Inflammatory (also called lag or exudative phase)	1–4 days	Blood clot forms Wound becomes edematous Debris of damaged tissue and blood clot are phagocytosed
Proliferative (also called fibroblastic or connective tissue phase)	5–20 days	Collagen produced Granulation tissue forms Wound tensile strength increases
Maturation (also called differentiation, resorptive, remodeling, or plateau phase)	21 days to months or even years	Fibroblasts leave wound Tensile strength increases Collagen fibers reorganize and tighten to reduce scar size

As a wound heals, many factors, such as adequate nutrition, cleanliness, rest, and position, determine how quickly healing occurs. These factors are influenced by nursing interventions. Specific nursing assessments and interventions that address these factors and help to promote wound healing are presented in Table 20-3. Other nursing interventions include assessment and care of the wound.

CHANGING THE DRESSING

While the first postoperative dressing is usually changed by a member of the surgical team, subsequent dressing changes in the immediate postoperative period are usually performed by the nurse. A dressing is applied to a wound for one or more of the following reasons: (1) to provide a proper environment for wound

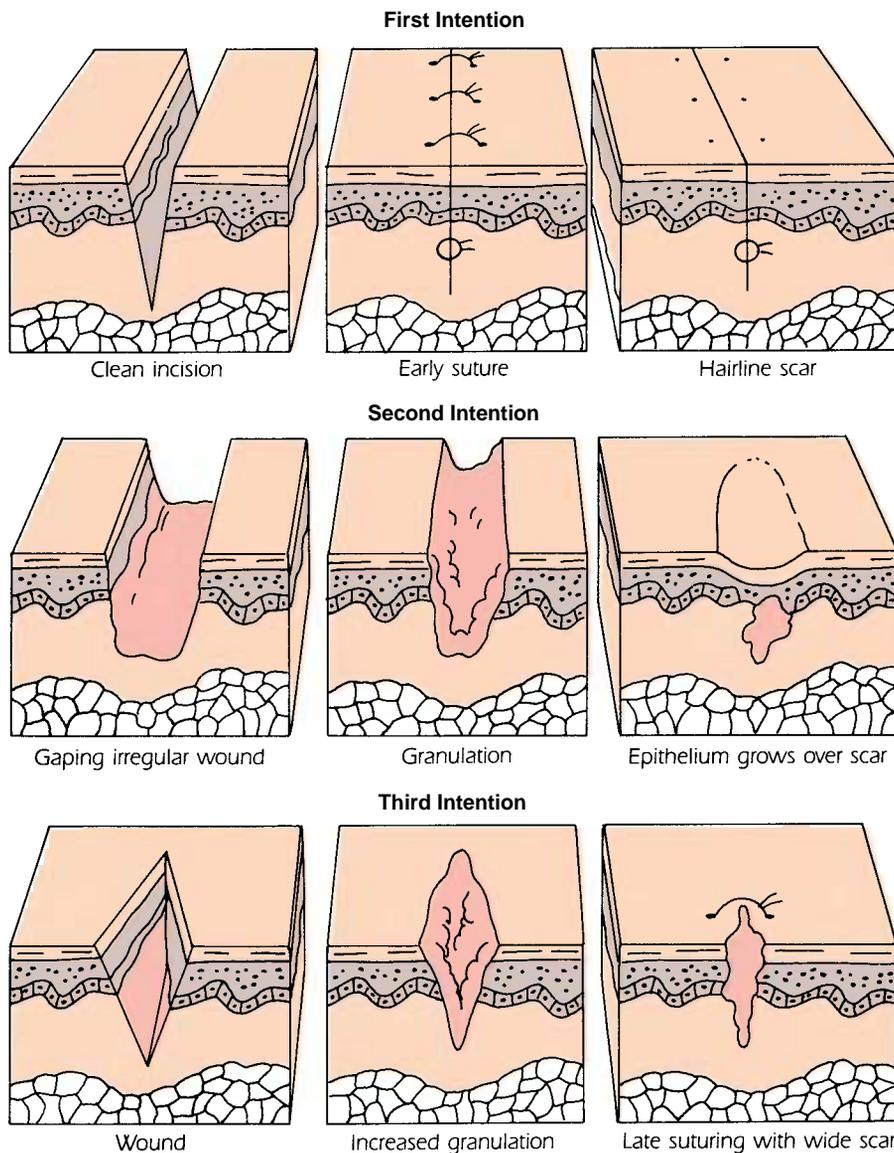


FIGURE 20-7 Types of wound healing: first intention healing, second intention healing, and third intention healing.

Table 20-3 • Factors Affecting Wound Healing

FACTORS	RATIONALE	NURSING INTERVENTIONS
Age of patient Handling of tissues Hemorrhage	The older the patient, the less resilient the tissues. Rough handling causes injury and delayed healing. Accumulation of blood creates dead spaces as well as dead cells that must be removed. The area becomes a growth medium for organisms.	Handle all tissues gently. Handle tissues carefully and evenly. Monitor vital signs. Observe incision site for evidence of bleeding and infection.
Hypovolemia	Insufficient blood volume leads to vasoconstriction and reduced oxygen and nutrients available for wound healing.	Monitor for volume deficit (circulatory impairment). Correct by fluid replacement as prescribed.
Local factors Edema	Reduces blood supply by exerting increased interstitial pressure on vessels	Elevate part; apply cool compresses.
Inadequate dressing technique Too small Too tight	Permits bacterial invasion and contamination Reduces blood supply carrying nutrients and oxygen	Follow guidelines for proper dressing technique.
Nutritional deficits	Protein-calorie depletion may occur. Insulin secretion may be inhibited, causing blood glucose to rise.	Correct deficits; this may require parenteral nutritional therapy. Monitor blood glucose levels. Administer vitamin supplements as prescribed.
Foreign bodies	Foreign bodies retard healing.	Keep wounds free of dressing threads, talcum, and powder from gloves.
Oxygen deficit (tissue oxygenation insufficient)	Insufficient oxygen may be due to inadequate lung and cardiovascular function as well as localized vasoconstriction.	Encourage deep breathing, turning, controlled coughing.
Drainage accumulation	Accumulated secretions hamper healing process.	Monitor closed drainage systems for proper functioning. Institute measures to remove accumulated secretions.
Medications Corticosteroids	May mask presence of infection by impairing normal inflammatory response	Be aware of action and effect of medications patient is receiving.
Anticoagulants Broad-spectrum and specific antibiotics	May cause hemorrhage Effective if administered immediately before surgery for specific pathology or bacterial contamination. If administered after wound is closed, ineffective because of intravascular coagulation.	
Patient overactivity	Prevents approximation of wound edges. Resting favors healing.	Use measures to keep wound edges approximated: taping, bandaging, splints. Encourage rest.
Systemic disorders Hemorrhagic shock Acidosis Hypoxia Renal failure Hepatic disease Sepsis	These depress cell functions that directly affect wound healing.	Be familiar with the nature of the specific disorder. Administer prescribed treatment. Cultures may be indicated to determine appropriate antibiotic.
Immunosuppressed state	Patient is more vulnerable to bacterial and viral invasion; defense mechanisms are impaired.	Provide maximum protection to prevent infection. Restrict visitors with colds; institute mandatory hand hygiene by all staff.
Wound stressors Vomiting Valsalva maneuver Heavy coughing Straining	Produce tension on wounds, particularly of the torso.	Encourage frequent turning and ambulation and administer antiemetic medications as prescribed. Assist patient in splinting incision.

healing; (2) to absorb drainage; (3) to splint or immobilize the wound; (4) to protect the wound and new epithelial tissue from mechanical injury; (5) to protect the wound from bacterial contamination and from soiling by feces, vomitus, and urine; (6) to promote hemostasis, as in a pressure dressing; and (7) to provide mental and physical comfort for the patient.

The patient is told that the dressing is to be changed and that changing the dressing is a simple procedure associated with little discomfort. The dressing change is performed at a suitable time (eg, not at mealtimes or when visitors are present). Privacy is provided, and the patient is not unduly exposed. The nurse should avoid referring to the incision as a scar since the term may have negative connotations for the patient. Assurance is given that the incision will shrink as it heals and the redness will fade.

The nurse carries out hand hygiene before and after the dressing change and wears disposable gloves for the dressing change itself. The tape or adhesive portion of the dressing is removed by pulling it parallel with the skin surface and in the direction of hair growth, rather than at right angles. Alcohol wipes or nonirritating solvents aid in removing adhesive painlessly and quickly. The old dressing is removed and then deposited in a container designated for biomedical waste disposal. In accordance with standard precautions, dressings are never touched by ungloved hands because of the danger of transmitting pathogenic organisms.

If the patient is sensitive to adhesive tape, the dressing may be held in place with hypoallergenic tape. Many tapes are porous to permit ventilation and prevent skin maceration. The correct way to apply tape is to place the tape at the center of the dressing and then press the tape down on both sides, applying tension evenly away from the midline. The wrong method of applying tape—fixing one end of the tape to the skin and pulling it tight over the

dressing—often wrinkles and pulls the skin in the process. The resulting continuous and forceful traction produces a shearing effect, causing the epidermal layer to slip sideways and become separated from the deeper dermal layers. Some wounds become edematous after having been dressed, causing considerable tension on the tape. If the tape is not flexible, the stretching bandage will also cause a shear injury to the skin. This can result in denuded areas or large blisters. An elastic adhesive bandage (Elastoplast, Microfoam-3M) may be used to hold dressings in place over mobile areas, such as the neck or the extremities, or where pressure is required.

While changing the dressing, the nurse has an opportunity to teach the patient how to care for the incision and change the dressings at home. The nurse observes for indicators of the patient's readiness to learn, such as looking at the incision, expressing interest, or assisting in the dressing change. Information on self-care activities and possible signs of infection are summarized in Chart 20-3.

MAINTAINING NORMAL BODY TEMPERATURE

The patient is still at risk for malignant hyperthermia and hypothermia in the postoperative period (Fortunato-Phillips, 2000). Efforts are made to identify malignant hyperthermia and to treat it early and promptly (Redmond, 2001). (See the discussion of malignant hyperthermia in Chap. 19.)

Patients who have been anesthetized are susceptible to chills and drafts. Attention to hypothermia management, begun in the intraoperative period, extends into the postoperative period to prevent significant nitrogen loss and catabolism. Signs of hypothermia are reported to the physician. The room is maintained at a comfortable temperature, and blankets are provided to prevent chilling. Treatment includes oxygen administration, adequate



Chart 20-3 • PATIENT EDUCATION Wound Care Instructions

Until Sutures Are Removed

- Keep the wound dry and clean.
 - If there is no dressing, ask your nurse or physician if you can bathe or shower.
 - If a dressing or splint is in place, do not remove it unless it is wet or soiled.
 - If wet or soiled, change dressing yourself if you have been taught to do so; otherwise, call your nurse or physician for guidance.
 - If you have been taught, instruction might be as follows:
 - Cleanse area *gently* with sterile normal saline once or twice daily.
 - Cover with a sterile Telfa pad or gauze square large enough to cover wound.
 - Apply hypoallergenic tape (Dermacel or paper). Adhesive is not recommended because it is difficult to remove without possible injury to the incisional site.
- Immediately report any of these signs of infection:
 - Redness, marked swelling exceeding $\frac{1}{2}$ inch (2.5 cm) from incision site; tenderness; or increased warmth around wound
 - Red streaks in skin near wound
 - Pus or discharge, foul odor
 - Chills or temperature higher than 37.7°C (100°F)
- If soreness or pain causes discomfort, apply a dry cool pack (containing ice or cold water) or take prescribed

acetaminophen tablets (2) every 4–6 hours. Avoid using aspirin without direction or instruction because bleeding can occur with its use.

- Swelling after surgery is common. To help reduce swelling, elevate the affected part to the level of the heart.
 - Hand or arm
 - Sleep—elevate arm on pillow at side
 - Sitting—place arm on pillow on adjacent table
 - Standing—rest affected hand on opposite shoulder; support elbow with unaffected hand
 - Leg or foot
 - Sitting—place a pillow on a facing chair; provide support underneath the knee
 - Lying—place a pillow under affected leg

After Sutures Are Removed

Although the wound appears to be healed when sutures are removed, it is still tender and will continue to heal and strengthen for several weeks.

- Follow recommendations of physician or nurse regarding extent of activity.
- Keep suture line clean; do not rub vigorously; pat dry. Wound edges may look red and may be slightly raised. This is normal.
- If the site continues to be red, thick, and painful to pressure after 8 weeks, consult the health care provider. (This may be due to excessive collagen formation and should be checked.)

hydration, and proper nutrition. The patient is also monitored for cardiac dysrhythmias. The risk for hypothermia is greater in the elderly and in patients who were in the cool operating room environment for a prolonged period.

MANAGING GASTROINTESTINAL FUNCTION AND RESUMING NUTRITION

Gastrointestinal discomfort (nausea, vomiting, hiccups) and resumption of oral intake are issues for both the patient and the nurse. Nausea and vomiting are common after anesthesia (Litwack, 1999; Meeker & Rothrock, 1999). They are more common in women, obese people (fat cells act as reservoirs for the anesthetic), patients prone to motion sickness, and patients who have undergone lengthy surgical procedures. Other causes of postoperative vomiting include an accumulation of fluid in the stomach, inflation of the stomach, and the ingestion of food and fluid before peristalsis resumes.

When vomiting is likely because of the nature of surgery, a nasogastric tube is inserted preoperatively and remains in place throughout the surgery and the immediate postoperative period. In addition, a nasogastric tube may be inserted when a patient who has food in the stomach requires emergency surgery.

Hiccups, produced by intermittent spasms of the diaphragm secondary to irritation of the phrenic nerve, can occur after surgery. The irritation may be direct, such as from stimulation of the nerve by a distended stomach, subdiaphragmatic abscess, or abdominal distention; indirect, such as from toxemia or uremia that stimulates the center; or reflexive, such as irritation from a drainage tube or obstruction of the intestines. Usually these occurrences are mild, transitory attacks that cease spontaneously. When hiccups persist, they may produce considerable distress and serious effects such as vomiting, exhaustion, and wound dehiscence. The physician may prescribe phenothiazine medications for severe, persistent hiccups.

Once nausea and vomiting have subsided and the patient is fully awake and alert, the sooner he or she can tolerate a usual diet, the more quickly normal gastrointestinal function will resume. Taking food by mouth stimulates digestive juices and promotes gastric function and intestinal peristalsis. The return to normal dietary intake should proceed at the pace set by the patient. Of course, the nature of surgery and the type of anesthesia directly affect the rate at which normal gastric activity resumes. Liquids are typically the first substances desired and tolerated by the patient after surgery. Water, fruit juices, and tea may be given in increasing amounts. Cool fluids are tolerated more easily than those that are ice cold or hot. Soft foods (gelatin, custard, milk, and creamed soups) are added gradually after clear fluids have been tolerated. As soon as the patient tolerates soft foods well, solid food may be given.

Assessment and management of gastrointestinal function are important after surgery because the gastrointestinal tract is subject to uncomfortable or potentially life-threatening complications. Any postoperative patient may suffer from distention. Postoperative distention of the abdomen results from the accumulation of gas in the intestinal tract. Manipulation of the abdominal organs during surgery may produce a loss of normal peristalsis for 24 to 48 hours, depending on the type and extent of surgery. Even though nothing is given by mouth, swallowed air and gastrointestinal secretions enter the stomach and the intestines; if not propelled by peristalsis, they collect in the intestines, producing distention and causing the patient to complain of fullness or pain in the abdomen. Most often, the gas collects in the colon.

Abdominal distention is further increased by immobility, anesthetic agents, and the use of opioid medications.

After major abdominal surgery, distention may be avoided by having the patient turn frequently, exercise, and ambulate as early as possible. This also alleviates distention produced by swallowing air, which is common in anxious patients. When postoperative distention is anticipated, a nasogastric tube may be inserted before surgery. The tube may remain in place until full peristaltic activity (indicated by the passage of flatus) has resumed. The nurse can determine when peristaltic bowel sounds return by listening to the abdomen with a stethoscope. Bowel sounds are documented so that diet progression can occur.

Paralytic ileus and intestinal obstruction are potential postoperative complications that occur more frequently in patients undergoing intestinal or abdominal surgery. Refer to Chapter 37 for discussion of treatment.

PROMOTING BOWEL FUNCTION

Constipation is common after surgery and can range from a minor irritation to a serious complication (Fox, 1998). Decreased mobility, decreased oral intake, and opioid analgesics contribute to difficulty having a bowel movement. In addition, irritation and trauma to the bowel during surgery may inhibit intestinal movement for several days. The combined effect of early ambulation, improved dietary intake, and a stool softener (if prescribed) promotes bowel elimination. Until the patient reports return of normal bowel function, the nurse should assess the abdomen for distention and the presence and frequency of bowel sounds. If the abdomen is not distended and bowel sounds are normal, and if the patient does not have a bowel movement by the second or third postoperative day, the physician should be notified so that a laxative can be given that evening.

MANAGING VOIDING

Urinary retention after surgery can occur for various reasons. Anesthetics, anticholinergic agents, and opioids interfere with the perception of bladder fullness and the urge to void and inhibit the ability to initiate voiding and completely empty the bladder. Abdominal, pelvic, and hip surgery may increase the likelihood of retention secondary to pain. Additionally, some patients find it difficult to use the bedpan or urinal in the recumbent position.

Bladder distention and the urge to void should be assessed on the patient's arrival on the unit and frequently thereafter. The patient is expected to void within 8 hours of surgery (this includes time spent in the PACU). If the patient has an urge to void and cannot, or if the bladder is distended and no urge is felt or the patient cannot void, catheterization is not delayed solely on the basis of the 8-hour time frame. All methods to encourage the patient to void should be tried (eg, letting water run, applying heat to the perineum). The bedpan should be warm; a cold bedpan causes discomfort and automatic tightening of muscles (including the urethral sphincter). When the patient cannot void on a bedpan, it may be permissible to use a commode rather than resorting to catheterization. Male patients are often permitted to sit up or stand beside the bed to use the urinal, but safeguards should be taken to prevent the patient from falling or fainting due to loss of coordination from medications or orthostatic hypotension. If the patient cannot void in the specified time frame, the patient is catheterized and the catheter removed after the bladder has emptied. Straight intermittent catheterization is preferred over indwelling catheterization because the risk for infection is increased with an indwelling catheter.

Even if the patient voids, the bladder may not necessarily be empty. The nurse notes the amount of urine voided and palpates the suprapubic area for distention or tenderness. A portable ultrasound device may also be used to assess residual volume. Intermittent catheterization continues every 4 to 6 hours until the patient can void spontaneously and the postvoid residual is less than 100 mL.

MAINTAINING A SAFE ENVIRONMENT

During the immediate postoperative period, the patient recovering from anesthesia should have all side rails up, and the bed should be in the low position. The nurse assesses the patient's level of consciousness and orientation and determines if the patient needs his or her eyeglasses or hearing aid, because impaired vision, inability to hear postoperative instructions, or inability to communicate verbally place the patient at risk for injury. All objects the patient may need should be within reach, especially the call bell. Any immediate postoperative orders concerning special positioning, equipment, or interventions should be implemented as soon as possible. The patient is instructed to ask for assistance with any activity. Although they are occasionally necessary for the disoriented patient, restraints should not be used if at all possible.

Any surgical procedure has the potential for injury due to disrupted neurovascular integrity resulting from prolonged awkward positioning in the operating room, manipulation of tissues, inadvertent severing of nerves, or tight bandages. Any orthopedic surgery or surgery involving the extremities carries a risk for peripheral nerve damage. Vascular surgeries, such as replacing sections of diseased peripheral arteries or inserting an arteriovenous graft, put the patient at risk for thrombus formation at the surgical site and subsequent ischemia of tissues distal to the thrombus. Assessment includes having the patient move the hand or foot distal to the surgical site through a full range of motion, assessing that all surfaces have intact sensation, and assessing peripheral pulses.

PROVIDING EMOTIONAL SUPPORT TO THE PATIENT AND FAMILY

Although patients and families are undoubtedly relieved that surgery is over, anxiety levels may remain high in the immediate postoperative period. Many factors contribute to this anxiety: pain, being in an unfamiliar environment, feeling unable to control one's circumstances, fear of the long-term effects of surgery, fear of complications, loss of ability to care for self, fatigue, spiritual distress, altered role responsibilities, ineffective coping, and altered body image are all potential reactions to the surgical experience. The nurse helps the patient and family work through their anxieties by providing reassurance and information and by spending time listening to and addressing their concerns. The nurse describes hospital routines and what to expect in the ensuing hours and days until discharge and explains the purpose of nursing assessments and interventions. Informing patients when they will be able to drink fluids or eat, when they will be getting out of bed, and when tubes and drains will be removed helps them gain a sense of control and participation in recovery and engages them in the plan of care. Acknowledging family members' concerns and accepting and encouraging their participation in the patient's care assists them in feeling they are helping their loved one. The nurse can manipulate the environment to enhance rest and relaxation by providing privacy, reducing noise, adjusting the lighting, providing enough seating for family members, and performing any other measures that will produce a supportive atmosphere.

MANAGING POTENTIAL COMPLICATIONS

Deep Vein Thrombosis

Deep vein thrombosis and other complications, such as pulmonary embolism, are serious potential complications of surgery (Chart 20-4). The stress response that is initiated as a result of surgery inhibits the fibrinolytic system, resulting in blood hypercoagulability. Dehydration, low cardiac output, blood pooling in the extremities, and bed rest add to the risk of thrombosis formation. Although all postoperative patients are at some risk, certain surgeries and patient populations carry a greater risk. The first symptom of deep vein thrombosis may be a pain or cramp in the calf. Although not present in all cases, calf pain elicited on ankle dorsiflexion (Homans' sign) suggests thrombosis (Fig. 20-8). Initial pain and tenderness may be followed by a painful swelling of the entire leg, often accompanied by a fever, chills, and diaphoresis.

Prophylactic treatment for postoperative patients at risk is common practice. Low-dose heparin may be prescribed and administered subcutaneously until the patient is ambulatory. Low-molecular-weight heparin and low-dose warfarin are other anticoagulants that may be used. External pneumatic compression and thigh-high elastic compression stockings can be used alone or in combination with low-dose heparin.



Chart 20-4

Risk Factors for Postoperative Complications

Patients at increased risk for postoperative complications (eg, deep vein thrombosis) and pulmonary problems include the following:

Deep Vein Thrombosis

- Orthopedic patients having hip surgery, knee reconstruction, and other lower extremity surgery
- Urologic patients having transurethral prostatectomy, and older patients having urologic surgery
- General surgical patients over 40 years of age, those who are obese, those with a malignancy, those who have had prior deep vein thrombosis or pulmonary embolism, or those undergoing extensive, complicated surgical procedures
- Gynecology (and obstetric) patients over 40 years of age with added risk factors (varicose veins, previous venous thrombosis, infection, malignancy, obesity)
- Neurosurgical patients, similar to other surgical high-risk groups (in patients with stroke, for instance, the risk of deep vein thrombosis in the paralyzed leg is as high as 75%)

Pulmonary Complications

- Type of surgery—greater incidence after all forms of abdominal surgery when compared with peripheral surgery
- Location of incision—the closer the incision to the diaphragm, the higher the incidence of pulmonary complications
- Preoperative respiratory problems
- Age—greater risk after age 40 than before age 40
- Sepsis
- Obesity—weight greater than 110% of ideal body weight
- Prolonged bed rest
- Duration of surgical procedure—more than 3 hours
- Aspiration
- Dehydration
- Malnutrition
- Hypotension and shock
- Immunosuppression

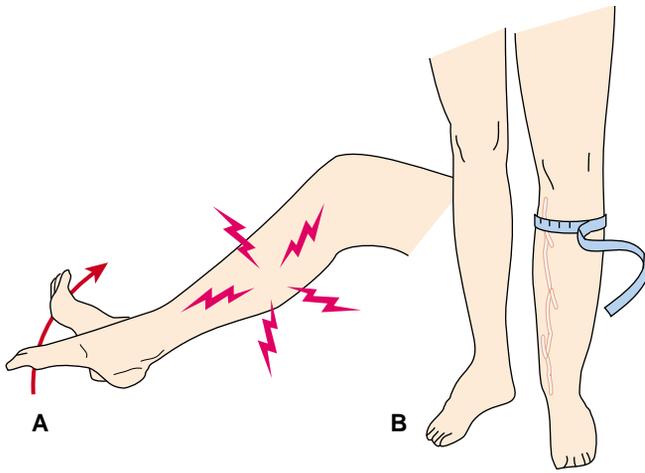


FIGURE 20-8 Assessment of signs and symptoms of deep vein thrombosis. (A) With the knee flexed, the patient may complain of pain in the calf on dorsiflexion of the foot (Homans' sign). This is a sign of early and subclinical thrombosis, which may or may not be present. Gentle compression reveals tenderness of the calf muscles (note arrow). (B) The affected leg may swell; veins are more prominent and may be palpated easily.

The benefits of early ambulation and hourly leg exercises in preventing deep vein thrombosis cannot be overemphasized, and these activities are recommended for all patients, regardless of their risk. It is important to avoid the use of blanket rolls, pillow rolls, or any form of elevation that can constrict vessels under the knees. Even prolonged “dangling” (having the patient sit on the edge of the bed with legs hanging over the side) can be dangerous and is not recommended in susceptible patients because pressure under the knees can impede circulation. Adequate hydration is also encouraged; the patient can be offered juices and water

throughout the day to avoid dehydration. Refer to Chapter 30 for a complete discussion of deep vein thrombosis and to Chapter 23 for discussion of pulmonary embolus.

Hematoma

At times, concealed bleeding occurs beneath the skin at the surgical site. This hemorrhage usually stops spontaneously but results in clot (hematoma) formation within the wound. If the clot is small, it will be absorbed and need not be treated. When the clot is large, the wound usually bulges somewhat, and healing will be delayed unless the clot is removed. After several sutures are removed by the physician, the clot is evacuated and the wound is packed lightly with gauze. Healing occurs usually by granulation, or a secondary closure may be performed.

Infection (Wound Sepsis)

The creation of a surgical wound disrupts the integrity of the skin and its protective function. Exposure of deep body tissues to pathogens in the environment places the patient at risk for infection of the surgical site, a potentially life-threatening complication. Surgical site infection increases hospital length of stay, costs of care, and risk for further complications. In postoperative patients, surgical site infection is the most common nosocomial infection, with 67% of these infections occurring within the incision and 33% occurring in an organ or space around the surgical site (CDC, 1999). Recent research suggests that the administration of supplemental oxygen during colorectal resection and for 2 hours postoperatively reduces the incidence of postoperative infection (Greif, Ozan, Horn et al., 2000).

Multiple factors place the patient at risk for wound infection. One risk factor is the wound classification. Surgical wounds are classified according to the degree of contamination. Table 20-4 defines the terms used to describe surgical wounds and gives the expected rate of wound infection per category. Other risk factors

Table 20-4 • Wound Classification and Associated Surgical Site Infection Risk

SURGICAL CATEGORY	DETERMINANTS OF CATEGORY	EXPECTED RISK OF POSTSURGICAL INFECTION (%)
Clean	Nontraumatic site Uninfected site No inflammation No break in aseptic technique No entry into respiratory, alimentary, genitourinary, or oropharyngeal tracts	1–3
Clean-contaminated	Entry into respiratory, alimentary, genitourinary or oropharyngeal tracts without unusual contamination Appendectomy Minor break in aseptic technique Mechanical drainage	3–7
Contaminated	Open, newly experienced traumatic wounds Gross spillage from gastrointestinal tract Major break in aseptic technique Entry into genitourinary or biliary tract when urine or bile is infected	7–16
Dirty	Traumatic wound with delayed repair, devitalized tissue, foreign bodies, or fecal contamination Acute inflammation and purulent drainage encountered during procedure	16–29

include both patient-related factors and those associated with the surgical procedure. Patient-related factors include age, nutritional status, diabetes, smoking, obesity, remote infections, endogenous mucosal microorganisms, altered immune response, length of preoperative stay, and severity of illness (Bryant, 2000). Factors related to the surgical procedure include the method of preoperative skin preparation, surgical attire of the team, method of sterile draping, duration of surgery, antimicrobial prophylaxis, aseptic technique, factors related to surgical technique, drains or foreign material, operating room ventilation, and exogenous microorganisms. Efforts to prevent wound infection are directed at reducing these risks. Preoperative and intraoperative risks and interventions are discussed in Chapters 18 and 19. Although the conditions for surgical site infection and serious contamination of the wound occur in the preoperative and intraoperative time frames, postoperative care of the wound centers on assessing the wound, preventing contamination and infection before wound edges have sealed, and enhancing healing.

Wound infection may not present until at least postoperative day 5. Most patients are discharged before that time, and more than half of wound infections are diagnosed after discharge, highlighting the importance of patient education regarding wound care. Risk factors for wound sepsis include wound contamination, foreign body, faulty suturing technique, devitalized tissue, hematoma, debilitation, dehydration, malnutrition, anemia, advanced age, extreme obesity, shock, length of preoperative hospitalization, duration of surgical procedure, and associated disorders (eg, diabetes mellitus, immunosuppression). Signs and symptoms of wound infection include pulse rate and temperature elevation; an elevated white blood cell count; wound swelling, warmth, tenderness, or discharge; and incisional pain. Local signs may be absent if the infection is deep. *Staphylococcus aureus* accounts for many postoperative wound infections. Other infections may result from *Escherichia coli*, *Proteus vulgaris*, *Aerobacter aerogenes*, *Pseudomonas aeruginosa*, and other organisms. Although rare, beta-hemolytic streptococcal or clostridial infections can be rapid and deadly. If wound infection due to beta-hemolytic streptococcus or clostridium occurs, extreme care is needed to prevent spread of infection to others. Intensive medical and nursing care is essential if the patient is to survive.

When a wound infection is diagnosed in a surgical incision, the surgeon may remove one or more sutures or staples and, using aseptic precautions, separate the wound edges with a pair of blunt scissors or a hemostat. Once the incision is opened, a drain is inserted. If the infection is deep, an incision and drainage procedure may be necessary. Antimicrobial therapy and a wound care regimen are also initiated (Bryant, 2000).

Wound Dehiscence and Evisceration

Wound **dehiscence** (disruption of surgical incision or wound) and **evisceration** (protrusion of wound contents) are serious surgical complications (Fig. 20-9). Dehiscence and evisceration are especially serious when they involve abdominal incisions or wounds. These complications result from sutures giving way, from infection, and, more frequently, after marked distention or strenuous cough. They may also occur because of increasing age, poor nutritional status, and pulmonary or cardiovascular disease in patients undergoing abdominal surgery.

When the wound edges separate slowly, the intestines may protrude gradually or not at all, and the earliest sign may be a gush of bloody (serosanguineous) peritoneal fluid from the wound. When a wound ruptures suddenly, coils of intestine may push out of the abdomen. The patient may report that “some-

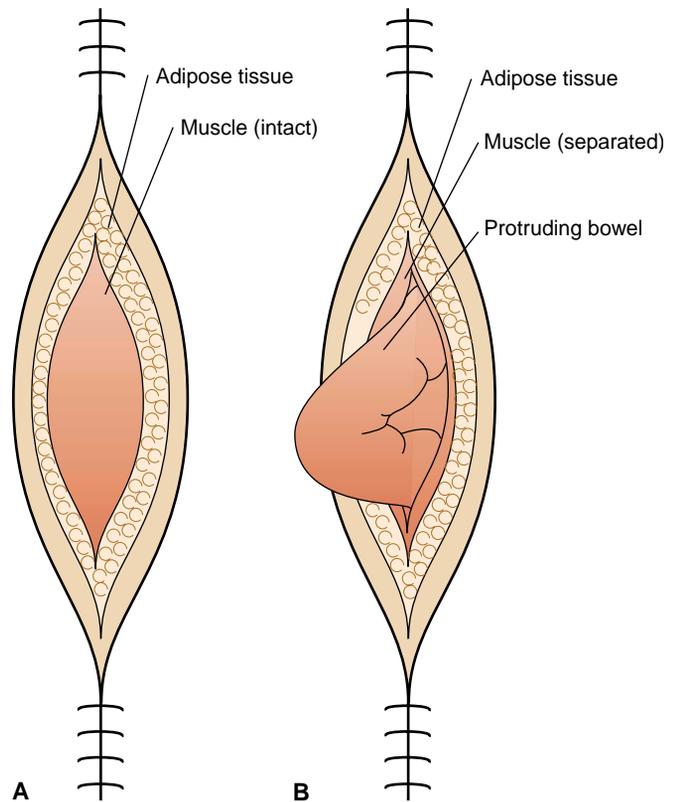


FIGURE 20-9 (A) Wound dehiscence; (B) wound evisceration.

thing gave way.” The evisceration causes pain and can be associated with vomiting.

NURSING ALERT When disruption of a wound occurs, the patient is placed in low Fowler’s position and instructed to lie quietly. These actions minimize protrusion of body tissues. The protruding coils of intestine are covered with sterile dressings moistened with sterile saline solution, and the surgeon is notified at once.

An abdominal binder, properly applied, is an excellent prophylactic measure against an evisceration and often is used along with the primary dressing, especially in patients with weak or pendulous abdominal walls or when rupture of a wound has occurred.

Gerontologic Considerations

Older adults recover more slowly, have a longer hospital stay, and are at greater risk for developing postoperative complications (Polanczyk et al., 2001). Delirium, pneumonia, decline in functional ability, exacerbation of comorbid conditions, pressure ulcers, decreased oral intake, gastrointestinal disturbance, and falls are all threats to recovery in the older adult. Expert nursing care can help the older adult avoid these complications or minimize their effects.

Postoperative delirium, characterized by confusion, perceptual and cognitive deficits, altered attention levels, disturbed sleep patterns, and impaired psychomotor skills, is a significant problem for older adults. Causes of delirium are multifactorial (Chart 20-5).

Chart
20-5

Causes of Postoperative Delirium

- Fluid and electrolyte imbalance
- Dehydration
- Hypoxia
- Hypercarbia
- Acid–base disturbance
- Infection (urinary tract, wound, respiratory)
- Medications (anticholinergics, benzodiazepines, central nervous system depressants)
- Unrelieved pain
- Blood loss
- Decreased cardiac output
- Cerebral hypoxia
- Heart failure
- Acute myocardial infarction
- Hypothermia or hyperthermia
- Unfamiliar surroundings and sensory deprivation
- Emergent surgery
- Alcohol withdrawal
- Urinary retention
- Fecal impaction

Skilled and frequent assessment of mental status and of all physiologic factors influencing mental status helps the nurse plan care, because in the elderly patient delirium may be the initial or only early indicator of infection, fluid and electrolyte imbalance, or deterioration of respiratory or hemodynamic status. Factors that determine if the patient is at risk for delirium include age, history of alcohol abuse, preoperative cognitive function, physical function, serum chemistries, and type of surgery.

Recognizing postoperative delirium and identifying and treating its underlying cause are the goals of care. Postoperative delirium is sometimes mistaken for preexisting dementia or is attributed to age. In addition to monitoring and managing identifiable causes, nurses can implement supportive interventions. Keeping the patient in a well-lit room and close to the nurses' station can help with sensory deprivation. At the same time, distracting and unfamiliar noises should be minimized. Because pain can contribute to postoperative delirium, the nurse collaborates with the physician or geriatric nurse specialist and the patient to achieve pain relief without oversedation (Lynch, Lazor, Gellis et al., 1998). The patient is reoriented as often as necessary, and staff should introduce themselves each time they come in contact with the patient. Engaging the patient in conversation and care activities and placing a clock and calendar nearby may improve cognitive function. Physical activity should not be neglected while the patient is confused, because physical deterioration can worsen delirium and place the patient at increased risk for other complications. Restraints should be avoided because they can also worsen confusion. If possible, a family member or staff member is asked to sit with the patient instead. Haloperidol (Haldol) or lorazepam (Ativan) may be given during episodes of acute confusion, but these medications should be discontinued as soon as possible to avoid side effects.

Other problems confronting the older postoperative patient, such as pneumonia, altered bowel function, deep vein thrombosis, weakness, and functional decline, often can be prevented by early and progressive ambulation. Ambulation means walking,

not just getting out of bed and sitting in a chair. Prolonged sitting positions that promote venous stasis in the lower extremities should be avoided. Assistance with ambulation may be required to keep the patient from bumping into objects and falling. A physical therapy referral may be indicated to promote safe, regular exercise for the older adult.

Urinary incontinence can be prevented by providing easy access to the call bell and the commode and by prompting voiding. Early ambulation and familiarity with the room help the patient to become self-sufficient sooner.

Optimal nutritional status is important for wound healing, return of normal bowel function, and fluid and electrolyte balance. The nurse and patient can consult with the dietitian to plan appealing, high-protein meals that provide sufficient fiber, calories, and vitamins. Nutritional supplements, such as Ensure or Sustacal, may be recommended. Multivitamins, iron, and vitamin C supplements aid in tissue healing, formation of new red blood cells, and overall nutritional status and are commonly prescribed postoperatively.

In addition to monitoring and managing the older adult's physiologic recovery, the nurse identifies and addresses psychosocial needs. The older adult may require more encouragement and support to resume activities, and the pace may be slower. Sensory deficits may require frequent repetition of instructions, and decreased physiologic reserve may necessitate frequent rest periods. The older adult may require extensive discharge planning to coordinate both professional and family care providers, and the nurse, social worker, or nurse case manager may institute the plan for continuing care.

PROMOTING HOME AND COMMUNITY-BASED CARE

Teaching Patients Self-Care

Patients have always required detailed discharge instructions to become proficient in special self-care needs after surgery; however, dramatically reduced hospital lengths of stay during the past decade have greatly increased the amount of information that should be provided while reducing the amount of time in which to provide it (Fox, 1998; Quinn, 1999). Although needs are specific to individual patients and the procedures they have undergone, general patient education needs for postoperative care have been identified (see Chart 20-1).

Continuing Care

Continuing care provided by community-based services is frequently necessary after surgery. Older patients, patients who live alone, patients without family support, and patients with preexisting disabilities are often in greatest need. Planning for discharge involves arranging for necessary services early in the acute care hospitalization. Wound care, drain management, catheter care, infusion therapy, and physical or occupational therapy are some of the needs addressed by community health care providers. The home care nurse coordinates these activities and services.

During home care visits, the nurse assesses the patient for postoperative complications; the nurse also assesses the surgical incision, respiratory and cardiovascular status, adequacy of pain management, fluid and nutritional status, and the patient's progress in returning to preoperative status. The nurse assesses the patient's and family's ability to manage dressing changes and drainage systems and other devices and to administer prescribed medications. The nurse may change dressings or catheters if needed. The nurse determines if any additional services are

needed and assists the patient and family to arrange for them. Previous teaching is reinforced, and the patient is reminded to keep follow-up appointments. The patient and family are instructed about signs and symptoms to be reported to the surgeon. In addition, the nurse may provide information about how to obtain needed supplies and may suggest resources or support groups the patient may want to contact. In many settings, post-operative telephone calls are made to answer questions, assess recovery, and reassure patients and families.

Evaluation

EXPECTED PATIENT OUTCOMES

Expected patient outcomes may include:

1. Maintains optimal respiratory function
 - a. Performs deep-breathing exercises
 - b. Displays clear breath sounds
 - c. Uses incentive spirometer as prescribed
 - d. Splints incisional site when coughing to reduce pain
2. Indicates that pain is decreased in intensity
3. Exercises and ambulates as prescribed
 - a. Alternates periods of rest and activity
 - b. Progressively increases ambulation
 - c. Resumes normal activities within prescribed time frame
 - d. Performs activities related to self-care
4. Wound heals without complication
5. Maintains body temperature within normal limits
6. Resumes oral intake
 - a. Reports absence of nausea and vomiting
 - b. Takes at least 75% of usual diet
 - c. Is free of abdominal distress and gas pains
 - d. Exhibits normal bowel sounds
7. Reports resumption of usual bowel elimination pattern
8. Resumes usual voiding pattern
9. Is free of injury
10. Exhibits decreased anxiety
11. Acquires knowledge and skills necessary to manage therapeutic regimen
12. Experiences no complications

Critical Thinking Exercises

1. Your patient has a history of esophageal cancer and is HIV positive. After undergoing ambulatory surgery to insert a gastric feeding tube, he is to be discharged to home. Indicate which assessment findings would indicate his readiness for discharge. Describe a teaching plan for the patient and his family. How would you modify the plan if the patient lives alone?

2. A patient who has undergone abdominal surgery reports severe pain and as a result is unable to cough and deep breathe. When you listen to the patient's lungs you hear crackles in the bases. Analyze these findings and indicate the interventions you would implement in this situation. How would your care differ if the patient has a musculo-skeletal disorder that makes turning and ambulation difficult?

3. You are visiting a 72-year-old woman who had emergency surgery for a broken hip 3 weeks ago and has returned to her home, where she is living alone. How would you direct your assessment to identify the factors that might affect her recovery? How would you modify your assessment and nursing care plan because of her age?

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RESOURCES AND WEBSITES

- American Academy of Ambulatory Care Nursing, East Holly Ave., Box 56, Pitman, NJ, 08071; (856) 256-2350; (800) AMB-NURS; <http://www.aaacn.org>.
- American Society of PeriAnesthesia Nurses, 10 Melrose Ave., Suite 110, Cherry Hill, NJ 08003-3696; (856) 616-9600 or 9601; toll-free 1-877-737-9696; fax (856) 616-9621; <http://www.aspan.org>.
- Association of PeriOperative Registered Nurses, Inc., 2170 S. Parker Road, Suite 300, Denver, CO 80231; (800) 755-2676, (303) 755-6304; <http://www.aorn.org>.
- Malignant Hyperthermia Association of the United States (MHAUS), 39 East State Street, P.O. Box 1069, Sherburne, NY 13460; (607) 674-7901; <http://www.mhaus.org>.