Competency for Safe Patient Care
During Operative and Invasive Procedures

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**INTRODUCTION**

The *Systems-in-Contingency Model* provides a framework for practice for the nurse providing care for patients undergoing operative or invasive procedures. The model describes the focus of nursing practice in the operative and invasive procedure setting and explains how the nurse relates with other members of the team when with the patient, who is the center and focus of all activities in the operative and invasive procedure setting.

**CORE CONCEPTS**

*Person, environment, health, and nursing* are the core concepts of the *Systems-in-Contingency Model*. These concepts theoretically describe the interaction of the patient with the environment, the goal of nursing care provided by the *registered nurse*, and the focus of all nursing interventions during the operative and invasive procedure period. The core concepts give direction to the nurse in collecting patient health data, analyzing health data, determining diagnoses, identifying expected outcomes, planning care that prescribes interventions to achieve expected outcomes, implementing interventions, and evaluating the patient’s progress toward achievement of outcomes (AORN, 2008).

**ASSUMPTIONS**

Supporting assumptions for the *Systems-in-Contingency Model* are based on the model's concepts of the person as a contingency system interacting with the environment and on the process of establishing and sustaining system equilibrium during the operative and invasive procedure period.
The term nurse refers to the nurse caring for a patient immediately before, during, and immediately after an operative and invasive procedure. Practice areas for the nurse include inpatient, outpatient, and office-based operating rooms, gastrointestinal laboratories, cardiac catheterization laboratories, interventional radiology departments, preprocedure preparation areas, and postprocedure care areas (discharge).

Assumption 1

The person is a holistic system composed of physical, psychological, sociocultural, and spiritual components.

The theory of holism describes the universe in terms of interacting wholes that are more than the mere sum of elementary particles. The person, when viewed from a holistic perspective, is seen as an interacting system that is more than the total of the components of the system. Like other nursing models, the Systems-in-Contingency Model of care of the patient undergoing an operative or invasive procedure views the person as having a physical (biological) nature, a psychological nature, and a sociocultural nature. The model goes a step further, however, to describe the spiritual nature of the person (Fig. 1.1).

Specifically, the physical component describes the anatomical parts of the person and how they function physiologically. The psychological component focuses on the person’s “perception, cognition, emotion, personality, behavior, and interpersonal relationships” (Wikipedia, 2008). The sociocultural component describes the behaviors common to all members of human society and those required for successful functioning in a particular segment of human society. Social behaviors refer to the interactions of a person with a group of people such as the family, a community, or a work group; and cultural behaviors refer to the customary beliefs, values, symbols, knowledge, attitudes, and habits of a specific social group. The spiritual component describes the incorporeal presence, the animating principle, or the actuating cause of a person’s life. A person’s view of the spiritual component is influenced by religious and philosophical beliefs.

Assumption 2

The physical, psychological, sociocultural, and spiritual components of the system exist in a state of contingency.

The physical, psychological, sociocultural, and spiritual components of a person are interrelated, dependent on, and conditioned by one another. Furthermore, each component receives sustenance from the others, which leads to a state of interdependence (Fig. 1.2).

Assumption 3

The spiritual component of the person is the unifying force of the system.

The spiritual component holds the system together and continues to exist after biological death (Fig. 1.3). Some people believe the spiritual component exists in the form of a soul. Others believe that it exists through reincarnation or may continue to exist in one’s family, religious institution, work, community, or school.
INTRODUCTION
As operative and invasive procedures and the associated technologies have evolved, becoming more sophisticated and complex, many procedures are being performed in settings such as offices, cardiac catheterization laboratories, interventional radiology suites, gastrointestinal laboratories, and free-standing clinics, as well as the traditional setting of the operating room.

Complexity and increased sophistication in the delivery of operative and invasive procedure services have led to advances in patient care and outcomes not imagined a decade ago. However, this complexity and sophistication have also stressed the delivery system, to include the human factor, to the point that agencies such as the Joint Commission and Centers for Medicare-Medicaid Services have focused attention on adverse outcomes and require facilities to provide definitive plans that address these unfortunate events. Competency assessment is one of the tools healthcare facilities can use to build a culture of quality patient care and potentially reduce the number of adverse outcomes.

Competency assessment within the operative and invasive procedure setting is a means of determining if nurses, surgical technologists, and other staff members, to include physicians and anesthesia providers, are proficient and have demonstrated the knowledge, cognitive skills, and psychomotor skills necessary to provide safe patient care relevant to their specific role function. This chapter will address competency assessment for members of the nursing team which includes registered nurses, licensed vocational nurses, surgical technologists, and others engaged in delivery, or supporting the delivery of nursing care, in the operative and invasive procedure

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18 Introduction
19 Nursing Roles in the Operative and Invasive Procedure Suite
20 Practice Models for the Delivery of Nursing Care in the Operative and Invasive Procedure Area
25 The Competency Continuum
37 Manufacturer Instructions for Use
37 Conclusion
38 References
suite. The chapter will discuss practice frameworks for the delivery of nursing care in the operative and invasive procedure setting that can be used to develop competency assessment tools, a model for skill acquisition, methodologies for assessing competency, agencies that provide resources for assessing competency, and sample competency assessment tools.

**NURSING ROLES IN THE OPERATIVE AND INVASIVE PROCEDURE SUITE**

Nursing roles within the operative and invasive procedure setting are highly differentiated and include direct patient care as well as roles that indirectly address patient needs. The primary direct patient care roles for the registered nurse are scrubbing and circulating. When performing these roles the registered nurse provides care during patient care events that were previously described in Chapter 1. **Table 2.1** lists these patient care events which are common to most procedures performed in the operative and invasive procedure setting.

Another direct care role is first assistant. Registered nurses performing this role assist the surgeon during an operative procedure. Role functions include handling tissue with instruments and providing hemostasis during the procedure.

New knowledge impacts patient care. Informatics, sterile processing, genetics, and environmental issues have pushed the boundaries of nursing practice in the operative and invasive procedure suite. Nurses must continue to learn and integrate new knowledge into existing roles or tasks. Nurses in Advanced Practice Registered Nursing (APRN) roles in operative and invasive procedure settings continue to increase in numbers. Their roles are varied and continue to expand as more specialized knowledge is necessary due to the increasing complexity of patients and the technologies

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<td><strong>During the Procedure</strong></td>
</tr>
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</tr>
<tr>
<td>3. Assist the anesthesia provider</td>
</tr>
<tr>
<td>4. Position the patient</td>
</tr>
<tr>
<td>5. Establish and maintain the sterile field</td>
</tr>
<tr>
<td>6. Perform sponge, sharp, and instrument counts</td>
</tr>
<tr>
<td>7. Provide instruments, equipment, and supplies for the procedure</td>
</tr>
<tr>
<td>8. Administer drugs and solutions</td>
</tr>
<tr>
<td>9. Physiologically monitor the patient</td>
</tr>
<tr>
<td>10. Monitor and control the environment</td>
</tr>
<tr>
<td>11. Handle cultures and specimens</td>
</tr>
<tr>
<td><strong>After the Procedure</strong></td>
</tr>
<tr>
<td>12. Facilitate care after the procedure</td>
</tr>
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</table>
INTRODUCTION
The operative and invasive procedure area must constantly change as technology improves or becomes obsolete, as employees come and go, as the departments are reorganized, and as healthcare consumers become more discerning. Change is fundamental to success. The performance improvement team is the change agent within the operative and invasive procedure area. Performance improvement begins as a study of a process or procedure, then moves on to the modification of the process in order to accomplish a more desirable result.

In any health care setting, departments must adapt to change while continuing an existing workload and providing an optimal level of care for patients. This is why it is critical to have a well-defined process in place to manage changes. Practices such as those contained in this chapter can provide guidance.

DEVELOPING A PERFORMANCE IMPROVEMENT PROGRAM
There are three ways to decide where to place your performance improvement efforts. They are best practices, occurrence trending, and clinical accidents. These strategies enable the performance improvement team to identify and address performance and process gaps in the delivery of patient care.

Best Practices
Best practices are those strategies and activities around patient care that have been proven through research and experience to be most effective in providing excellent results for patients. There are several organizations dedicated to providing information on evidence-based best practices. In this age of information and technology, learning the
best practices for the operative and invasive procedure area are just a few keystrokes away. Before addressing a single organization, however, it is important to have some perspective of what is happening on a national or world-wide level in the perioperative setting. Table 3.1 lists websites of organizations that provide valuable information concerning performance improvement.

<table>
<thead>
<tr>
<th>Table 3.1</th>
<th>Websites with Performance Improvement Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organization</strong></td>
<td><strong>Website</strong></td>
</tr>
</tbody>
</table>
| Association of periOperative Registered Nurses (AORN) | www.aorn.org | - Annual publication, Perioperative Standards and Recommended Practices  
- Classic resource for perioperative practice  
- Website has a large library, tool kits, research and articles with an easy-to-use search engine for key words |
| Institute for Healthcare Improvement | www.ihi.org | - Comprised of professionals who have an interest in improving healthcare  
- Site is for all aspects of care  
- A search for best practices related to the operative and invasive procedure area is required  
- Links to other useful sites, a search engine for key words, improvement models and various tool kits |
| Quality Net | www.qualitynet.org | - Established by the Centers for Medicare and Medicaid Services (CMS)  
- Provides news, resources and data reporting tools |
| US Department Health & Human Services | www.hospitalcompare.hhs.gov | - Site shows how area hospitals compare on compliance with various best practices  
- Modern healthcare consumers are educated as to what hospitals should be doing for them  
- Information is publicly reported and readily available |
| Joint Commission | www.jointcommission.org | - Accredits and certifies healthcare organizations in the United States  
- Organization dedicated to health care quality  
- Website provides standards and performance measures  
- Site has valuable information about patient safety, including the national patient safety goals, sentinel event alerts, and more  
- Comprehensive site with much to offer |
INTRODUCTION
Nurses providing care in the operative and invasive procedure setting have long recognized the importance of the environment of care to the quality of the care the nurse delivers. The legal and ethical context of care is a part of the social environment within which care delivery occurs. While nurses cannot directly manage these systems in the same way they can manage other important elements in the environment of care (see Chapter 14), it is no less important that the nurse be cognizant of and incorporate these elements into care delivery in operative and invasive procedure settings.

The evolution of healthcare as a business, combined with the intimately personal type of service it is, has resulted in a near microcosm of American capitalist society at large—and operative and invasive care services, in turn, are a microcosm of the healthcare system. Almost every segment of the legal system has some application/relevance for the delivery and administration of these services. Ethics is also a part of the same society and ethical systems, too, interact and overlap with both the legal and healthcare systems.

Nurses and healthcare are part of this same society. In this representative democracy they have the power and, some would argue, the ethical duty, to influence laws and regulations to best benefit the provision of quality care to patients.

This chapter begins with a basic review of the American legal system structure, proceeds with application and examples of each structure to operative and invasive procedure services, and concludes with a review of ethical principles related to healthcare and how they are or are not reflected in the legal developments related to operative and
invasive procedure healthcare. It is intended as a survey chapter to alert the reader to
many of the legal, regulatory, and ethical issues that influence perioperative practice
and to provide web-based resources for detailed up-to-date information. No attempt
is made or claimed to treat any one issue comprehensively because doing so would
take volumes and outdate quickly.

Nurses should not expect themselves to be experts on every facet of the legal,
regulatory, and ethical systems that influence their care. These areas are so many
and so complex that most facilities designate compliance officers who keep current
on legal and regulatory changes as part of their professional responsibilities. Most
facilities also have access to ethics committees to review, discuss, and advise.
Ethics committees, compliance officers, and risk managers can serve as the
primary onsite resources for perioperative nurses needing more immediate and
detailed information about how law and ethics frame the analysis of their specific
situations.

THE AMERICAN LEGAL SYSTEM STRUCTURE

Sources of Law

The United States legal system is built around a tripartite form of government as
set forth in the federal Constitution. The Constitution provides for three branches
of government: the executive, legislative, and the judiciary. The Constitution also
provides that individual states have the right to adopt their own constitutions within
the limits of the federal constitutions. The states also have executive, legislative, and
judicial branches although the states differ in how these are constituted and named.
So, too, do cities, counties, and other local municipalities have some system of execu-
tive, legislative, and judicial branches within the confines of state laws.

The executive branches are headed by the president of the country and the
governors of respective states and govern via executive actions and orders allowed
by the respective constitutions. Fewer executive orders directly affect perioperative
services as compared to the outcomes of the other branches, but some do, such as
the mobilization of the armed forces or disaster declarations. The executive branches
also appoint the directors and other top leaders or members of the administrative
agencies that then provides indirect executive effects on healthcare.

The legislative branches (US Congress or state legislatures) govern through the
passage of statutes. Statutes are written laws whose language is agreed upon by elected
members of the Congress/legislature and signed by the executive or, if vetoed by the
executive, overridden by the Congress or legislature. Because the federal Constitution
leaves matters related to the public’s health and safety to the states, more state statutes
directly apply to operative and invasive procedure services than federal statutes.
State statutes applying to healthcare are many and varied, most notably the Nurse
Practice Act and its definition of what constitutes nursing practice in that state. How-
ever, many federal statutes do reach perioperative services through the administrative
agencies they create (eg, Food and Drug Administration [FDA], Occupational Safety
and Health Administration [OSHA]) and via the fact that the federal government
pays for healthcare via Medicare and Medicaid, and thus can regulate the services it
pays for.
Preparation of the Patient for the Procedure: Physical, Psychological, and Emotional Considerations

Charlotte Dorsey

INTRODUCTION
Over the past decades, preparation of the operative patient has drastically changed. At one time, the patient was admitted to the healthcare facility one to two days before the procedure during which time the preprocedure assessment and testing were completed. Today, the patient is admitted the day of the operative or invasive procedure, or the procedure is performed on an outpatient basis. Preprocedure preparation is critical to positive patient outcomes.

Preparing the patient for an operative or invasive procedure refers to the activities done by the registered nurse (RN) before the procedure to make the patient physically, psychologically, and emotionally ready for the procedure. The extent of involvement of the nurse in preparing the patient for the procedure depends on the practice expectations delineated in the position description. Responsibilities may include one or more of the following duties: admitting the patient, collecting laboratory specimens, obtaining the consent for treatment, and providing any ordered preprocedure treatment or care. Nurses providing these services may also provide patient care during and after the procedure.

MEASURABLE CRITERIA
The nurse demonstrates competency to prepare the patient for an operative or invasive procedure by:

- Facilitating patient admission to the healthcare facility;
- Identifying existing alterations in health status that contribute to the patient’s risk for adverse outcomes before, during, and after the operative or invasive procedure;
Section 2: Competencies for Safe Patient Care

- Identifying alterations in psychosocial and emotional health status; and
- Facilitating preprocedure care.

FACILITATING ADMISSION TO THE HEALTHCARE FACILITY

The physician, advanced practice nurse, office nurse, or physician's secretary may schedule the procedure with the hospital or healthcare facility. When scheduling the procedure, provide the clerk or secretary posting the case with the following information:

- patient’s full name, age, date of birth, gender;
- physician’s name;
- date and time of the procedure;
- planned procedure;
- preprocedure diagnosis;
- insurance information;
- preauthorization number from any insurance provider; and
- any special instrumentation, supplies, or equipment needed.

Operative and invasive procedure case posting varies by institution. In some institutions, the posting clerk obtains all the information noted above; in others, admitting personnel obtain information about insurance and preauthorization numbers. After posting the case, tell the patient when to report to the facility for pre-admission assessment and testing, as well as on the day of the operative or invasive procedure. Tell the patient to wear comfortable, loose-fitting clothing, leave valuables at home, and bring all home prescription medications to the healthcare facility when admitted. If an outpatient procedure is scheduled, the patient should ingest nothing by mouth after midnight or according to the protocol established by the anesthesia department. If the patient is a parent, instruct him or her to make plans for child care the day of the procedure. The patient should understand the requirement that after receiving sedation or anesthesia, he/she must be discharged in the company of a responsible, designated adult (The Joint Commission, 2007).

IDENTIFYING EXISTING ALTERATIONS IN HEALTH STATUS THAT CONTRIBUTE TO THE PATIENT’S RISK FOR ADVERSE OUTCOMES

Physical Assessment

The physical assessment evaluates the patient’s health status through a health history and physical examination. The assessment is based on clinical and laboratory data, the medical history, and the patient’s account of signs and symptoms (Taber’s®, 2005). The physician, anesthesia provider, and nurse use the assessment data. The physician uses the assessment data to diagnose acute or chronic medical conditions that may affect the performance of the procedure and to establish the patient’s risk of postprocedure complications. The anesthesia provider uses the assessment data to formulate the anesthetic plan and determine the patient’s anesthetic risk. Assessment data are used by the nurse to diagnose actual or potential alterations in health status.
INTRODUCTION

Transfer the patient describes the activities of the nurse and other members of the operative and invasive procedure nursing team in moving the patient to and from the operative suite without compromising or causing injury to the patient.

Before transferring the patient, the nurse assesses the patient’s risk for adverse outcomes related to the transfer process, identifies nursing diagnoses that describe the patient’s degree of risk, identifies expected outcomes that delineate criteria for determining whether the patient experienced an adverse outcome, and plans for patient care, which includes the identification of needed transfer equipment and the assignment of trained personnel to perform transfer activities. The nurse evaluates the patient after the procedure according to the criteria delineated in the expected outcomes.

Transferring the patient is the responsibility of the nurse. Other personnel, such as the surgical technologist, orderly, or nursing assistant, participate, especially during transfer between the nursing unit and the operative and invasive procedure suite. The nurse, however, has ultimate responsibility for the welfare of the patient during the preprocedure transfer process and when the patient is moved to the bed from the gurney. This responsibility continues into the postprocedure transfer process when the patient is returned to the nursing unit or transferred to the postanesthesia care unit (PACU). When the nurse transfers the patient with the anesthesia provider, both share in the responsibility for patient welfare.
Chapter 6: Transfer the Patient

MEASURABLE CRITERIA

The nurse demonstrates competency to transfer the patient by:

- Identifying the patient’s risk for adverse outcomes related to transfer activities.
- Performing or directing the transfer of the patient from the nursing unit to the operative and invasive procedure suite holding area.
- Implementing handoff communication protocols at time of transfer.
- Admitting the patient to the operative and invasive procedure suite.
- Performing or directing the transfer of the patient from the operative and invasive procedure suite holding area to the procedure room.
- Implementing the *Universal Protocols for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery*.
- Assisting with the transfer of the patient from the operative and invasive procedure suite to the PACU.
- Performing or directing the transfer of the patient from the operative and invasive procedure suite to the nursing unit.
- Performing or directing the transfer of the patient with special needs.
- Documenting and communicating risk factors, nursing diagnoses, expected outcomes, the plan of care, interventions, and evaluation.

CONSIDERATIONS

Transferring the patient to and from the operative and invasive procedure suite is often viewed as a simple and tedious task that anyone can perform. Taking the transfer process lightly can lead to an adverse outcome for the patient.

Nurse Coordinating Transfer Activities

For the reason that each patient is unique and has different needs, the nurse coordinating the patient’s transfer must ensure that only qualified personnel who have demonstrated competency to implement appropriate safety measures, such as the nurse, surgical technologist, or unlicensed assistive person, perform transfer activities. Additionally, when planning for a transfer, the nurse ensures that an adequate number of personnel are available to implement the transfer activity.

The nurse coordinating transfer activities determines the skill set required for a patient transfer. For some transfers the presence of a nurse, in some cases, an anesthesia provider, will be required. For routine transfers, such as low-risk patients having an elective procedure, the assignment for the transfer is given to a qualified unlicensed assistive person.

Personnel Assigned to Implement Transfer Activities

Personnel performing a transfer activity should know and apply the principles of body mechanics, which will help in reducing the risk for injury to the patient and staff. Prior to the transfer, the assigned personnel verify that all transfer equipment is functioning according to manufacturers’ specifications. In the event restraints and other safety devices are required, they are used in accordance with regulatory standards, facility policy and procedure, and manufacturers’ written instructions.
INTRODUCTION
Assist the anesthesia provider refers to the activities performed by the registered nurse to support the anesthesia provider during the administration of anesthesia. During an operative or invasive procedure, the patient is usually anesthetized or sedated, and therefore is incapable of making decisions on his/her own behalf. Through effective collaboration with and assisting the anesthesia provider, the nurse serves as the patient’s advocate at a time when he/she is most vulnerable; this aspect of operative and invasive procedure nursing care is critical to the promotion of positive patient outcomes.

HISTORICAL PERSPECTIVE
The starting point from which anesthesiology emerged as a medical specialty was the public demonstration of ether anesthesia by William T.G. Morton in 1846 (Larson, 2005). Prior to this event, operative procedures were associated with unimaginable pain and the high probability of death. Historical accounts, including those by Ashhurst (1896), document that over hundreds of years, the search for pain-relieving techniques was undertaken by cultures worldwide. Various pain-relieving modalities ranged from botanical preparations of belladonna, marijuana, and jimsonweed; hypnosis; to actually striking the person to induce unconsciousness. By the 1800s, opium and alcohol were only partially effective and often accompanied by serious side effects such as vomiting and death. Since the 1800s, there have been both enormous progress and change in the specialty of anesthesiology, including increased understanding of cardiopulmonary physiology, intravascular pressures, autonomic nervous system
and neurohumoral transmission; the development of pain theories, and the introduction of the various types of anesthesia. In fact, the majority of operative procedures in today's operating rooms (OR) could not have been performed before the progress in anesthetic practice that took place between the years of 1925 and 1960 (Larson, 2005).

OVERVIEW

The administration of anesthesia is an integral part of operative and invasive procedure patient care, not only in hospital-based operative suites, but also in ambulatory surgery centers, physicians’ offices, and other outpatient facilities. Therefore, assisting the anesthesia provider is an important role of the nurse providing care to the patient undergoing operative and invasive procedures requiring anesthesia. The anesthesia provider may be anesthesiologist, a certified registered nurse anesthetist (CRNA), anesthesia assistant (AA), a physician in an anesthesiology residency program, or a registered nurse in a nurse anesthesia program. Anesthesia technicians or other unlicensed assistive personnel may also provide assistance to the anesthesia provider. The skills required by the nurse to assist the anesthesia provider range from patient assessment, knowledge of disease processes and medical treatment modalities, the objectives of the operative intervention to critical thinking skills in order to effectively anticipate patient care needs.

The nurse should also be familiar with the definition of the scope of anesthesia practice; the various types of anesthesia, including the equipment and supplies needed for each type; and also the level of assistance required to meet the anesthetic needs of the patient. In order to better understand the scope of the specialty of anesthesiology, it is helpful to review the definition promulgated by the American Board of Anesthesiology (2004):

Anesthesiology and perioperative management are defined as the continuity of patient care involving preoperative [preprocedure] evaluation, intraoperative and postoperative [postprocedure] care and the management of systems and personnel that support these activities.

MEASURABLE CRITERIA

The nurse demonstrates competency to assist the anesthesia provider during the operative or invasive procedure by:

- Identifying the patient's risk for potential adverse outcomes related to the administration of anesthesia;
- Describing the various types of anesthesia;
- Assisting the anesthesia provider with induction of anesthesia;
- Assisting the anesthesia provider with proper positioning for regional anesthesia;
- Describing the potential physiologic changes that may occur during monitored anesthesia care;
- Assisting the anesthesia provider with administering blood component therapy;
INTRODUCTION

Position the Patient provides information to the registered nurse about positioning patients for operative and invasive procedures. The nurse must perform many activities when positioning the patient on the operating room or the invasive procedure bed. Proper positioning is extremely important because it allows for accurate operative site preparation, appropriate draping, and adequate exposure of the operative site. The nurse must have knowledge of anatomy and physiology as well as the operative or invasive procedure involved to facilitate proper patient positioning. Proper positioning must be accomplished while maintaining the patient’s musculoskeletal and neurological safety, skin and tissue integrity, body alignment, and optimal physiological functioning of the respiratory and circulatory system during the operative or invasive procedure.

Before the procedure, the nurse makes a complete assessment of the patient. This assessment must include skin integrity, range of motion, including restrictions or previous injury, age, medical conditions, and the presence of implants or prostheses. This assessment supports the actions in the nursing plan of care that promote optimal outcomes. The care plan includes specific actions to take during positioning, including the appropriate positioning devices to use, special precautions to take when moving the patient, avoiding nerve injury, and the number of assistants needed. The goal is to avoid adverse outcomes while providing optimal positioning for the procedure. The nurse evaluates the patient at the end of the procedure based on the expected outcome criteria.
Only a registered nurse with proven competency should position the patient for a procedure. Delegation of positioning activities to surgical technologists or assistive personnel occurs only if the nurse determines that the patient's risk for adverse outcomes related to positioning is low. When delegating any part of the positioning to another party, the nurse must reassess the patient before the procedure begins. Reassessment of the patient during the procedure occurs when patient or environmental variables change. These changes may include change in position, extended procedure time, pooling of body fluids, or team members leaning against a body structure. The nurse must remain vigilant in observing changes and reassessing the patient as needed. The nurse maintains accountability for the patient throughout the procedure.

**MEASURABLE CRITERIA**
The nurse demonstrates competency for positioning a patient by

- Identifying the patient’s risk for adverse outcomes related to positioning
- Selecting the appropriate supplies and equipment based on the patient’s identified needs
- Preparing the bed
- Centering the patient on the bed
- Placing the arms on arm boards
- Using positioning devices according to the established practice recommendations and the manufacturer’s recommendations
- Padding bony prominences
- Moving the anesthetized patient
- Communicating and documenting risk factors, nursing diagnoses, expected outcomes, the plan of care, interventions, and evaluation
- Placing the patient in various positions for operative and invasive procedures
  - Supine
  - Trendelenburg
  - Reverse Trendelenburg
  - Lithotomy (high and low)
  - Prone
  - Jackknife
  - Lateral
  - Fowler (sitting)
  - Semi-Fowler (beach chair)
  - Fracture table
  - Spine table

**IDENTIFYING THE PATIENT’S RISK FOR ADVERSE OUTCOMES RELATED TO POSITIONING**
Positioning for the procedure has the potential for compromising or causing injury to the patient. Table 8.1 identifies outcome statements, diagnoses, risk factors, and outcome indicators related to this patient care event.
Establish and Maintain the Sterile Field

Pat Mews

INTRODUCTION
As patient advocates, nurses are responsible for providing a safe environment for patients undergoing operative and invasive procedure intervention. Establishing and maintaining a sterile field can directly influence patient outcomes. Patient care activities that adhere to aseptic practices by all individuals involved in the procedure aid in fulfilling the professional responsibility to protect patients from injury. Implementation of aseptic practices before, during, and after the procedure minimizes wound contamination and reduces the patient's risk for an operative site infection (AORN, 2008a). One of the fundamental components of providing a safe environment is the practice of strict aseptic technique. Rigorous adherence to the principles of asepsis is the foundation for preventing an operative site infection.

MEASURABLE CRITERIA
The nurse demonstrates competency to establish and maintain a sterile field by

- Identifying patients at risk for adverse outcomes related to establishing and maintaining a sterile field
- Donning and wearing appropriate operative attire
- Preparing supplies, instruments, and equipment for the sterile field
- Scrubbing the hands and forearms
- Donning sterile gown and gloves
- Preparing the patient's skin for the procedure
- Draping the patient and equipment

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230 Preparing Supplies, Instruments, and Equipment for the Sterile Field
233 Scrubbing the Hands and Forearms
240 Donning Sterile Gown and Gloves
249 Preparing the Patient's Skin for the Procedure
258 One-Step Scrub Procedure
258 Two-Step Scrub Procedure for Specific Anatomical Areas
266 Draping the Patient and Equipment
273 Draping for Specific Procedures and Anatomical Areas
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CONSIDERATIONS FOR PREPARING A STERILE FIELD AND LOWERING THE RISK OF OPERATIVE SITE INFECTIONS

Surgical Site Infections

Establishing and maintaining a sterile environment during the procedure minimizes the patient's risk for an operative (surgical) site infection. Based on the National Nosocomial Infection Surveillance (NNIS) system, surgical site infections (SSI) are the third most common cause of healthcare-acquired (ie, nosocomial) infections, accounting for 38% of all such infections in the United States (Mangram, 1999). The CDC's NNIS system has developed standardized surveillance criteria for defining SSIs (Table 9.1). By these criteria, SSI are classified as either incisional or organ/space. Incisional SSIs are further divided into those involving only skin and subcutaneous tissue (superficial incisional SSI) and those involving deeper soft tissue (deep incisional SSI).

### Table 9.1 Criteria for Defining a Surgical Site Infection (SSI)

#### Superficial Incisional SSI

Infection occurs within 30 days after the operation and infection involves only skin or subcutaneous tissue of the incision and at least one of the following:

1. Purulent drainage, with or without laboratory confirmation, from the superficial incision.
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
3. At least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat and superficial incision is deliberately opened by surgeon, unless incision is culture-negative.
4. Diagnosis of superficial incisional SSI by the surgeon or attending physician.

Do not report the following conditions as SSI:

1. Stitch abscess (minimal inflammation and discharge confined to the points of suture penetration).
2. Infection of an episiotomy or newborn circumcision site.
3. Infected burn wound.
4. Incisional SSI that extends into the fascial and muscle layers (see deep incisional SSI).

Note: Specific criteria are used for identifying infected episiotomy and circumcision sites and burn wounds.

#### Deep Incisional SSI

Infection occurs within 30 days after the operation if no implant is left in place or within 1 year if implant is in place and the infection appears to be related to the operation and infection involves deep soft tissues (eg, fascial and muscle layers) of the incision and at least one of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehiscences or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>100.4°F [38°C]), localized pain, or tenderness, unless site is culture-negative.
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of a deep incisional SSI by a surgeon or attending physician.

Notes:

1. Report infection that involves both superficial and deep incision sites as deep incisional SSI.
2. Report an organ/space SSI that drains through the incision as a deep incisional SSI.
INTRODUCTION
Sponge, sharp, and instrument counts are performed by the registered nurse to reduce the potential for injury to the patient as a result of a retained foreign body. This crucial activity is an integral component of safe patient care during the operative and invasive procedure.

Because nurses have a critical responsibility to provide safe patient care, they should determine the patient’s risk for poor outcomes related to the retention of foreign bodies before every procedure.

MEASURABLE CRITERIA
The nurse demonstrates competency to ensure that the patient is free from injury related to retained sponges, instruments, and sharps by:

- Identifying the patient’s risk for adverse outcomes related to the retention of extraneous objects;
- Initiating count procedures that reduce the patient’s risk for retained extraneous objects;
- Initiating incorrect count procedures; and
- Documenting count procedures according to facility policy.

ROLE OF THE NURSE
Members of the surgical team are responsible for taking the measures necessary to provide safe patient care. The circulating nurse makes certain that the facility’s counting policies and procedures are followed and that the required counts are performed. The scrub person collaborates with the circulating nurse to account for all sponges, sharps, and instruments.
The Association of periOperative Registered Nurses (AORN) in its “Recommended Practices for Sponge, Sharp, and Instrument Counts” states “legislation does not prescribe how counts should be performed, who should perform them, or even that they need to be performed; the law requires only that foreign bodies not be negligently left in patients” (AORN, 2008, p. 293). Further, complete and accurate counts help promote optimal perioperative patient outcomes and also demonstrate the commitment to patient safety (AORN, 2008, p. 293). All members of the surgical team should be committed to establishing policies and procedures related to surgical counts. In the event of a lost counted item, the circulating nurse implements facility policy and procedures for reconciliation of count discrepancies.

**AORN RECOMMENDED PRACTICES**

The AORN “Recommended Practices for Sponge, Sharp, and Instrument Counts” (AORN, 2008) are intended as guidelines for the development of policies and procedures and are adaptable to various practice settings. These recommended practices help promote an optimal level of practice. Each practice setting should use the recommended practices to develop count policies and procedures tailored for its particular practice environment. For example, Recommended Practice III states that “instruments should be counted on all procedures in which the likelihood exists that an instrument could be retained” (AORN, 2008, p. 296). This recommended practice enables the facility to define what types of procedures require instrument counts. Instrument counts may be deferred for pediatric patients when there is no perceived risk of retained instruments (AORN, 2008, p. 297).

**FACILITY POLICIES AND PROCEDURES**

Facilities must define policies and procedures for counts. The registered nurse must know and carry out the facility’s policies and procedures. Failure to do so places the patient at risk for injury and the surgical team at risk for legal action. The facility’s policies and procedures should describe:

- Items to be counted;
- The sequence for performing counts (ie, start at the incision, surrounding sterile area, Mayo stand, back table, discarded items);
- Procedures for which subsequent counts can be omitted after a baseline count is performed;
- Miscellaneous items that should be counted; and
- Nursing actions and procedures for count discrepancy reconciliation.

**LEGAL ISSUES**

Protecting patients from injury is one of the nurse’s most critical roles. If a sponge, sharp, or instrument is left in a patient and the patient sues, and if the suit goes to trial, the jury will determine if the nurse did what any reasonable and prudent nurse would have done to account for the item before closure of the wound. Jury members will be instructed to base their decision on the evidence presented at the trial, such as expert witness testimony, AORN’s recommended practices, and the
INTRODUCTION
Emerging technologies continue to raise the bar of operative and invasive procedure care and challenges the nursing care team to be knowledgeable of instruments, equipment and supplies. This chapter describes the competencies necessary for the nurse to safely and efficiently provide these items before, during, and after operative and invasive procedures.

After identifying the patient's risk for adverse outcomes related to the provision of instruments, equipment, and supplies, the nurse may delegate appropriate tasks to qualified surgical technologists or assistive personnel. The nurse is responsible for knowing that surgical technologists and assistive personnel are competent to perform the task that is being delegated and the nurse must provide appropriate supervision.

MEASURABLE CRITERIA
The nurse demonstrates competency to safely and efficiently provide instruments, equipment, and supplies by:

- Identifying the patient's risk for adverse outcomes related to the provision of instruments, equipment and supplies;
- Selecting appropriate instrumentation, equipment, and supplies for an operative or invasive procedure;
- Delivering instruments and supplies to the sterile field;
- Arranging instruments and supplies on the back table and Mayo tray;
- Passing instruments and supplies to the physician or assistant;
- Preparing and passing sutures to the physician or assistant;
- Preparing and applying patient warming systems;
Section 2: Competencies for Safe Patient Care

- Applying and removing a pneumatic tourniquet;
- Preparing electrical instrumentation and equipment for use;
- Preparing air-powered instrumentation for use;
- Implementing electrosurgical safety precautions;
- Applying dressings;
- Assisting with the application of casts and splints; and
- Preparing and operating endoscopic equipment.

IDENTIFYING THE PATIENT’S RISK FOR ADVERSE OUTCOMES RELATED TO THE PROVISION OF INSTRUMENTS, EQUIPMENT AND SUPPLIES

Providing instruments, equipment, and supplies has the potential for compromising or causing injury to the patient. If done incorrectly the patient could experience infection, extended anesthesia time, alterations in body temperature, thermal injury secondary to use of a warming device, injury related to tourniquet use, injury related to the application of electrosurgery, and injury related to the inappropriate use of endoscopic video equipment. Table 11.1 identifies outcome statement, diagnosis, risk factors, and outcome indicators related to this patient care event.

| Table 11.1 Providing Instruments, Equipment, and Supplies Does Not Compromise or Cause Injury to the Patient |
|---|---|---|
| **Outcome 1** The patient is free from evidence of infection. | **Risk Factors** | **Outcome Indicators** |
| **Diagnosis** Risk for Infection. |  |  |
| Remote site of infection | Does the patient have a wound infection? |
| Abdominal of thoracic operative procedure | Does the patient have a urinary tract infection? |
| Procedure lasting longer than 2 hours | Does the patient have an upper respiratory infection? |
| Transected organ systems such as the gastrointestinal or urological system |  |
| Instrumentation/presence of devices (ventilator, suction, catheters, nebulizers, tracheostomy, invasive monitoring) |  |
| Implants |  |
| Anesthesia |  |
| Age (less than 1 year or more than 65 years) |  |
| Underlying disease conditions (chronic obstructive pulmonary disease, diabetes, cardiovascular blood dyscrasia) |  |
| Substance abuse |  |
| Medications (steroids, chemotherapy, antibiotics) than modify the immune system |  |
| Nutritional status (intake less than minimum daily requirements or more than minimum daily requirements) |  |
| Smoker |  |
| Compromise of the immune system |  |
| High white blood cell count, low platelet count, and anemia |  |
INTRODUCTION
The nurse must ensure that drugs or solutions are administered to the patient according to hospital policy, manufacturers’ recommendations, applicable federal and state regulations and laws, and recommended nursing practices. Before administering drugs and solutions, the nurse identifies the patient’s risk for adverse outcomes related to the administration of drugs and solutions, the nursing diagnoses that describe the degree of risk, and expected patient outcomes. After the identification of risks, diagnoses, and outcomes, the nurse plans interventions for care. After administering drugs and solutions the nurse evaluates the effectiveness of interventions according to criteria delineated in the expected outcomes.

Proper administration of drugs and solutions is essential for safe, quality patient care in the operative and invasive procedure suite. The nurse ensures that the administration of drugs and solutions is performed correctly and does not harm the patient. Although the nurse may administer medications and solutions orally or by inhalation, most medications and solutions given during the procedure are administered by injection, topical application to the skin or mucous membranes, or irrigation to the operative site.

The focus of this chapter is on medications and solutions administered in the operative and invasive procedure suite by the registered nurse functioning as the circulating nurse. For discussion of drugs and solutions usually administered by an anesthesia provider (e.g., anesthetic agents, intravenous [IV] preparations, and blood products) please refer to Chapter 7.
**Section 2: Competencies for Safe Patient Care**

### MEASURABLE CRITERIA

The nurse demonstrates competency to administer drugs and solutions by:

- Recognizing potential adverse drug and solution reactions
- Describing the pharmacological characteristics of drugs and solutions used during operative or invasive procedures
- Describing the human response to the administration of drugs and solutions
- Obtaining a medication history
- Identifying patients at risk for adverse outcomes related to the administration of drugs and solutions (see Table 12.1)
- Gathering supplies and equipment
- Preparing and administering drugs and solutions according to institutional policy, manufacturers’ recommendations, federal and state regulations, and recommended nursing practices.

#### Table 12.1 Administering Drugs and Solutions Does Not Result in Adverse Outcomes for the Patient

<table>
<thead>
<tr>
<th>Outcome 1</th>
<th>The patient is free from evidence of infection solutions related to the administration of drugs and solutions.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td>Risk for infection related to the administration of drugs and solutions</td>
</tr>
<tr>
<td><strong>Outcome Indicator</strong></td>
<td>Are there signs of localized or systemic infection 48 hours after the operative or invasive procedure?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome 2</th>
<th>The patient is free from evidence of hypersensitivity reaction because of improper identification of patient allergies.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td>Risk for injury related to hypersensitivity reaction because of improper identification of patient allergies</td>
</tr>
<tr>
<td><strong>Outcome Indicators</strong></td>
<td>History of a past reaction to specific or related agent, Inability of the patient or family members to provide an accurate drug history, Use of antimicrobial drugs for self-treatment of minor infections</td>
</tr>
<tr>
<td></td>
<td>Is the patient uneasy, apprehensive, weak, or expressing feelings of impending doom?</td>
</tr>
<tr>
<td></td>
<td>Does the patient demonstrate a generalized pruritus or urticaria?</td>
</tr>
<tr>
<td></td>
<td>Is erythema and angioedema of the eyes, lips, or tongue present?</td>
</tr>
<tr>
<td></td>
<td>Is there evidence of discrete cutaneous wheals or urticarial eruptions?</td>
</tr>
<tr>
<td></td>
<td>Does the patient have congestion, rhinorrhea, dyspnea, or an increasing respiratory distress with audible wheezing?</td>
</tr>
<tr>
<td></td>
<td>Are rales, wheezing, and diminished breath sounds present?</td>
</tr>
<tr>
<td></td>
<td>Is the patient hypotensive? What is the status of the pulse? Rapid? Weak?</td>
</tr>
<tr>
<td></td>
<td>Does the patient have abdominal cramping, diarrhea, or vomiting?</td>
</tr>
</tbody>
</table>
INTRODUCTION
This chapter describes the patient care activities performed by the registered professional nurse in monitoring the patient's physiological status during operative and invasive procedures. The nurse monitors the patient to prevent ineffective airway clearance and an ineffective breathing pattern, air embolus from intravenous (IV) catheters, local infiltration of IV fluid, fluid volume excess or deficit, hyperthermia or hypothermia, extravasation of IV medication, and cardiodepression related to the administration of local anesthetics.

Begin the process to physiologically monitor the patient by assessing the patient's risk for potential adverse outcomes related to the physiological stressors associated with the operative or invasive procedure. After the assessment, identify nursing diagnoses that describe the patient's degree of risk. Next, delineate expected outcomes and outcome indicators for determining if the patient maintained physiological status during the procedure. After identifying the desired outcomes, identify the appropriate interventions to maintain patient's physiological status. During and at the completion of the procedure, evaluate to determine if the patient met the criteria delineated in the expected outcomes (AORN, 2008a).

During many procedures the nurse assists the anesthesia provider in monitoring the patient. However, when assigned as the monitoring nurse during procedures using moderate sedation/analgesia or local anesthesia, the nurse assumes total responsibility for monitoring duties. Consequently, every circulating nurse should demonstrate competencies related to assessment, diagnosis, implementation, and evaluation of treatments and procedures that contribute to the physiological stability of the patient (AORN, 2007). Emphasis in this
chapter is on monitoring the physiological stressors that can affect the patient during an operative or invasive procedure (Table 13.1).

Physiologically monitoring the patient is always a professional nursing responsibility. Do not delegate this activity to licensed practical nurses or unlicensed assistive personnel.

**MEASURABLE CRITERIA**
The nurse demonstrates competency to monitor the physiological status of the patient by:

- Identifying the patient’s risk for adverse outcomes related to physiological status
- Managing the patient’s airway and breathing pattern
- Managing the patient’s fluid intake
- Monitoring the patient’s fluid loss
- Maintaining the patient’s body temperature
- Monitoring the patient during the administration of moderate sedation/analgesia and local anesthesia

<table>
<thead>
<tr>
<th>Table 13.1 Methods of Monitoring Physiological Stressors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airway Clearance and Breathing Pattern</strong></td>
</tr>
<tr>
<td>- Use pulse oximetry</td>
</tr>
<tr>
<td>- Inspect the skin and nails for color and capillary refill</td>
</tr>
<tr>
<td>- Inspect the operative field for the color of tissue and blood</td>
</tr>
<tr>
<td>- Listen to lung sounds and ventilatory rate</td>
</tr>
<tr>
<td>- Monitor arterial blood gas values as needed</td>
</tr>
<tr>
<td><strong>Fluid Intake</strong></td>
</tr>
<tr>
<td>- Inspect mucous membranes and conjunctiva for color, moisture, and edema</td>
</tr>
<tr>
<td>- Monitor intake of intravenous fluids</td>
</tr>
<tr>
<td>- Note the amount and type of surgical irrigation used</td>
</tr>
<tr>
<td><strong>Fluid Loss</strong></td>
</tr>
<tr>
<td>- Assess blood loss, urine output, and other drainage</td>
</tr>
<tr>
<td>- Assess for third-space fluid loss and insensible fluid loss</td>
</tr>
<tr>
<td>- Assess blood pressure and pulse (rate, rhythm, and quality)</td>
</tr>
<tr>
<td>- Note the amount and rate of blood loss</td>
</tr>
<tr>
<td><strong>Body Temperature</strong></td>
</tr>
<tr>
<td>- Assess skin temperature and core temperature as needed</td>
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<tr>
<td><strong>Effects of IV Sedation and Local Anesthesia</strong></td>
</tr>
<tr>
<td>- Inspect the skin for rash, edema, or pruritus</td>
</tr>
<tr>
<td>- Check IV site for possible extravasation of IV medication into the surrounding tissues</td>
</tr>
<tr>
<td>- Monitor for changes in hemodynamic status, respiratory function, and mental and neurologic status</td>
</tr>
</tbody>
</table>
INTRODUCTION
Monitoring and controlling the operative and invasive procedure environment refers to those activities and practice-related issues performed by the nurse that promote a safe and efficacious environment during operative or minimally invasive procedures. One of the primary functions of the nurse is to protect the patient from potential hazards within the environment in order to provide an environment that promotes safety.

MEASURABLE CRITERIA
The nurse demonstrates competency to monitor and control the environment by:

- Identifying the patient's risk for adverse outcomes related to monitoring and controlling the environment
- Regulating temperature and humidity of the operating and invasive procedure room
- Protecting the patient from injury caused by extraneous objects (equipment)
- Ensuring the patient is free from chemical injury
- Ensuring electrical safety
- Ensuring fire safety
- Ensuring environmental air quality
- Monitoring the sensory environment
- Ensuring radiation and laser safety
- Maintaining suite traffic patterns
- Preventing latex exposure to sensitive patients and staff
Chapter 14: Monitor and Control the Environment

- Performing environmental sanitation
- Providing appropriate care handling, and sterilization of instruments, supplies, and equipment

ROLE OF THE REGISTERED NURSE

The nurse implements the measurable criteria. With the appropriate supervision, the nurse may assign these tasks to qualified surgical technologists and/or assistive personnel. If assistive personnel help the nurse accomplish the measurable criteria, the professional registered nurse maintains the responsibility and accountability for all implemented patient care activities.

IDENTIFYING THE PATIENT’S RISK FOR ADVERSE OUTCOMES RELATED TO MONITORING AND CONTROLLING THE ENVIRONMENT

Failure to monitor and control the environment potentially places the patient at risk for adverse outcomes. Table 14.1 delineates the potential adverse outcomes related to this patient care event.

REGULATING TEMPERATURE AND HUMIDITY OF THE OPERATING AND INVASIVE PROCEDURE ROOM

The nurse monitors temperature and humidity levels. A relative humidity of 30%–60% facilitates a decrease of bacterial growth and static electricity. Room temperature within the range of 68°F–73°F (20°C–22.8°C) also inhibits bacterial growth (AIA, 2006). Although temperatures within this range usually feel comfortable for the operative team members dressed in sterile attire, they nevertheless present a potential hazard for compromised patients such as those who are immunosuppressed and geriatric and pediatric patients. Consequently, the nurse must monitor and control not only the environmental temperature and humidity, but also the temperature of the patient. The supplies and equipment necessary for regulating temperature and humidity include room temperature-monitoring and humidity-monitoring devices, overhead warming units, heat conduction units, cooling or warming blankets, blood warmers, thermal body drapes, cloth blankets, warming cabinets for solutions and blankets. Patient temperature-monitoring devices include esophageal, urinary bladder, axillary, rectal, or tympanic monitors.

Before the first case of the day, take a baseline reading of the room temperature and humidity level. As noted above, maintain the room temperature within the range of 68°F–73°F (20°C–22.8°C). Keep the humidity level in the range of 30% to 60%; report temperature and humidity variations to the unit manager or according to facility policy and procedure. Except in extenuating circumstances, such as an emergency or when raising the room temperature to accommodate a patient at risk for alteration in body temperature, do not use rooms that fail to adhere to these ranges. Room temperature and humidity levels that vary from the normal criteria may contribute to alterations in patient body temperature. Additionally, an elevated room temperature or humidity level is uncomfortable, as well as stressful for the patient.
INTRODUCTION
Handle specimens and cultures describes patient care activities performed by the nurse, the surgical technologist, and other members of the patient care team to collect, process, store, preserve, and transport operative or invasive procedure tissue specimens and cultures.

MEASURABLE CRITERIA
The registered nurse, providing care as the circulator, implements the measurable criteria for safe handling of specimens and cultures. The nurse demonstrates competency to collect, identify, label, process, store, preserve, and transport specimens and cultures by:

- Identifying legal implications of handling specimens and cultures.
- Identifying the patient’s risk for adverse outcomes related to the improper handling of specimens and cultures.
- Implementing infection control practices when handling specimens and cultures.
- Safely handling formalin.
- Providing supplies and equipment to collect specimens and cultures.
- Completing the laboratory requisitions.
- Documenting the collection of specimens and cultures.
- Establishing the chain of custody for specimens and cultures.
- Collecting and preparing tissue for examination.
- Collecting and preparing cultures for examination.

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448 Identifying Legal Implications of Handling Specimens and Cultures
448 Identifying the Patient’s Risk for Adverse Outcomes Related to the Improper Handling of Specimens and Cultures
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453 Collecting and Preparing Tissue for Examination
457 Collecting and Preparing Cultures for Examination
460 Directing the Transfer of Specimens and Cultures to the Laboratory
461 Communicating Laboratory or Pathology Reports to the Physician During the Procedure
461 Storing, Preserving, and Maintaining Tissue
464 References
Section 2: Competencies for Safe Patient Care

- Directing the transfer of specimens and cultures to the laboratory.
- Communicating pathology reports to the physician during the procedure.
- Demonstrating knowledge of storing, preserving, and maintaining tissue.

IDENTIFYING LEGAL IMPLICATIONS OF HANDLING SPECIMENS AND CULTURES

The proper care and handling of specimens and cultures ensures continuity of care for the patient. Improving the safe care of patients has recently evoked national attention. Accurate specimen identification is a challenge in all hospitals, and a mislabeled specimen can lead to devastating patient consequences including misdiagnosis and consequent inappropriate patient treatment. The circulating nurse is responsible for identifying, documenting, and properly caring for specimens and cultures in the operative and invasive procedure setting, even when some elements of this activity are delegated. Proper documentation allows tracking of the specimen from its source to its disposition. Once the testing is complete, the pathology and laboratory result documents become part of the patient’s permanent record.

IDENTIFYING THE PATIENT’S RISK FOR ADVERSE OUTCOMES RELATED TO THE IMPROPER HANDLING OF SPECIMENS AND CULTURES

Handling specimens and cultures, if not done correctly, has the potential for compromising or causing injury to the patient. Incorrect handling of specimens and cultures could potentially result in the patient receiving a wrong diagnosis and subsequent treatment. Table 15.1 identifies outcome statement, diagnosis, risk factors, and outcome indicators related to this patient care event.

IMPLEMENTING APPROPRIATE INFECTION CONTROL PRACTICES WHEN HANDLING SPECIMENS AND CULTURES

Always consider specimens and cultures as potentially infectious. When collecting and preparing specimens and cultures for examination use Standard Precautions and don appropriate personal protection equipment (PPE) such as gloves, gowns, masks, and eyewear or face shields. When collecting specimens from the scrub person always wear gloves and wash hands after removing the gloves. Do not contaminate the exterior surface of the specimen containers and culture tubes with blood, tissue, or other body fluids; this will reduce the risk of cross-contamination to other personnel handling the containers and tubes. If contamination does occur, clean the exterior of the specimen container or culture tube with a tuberculocidal hospital-grade chemical germicide before removing the item from the operative or invasive procedure suite. Place containers or tubes that cannot be disinfected in an impervious, clear bag for transportation to the laboratory. Label the bag, identifying the contents as contaminated. This alerts the person receiving the specimen or culture to use caution when handling the container or tube. For a specimen in a large rigid container, attach a bio-hazardous sticker to the container. Prevent contamination of
INTRODUCTION

*Handle tissue with instruments* refers to skills that the first assistant (FA) uses to provide exposure of the operative site and to clamp, grasp, suture, and cut tissue. Every operation, because of the mere fact that tissue is cut, causes injury to the patient. The first assistant minimizes this injury by carefully and gently handling tissues. Careful, gentle, correct handling of tissues and instruments improves the result of any operation, thus minimizing damage and accelerating healing.

HISTORICAL PERSPECTIVES

As early as 10,000 B.C., people used sharpened flint knives to perform surgery. Egyptian writings dating back to 3000 B.C. tell of tourniquets. These early writings, as well as mummies found with wounds sutured with linen, reveal the use of suture ligatures. Early Hindu physicians were even more skillful than the Egyptians. They treated fractures and also practiced a crude form of plastic surgery. Early Greek carvings depict the use of scalpels. Early Arabian physicians used cautery to control hemorrhage. Hippocrates (460–377 B.C.) recommended hot iron to control bleeding.

Ammonius (c. 247 B.C.) wrote of an instrument used to impale a bladder stone. Albucasis (d. A.D. 1013) illustrated a large number of instruments, including a trocar (for paracentesis), scissors, and a syringe. He also described the use of animal gut for sutures. Galen (A.D. 130) depicted a method of grasping a vein with a hook and twisting it to stop bleeding, and he also recommended the use of a linen ligature for an artery.

In the 14th century, instruments remained relatively crude, even though modifications were made. During this century, the bullet extractor was introduced. Riveted handles were designed in the 16th century. Ambrose
Paré (1510–1590) used a forceps shaped like a “crow’s bill.” Instruments remained crude, however, because they were made by blacksmiths, armorers, and cutlers. It was not uncommon for a surgeon to use carpenter’s tools, as well as kitchen knives and forks.

Hospitals began to provide appointments for surgeons in the 18th century. More surgery was being attempted, and it was evolving into a scientific discipline. Copper-smiths, silversmiths, woodcutters, and steelworkers began to produce instruments. These instruments were limited in use, however, in that only operations of dire need, such as amputations, were performed regularly. Instruments were often works of art, with intricately carved handles made of wood or ivory, and were stored in velvet-lined boxes.

The 19th century produced great changes in the design of instruments. Two important discoveries were responsible. The first was Sir Humphrey Davy’s introduction of anesthesia in 1846. This enabled surgeons to work more cautiously because they no longer had to operate speedily on a struggling patient. As operative techniques were refined, a larger array of instruments was needed. The second development, in 1867, was Joseph Lister’s (1827–1912) antiseptic method for the prevention of infection. Instruments needed to be sterilized, and so the ornate, hand-carved instrument handles were replaced with metal ones. This was the beginning of modern surgery.

In 1900, stainless steel was introduced and became the preferred metal for making instruments. The pivot forceps and ratchet were also developed. As surgical specialties evolved, the number of different instruments increased vastly. Today, thousands of instruments are available for every purpose and preference to fulfill the needs of all surgeons.

**GENTLE HANDLING OF TISSUE**

William Stewart Halsted (1852–1922) established the first school of surgery in the late 19th century at Johns Hopkins Hospital in Baltimore. Adopting Theodore Kocher’s bloodless technique, Halstead emphasized the concepts of complete hemostasis, gentle manipulation of tissues, absolute asepsis, sharp dissection, and accurate reapproximation of divided tissues. He also introduced the wearing of rubber gloves during an operation. When Halsted’s principles of operative technique were abused, complications such as hematoma, infection, wound disruption, and contracture often occurred. Over the years, Halsted’s principles have remained intact and surgeons have learned that there are no substitutes for careful, gentle handling of tissue and accurate surgical technique.

**INSTRUMENT TERMINOLOGY**

Thousands of surgical instruments of varying sizes and shapes are available for use by the surgeon. Most of these instruments are categorized as sharps, clamps, graspers, and retractors (Table 16.1).

**MEASURABLE CRITERIA**

The first assistant demonstrates competency to handle tissues with instruments by:

- Identifying the patient’s risk for adverse outcomes related to the handling of tissue with instruments;
- Providing exposure during surgery;
INTRODUCTION
The term hemostasis means prevention of blood loss (Guyton & Hall, 2006). When a blood vessel ruptures or is severed, hemostasis can occur by several different methods (Guyton & Hall, 2006):

• Vascular constriction;
• Formation of a platelet plug;
• Formation of a blood clot; or
• Growth of fibrous tissue into the clot, closing the hole.

Uncontrolled or excessive bleeding can become a life-threatening situation, has adverse physiological effects for the patient, obscures visualization of the operative site, and interferes with the healing process. Effective application of hemostatic techniques is one of the key responsibilities of the first assistant.

MEASURABLE CRITERIA
The first assistant demonstrates competency to provide hemostasis by:

• Describing the mechanism of clotting;
• Assessing the patient’s clotting mechanisms;
• Describing the signs of hypovolemic shock;
• Identifying the patient’s risk for adverse outcomes related to the provision of hemostasis;
• Applying mechanical methods to control bleeding;
• Applying thermal methods to control bleeding; and
• Applying chemical methods to control bleeding.
ROLE OF FIRST ASSISTANT
Providing hemostasis is an ongoing process throughout an operative or invasive procedure. Usually, the surgeon determines the appropriate hemostatic technique and the first assistant performs or assists in performing that technique. In addition, the first assistant should know the hemostatic options available in the institution, anticipate the patient’s needs, request that the circulating nurse have specific supplies and equipment available, and ensure that the agents are being used in a safe manner.

MECHANISM OF CLOTTING
Understanding the mechanism of blood coagulation aids the first assistant in assessing the patient’s clotting abilities and in the effective application of mechanical, thermal, and chemical hemostatic techniques. Depending on the type of trauma, a blood vessel either contracts or constricts when damaged; if cut, the vessel wall contracts. Direct trauma to the muscle in the vessel wall, however, causes it to constrict for several centimeters, resulting in vascular spasm. The greater the trauma, the greater the degree of vasospasm. For example, sharply cut vessels usually result in greater blood loss than crushed vessels.

After damage is incurred, plugging of the disrupted vessel with platelets begins. Platelets are normally oval or round disks. When platelets contact the collagen fibers of a damaged vessel wall, they swell and assume irregular shapes with protuberances. They also become sticky and secrete enzymes that activate adjacent platelets. The cumulative effect is the formation of a loose platelet plug. Next, the blood clot forms; this event occurs in three steps:

1. Prothrombin activators form in response to vessel trauma (extrinsic pathway) or damage to the blood cells (intrinsic pathway).
2. Aided by the activators, prothrombin is converted to thrombin (calcium ions are essential to this process).
3. Thrombin converts the fibrinogen to fibrin.

The fibrin threads then enmesh with the platelets in the platelet plug and the remaining blood components to form a tight, unyielding plug. Later, the clot retracts, closing the vessel even more.

After clot formation, fibroblasts invade the clot and organize into connective tissue. During this process, the proteolytic enzyme called plasmin, or fibrinolysin, is activated to digest the fibrin threads. Eventually, the clot dissolves (Guyton & Hall, 2006). Refer to the clotting cascade outlined in Table 17.1.

ASSESSING THE PATIENT’S CLOTTING MECHANISMS
The first assistant collaborates with the surgeon in assessing the patient’s clotting mechanisms. When a patient’s history or physical examination suggests bleeding or clotting difficulties, the surgeon should order platelet and coagulation studies. If no studies have been obtained on these patients, appropriate tests should be recommended, such as prothrombin time (PT), partial thromboplastin time (PTT), thrombin time (TT), or quantitative platelet counts. PT measures the extrinsic clotting mechanism and is the time required for coagulation to take place. PTT measures the activity of the intrinsic
INTRODUCTION
Facilitating care after the operative or invasive procedure refers to the nursing care activities done during the postprocedure period to make the patient physically and psychologically ready to begin convalescence and rehabilitation.

ROLE OF THE PERIOPERATIVE ADVANCED PRACTICE NURSE
Because practice settings vary, involvement of the advanced practice nurse (APN) in facilitating postprocedure care varies. This chapter addresses activities that advanced practice nurses, such as registered nurses, first assistants, and clinical specialists, may perform during the patient’s last stages of the perioperative continuum. In the postoperative domain of patient care, the APN’s role includes (CBPN, 2003):

- Evaluating and managing an individualized perioperative plan of care;
- Communicating relevant information about the procedure to postoperative care personnel;
- Collaborating with the healthcare team to manage the patient’s postoperative course; and
- Serving as consultant, educator, and resource to the patient, family members, and other healthcare professionals during discharge planning.

The advance practice nurse’s activities during and after the procedure should complement the nursing care the patient receives in the postanesthesia care unit (PACU), the nursing unit, the clinic,
and the home. This chapter is divided into two parts: activities of the immediate postprocedure period and discharge planning.

**MEASURABLE CRITERIA**

The APN demonstrates competency to facilitate care after the operative or invasive procedure, including discharge planning and teaching, by identifying the critical variables that affect the patient's convalescence. These include:

- Describing the stages of wound healing.
- Recognizing postprocedure wound complications.
- Recognizing systemic postprocedure complications.
- Assessing the patient's physiological and psychological comfort level.
- Ensuring the proper functioning of devices employed to assist recovery.
- Providing discharge instructions to the patient and family based on their individual informational needs and health literacy.
- Completing discharge followup.

**POSTPROCEDURE CARE PREPARES THE PATIENT FOR CONVALESCENCE AND REHABILITATION**

Table 18.1 provides guidance for preparing the patient for convalescence and rehabilitation following the operative or invasive procedure. Outcome statements, potential nursing diagnoses, and outcome indicators are identified for the postprocedure period.

<table>
<thead>
<tr>
<th>Table 18.1</th>
<th>Postprocedure Care Prepares the Patient Physically and Psychologically for Convalescence and Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recognizing Postprocedure Wound Complications</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Outcome 1</strong></td>
<td>The patient experiences uncomplicated wound healing.</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td>Risk for Impaired Tissue Integrity related to abscess formation</td>
</tr>
<tr>
<td><strong>Risk Factors</strong></td>
<td>Presence of pus in the wound, inadequate wound drainage, use of agents such as hydrogen peroxide, 1% povidone-iodine, 0.25% acetic acid, and 0.5% sodium hypochlorite to clean the wound, poor wound care.</td>
</tr>
<tr>
<td><strong>Outcome Indicators</strong></td>
<td>Does the patient show evidence of damage to integumentary or subcutaneous tissue?</td>
</tr>
<tr>
<td><strong>Risk for Impaired Tissue Integrity related to the formation of gas gangrene</strong></td>
<td>Wound contamination with hemolytic streptococci or <em>Clostridium perfringens</em></td>
</tr>
<tr>
<td><strong>Risk Factors</strong></td>
<td>Does the patient have a high fever? Does the patient complain of intense localized pain? Is a foul odor present? Is tissue crepitant, dark, and cool?</td>
</tr>
</tbody>
</table>
INTRODUCTION
General surgery has long been the hallmark of surgeries for the operative and invasive procedure suite. The common procedures linked to general surgery focuses on the gastrointestinal tract and the breast. The procedure areas involve the stomach, the liver, the pancreas, the intestines, the gallbladder, the appendix, and the breast. Historically these procedures were performed with open incisions, but with the advent of minimally invasive procedures (MIP) many operations are now performed through a small incision. Once all of the criteria are met, MIP seems to be the more effective treatment option for the patient. Compared to open surgical procedures, the benefits of MIP for the patient include decreased pain, less trauma to the tissues, shorter recovery period, decreased hospital stay and potentially a lower risk for infection. The only downside for the moment seems to be a high operative expense. As new methods and practices emerge, less invasive procedures will be a more common choice for patients than previous open and invasive procedures.

ANATOMY
The stomach is a curved muscular organ that receives food from the esophagus (Fig. 19.1). It is divided into four areas: the cardia, the fundus, the body, and the pylorus. Each of these portions secretes fluids that aid in the digestion of food. The stomach both mixes and initiates peristalsis of food and secretions so that they are driven into the small intestine. The small intestine joins the stomach at the pylorus, which is the lower opening. In the small intestine, digestion of all ingested foods is completed. The small intestine is about 16 feet
Section 3: Operative and Invasive Procedures

(500 cm) long and consists of the duodenum, the jejunum, and the ileum. The duodenum houses the pancreatic and common bile ducts, which provide the digestive fluids. The jejunum is supplied with blood from the mesentery, which contains fat, blood vessels, lymph vessels, lymph nodes, and nerves. The mesentery also supplies blood to the ileum, or last portion of the small bowel.

The large intestine or colon extends from the end of the ileum to the rectum. The large intestine is about 5 feet (1.5 m) long and is divided into the right and left sides of the colon. The right side of the colon consists of the cecum, the ascending colon, the hepatic flexure, and the proximal transverse colon. The left side of the colon consists of the distal transverse colon, the splenic flexure, the descending colon, the sigmoid, and the rectosigmoid colon. The large intestine is responsible for maintaining the patency of the gastrointestinal tract by eliminating and removing all indigestible materials.

The liver is one of the largest organs in the body, representing 2% of the total body weight. It is located in the upper right portion of the abdomen just beneath the diaphragm and consists of two principal lobes, the left and the right, separated by the falciform ligament (Fig. 19.2). The liver stores and filters blood, secretes bile, converts sugars into glycogen, and performs many other metabolic activities.

The gallbladder is a pear-shaped organ measuring 3 to 4 inches (7.5–10 cm) long. It is located below the liver and actually divides the liver into the right and left lobes (Fig. 19.3). The gallbladder’s main function is the storage of bile; it can hold about 45 mL of bile when fully distended. It is divided into four portions: the fundus, the body (which serves as the storage area), the infundibulum, and the neck, which connects with the cystic duct. The cystic duct continues and is joined with the common duct.

The pancreas is a soft, finely lobulated gland that extends retroperitoneally across the posterior abdominal wall from the second part of the duodenum on the right to the spleen on the left (see Fig. 19.3). It consists of five named parts, which include the head, the uncinate process, the neck, the body, and the tail. The main pancreatic duct traverses the gland and passes through the duodenal wall as the ampulla of Vater and
Bariatric Surgery
Rebecca M. Blades

INTRODUCTION
Bariatric surgery, recognized as the most effective long-term treatment for morbid obesity, refers to the surgical modification of the gastrointestinal tract to reduce nutrient intake and/or absorption (Wikipedia, 2008a). This surgery is an option for people with a body mass index (BMI) of 40 or above. For people with life-altering comorbidities, such as depression, type 2 diabetes, arthritis, hypertension, some types of cancer, and skin infections, bariatric surgery provides an option if they have a BMI of 35–39.9.

ANATOMY
The stomach is a curved muscular organ that receives food from the esophagus following mastication. Within the highly acidic environment of the stomach, and in conjunction with the gastric digestive enzymes, large molecules, such as those from food, are broken down into smaller ones, thus allowing eventual absorption from the small intestine (Wikipedia, 2008b).

Lying between the esophagus and the duodenum, the stomach is oriented on the left side of the abdominal cavity (see Fig. 20.1). Divided into four parts, the cardia refers to the section where contents of the esophagus empty into the stomach. The next section, which is formed by the upper curvature, is called the fundus. The corpus, the third section of the stomach, forms the central region. The fourth section is called the pylorus or antrum. This area of the stomach facilitates emptying of the contents into the duodenum, the first section of the small intestine (Wikipedia, 2008b).
Chapter 20: Bariatric Surgery

The esophageal sphincter is found at the proximal end of the stomach in the cardiac region. At the distal end is found the pyloric sphincter. These smooth muscle valves keep the contents of the stomach contained (Wikipedia, 2008b).

The right and left gastric arteries supply the lesser curvature of the stomach. The left gastric artery also supplies the cardiac region of the stomach. The right and left gastroepiploic arteries supply the greater curvature. The short gastric artery supplies the fundus and the upper portion of the greater curvature (Wikipedia, 2008b).

Surrounding the stomach are the parasympathetic and orthosympathetic plexuses, which regulate the secretory activity and motor activity of the stomach muscles (Wikipedia, 2008b).

The small intestine is about 16 feet (500 cm) long and consists of the duodenum, jejunum, and ileum. The duodenum connects to the pancreatic and common bile ducts, which provide the pancreatic enzymes and bile. The jejunum and ileum secrete a juice called succus entericus, which also aides in digestion (Wikipedia, 2008c). Table 20.1 outlines the digestive enzymes.

SPECIAL INSTRUMENTS, SUPPLIES, AND EQUIPMENT

Bariatric surgery is a sub-specialty of general surgery and can be done by either open or laparoscopic technique. Instruments for the open technique consist of a general surgery laparotomy set with major instruments, to include large retractors.
INTRODUCTION
The history of surgery goes back thousands of years. The Edwin Smith papyrus documents operative procedures from 3,000 years ago and efforts to control bleeding from the vascular system. Hot rocks and heated metal were used to cauterize vessels. Uncontrolled bleeding was, however, a major limitation in the early days of surgery. In the 16th century Ambroise Pare, a French surgeon, gained his experience by treating battlefield wounds. Pare promoted the use of ligature over cautery because it was less destructive than burning the flesh with tools available at that time. Since Pare’s time, technology has evolved and improved, reducing the morbidity and improving the outcomes for operative patients (Ulmer, 2007).

Vascular surgery involves invasive procedures on the vessels of the body aimed at treating disease or correcting a deformity. Problems within the vascular system create quality of life issues for patients so anxiety is not uncommon. Successful vascular procedures preserve and restore proper function. Less favorable outcomes can result in loss of one or both limbs, stroke, or death resulting from uncontrolled bleeding. An important component of a successful outcome is a skilled and knowledgeable operative team. Each team member is responsible for understanding the procedure and anticipating the expected course of action. Knowing key facts about the procedure contributes to positive patient outcomes.
ANATOMY

Diseased vessels within the arterial system of the human reduce blood flow and thus the oxygenation of structures and tissues. Impairment of blood flow may be related to:

- the total or partial obstruction of the vessel lumen caused by plaque
- the structure of the vessel lumen (ie, narrow vessel lumen)
- trauma to the vessel

Obstruction of the vessel lumen by plaque is called *atherosclerosis*. This is often a silent disorder that progresses for years before producing symptoms. Clinical manifestations result from chronic ischemia great enough to reduce blood flow, acute ischemia due to arterial embolism or atheromatous debris, and/or acute ischemia produced by thrombosis of arteries. Common sites for the development of atherosclerotic plaque are the coronary arteries, the carotid bifurcation, the abdominal aorta, the iliac arteries, and the superficial femoral artery (Zwolak, 1990). Figure 21.1 illustrates...
Thoracic surgery involves operative and invasive procedures within the limits of the thoracic cavity, with the exception of cardiac surgery which is covered separately. Thoracic surgery covers many types of procedures. Included in this chapter are procedures involving the lungs, pleura, and the mediastinum. Some thoracic procedures have been done in the same way for many years. Others, however, have changed and evolved as surgical instrumentation has changed and improved. The advent of minimally invasive techniques and robotic surgery and the impact they have had on the thoracic surgery is also discussed.

ANATOMY
The thorax is defined anteriorly by the sternum and costal cartilages, laterally by the 12 pair of ribs, and posteriorly by the 12 thoracic vertebrae. The superior extent of the thorax is at the root of the neck at Sibson's fascia. The inferior extent of the thorax is at the diaphragm.

The sternum is divided into three parts: (1) the superior portion, or manubrium; (2) the midportion, or gladiolus; and (3) the most inferior portion, or xiphoid process. The manubrium is connected to the clavicles and the first two pairs of ribs. The gladiolus is the point of attachment for rib pairs three to seven (the remaining true ribs). The 8th, 9th, and 10th rib pairs articulate with the costal cartilages of the rib above; the 11th and 12th rib pairs are not attached to the costal arch. Each pair of ribs articulates with the corresponding thoracic vertebrae posteriorly (Fig. 22.1).
There are 11 pairs of intercostal muscles. Each pair has an internal and an external muscle. An intercostal artery, vein, and nerve are found with each muscle. The origin of the arterial blood supply is the internal thoracic artery anteriorly and the aorta posteriorly. The venous system empties into the mammary veins anteriorly and into the azygos and hemiazygos veins posteriorly. Great care must be taken to avoid damage to the intercostal nerve in each space. When necessary to disturb an intercostal nerve, some form of anesthetic agent should be used to prevent postprocedure pain.

A discussion of thoracic anatomy would be incomplete without the mention of thoracic outlet syndrome, which is the compression of the great vessels of the head, neck, and arm against the borders of the thoracic outlet. Those borders are (1) the manubrium, anteriorly; (2) the first ribs, anterolaterally; (3) the first thoracic vertebrae, posteriorly; and, (4) the posterior angle of the first vertebrae.

The thorax is further subdivided into the right and left pleural cavities. These cavities contain the lungs. The cavities are separated by the mediastinum. The lining of each hemithorax is called the parietal pleura. The parietal pleura is adjacent to the inner surfaces of the ribs posteriorly and the mediastinum medially, and it covers most of the surface of the diaphragm. The central portion of the diaphragm remains uncovered. Arising from the root of each lung is the reflection of the parietal pleura. At this reflection the visceral pleura begin and cover each lung. Between the two pleuræ is pleural fluid that provides lubrication to reduce friction. Normal amounts of pleural fluid range from 0.1 to 0.2 mL/kg of body weight.

The lungs are the primary organs of respiration. Each lung extends from the apices, above the first ribs superiorly and to the diaphragm inferiorly. The hilum, or root of the lung, is where the origins of the bronchus, great vessels, lymphatic vessels, and nerves enter and leave the lung, near the mediastinum. Each lung is divided into lobes by deep fissures. Each lobe has a primary bronchus; this bronchus further subdivides into each lobe, the last subdivision being bronchioles. The right lung is divided into three lobes: upper, middle, and lower. The left lung is divided into two lobes: upper and lower. Interestingly, each lung is composed of segments. Each segment functions by expanding from the center out. Each segment has its own bronchus, artery, and vein.

The blood supply that feeds the lungs originates from the aorta and passes through the bronchial arteries. The numbers and courses of these arteries vary. In general,
INTRODUCTION
The treatment of acquired and congenital cardiac disease affecting the heart and proximal great vessels has undergone profound changes both at the microscopic and the macroscopic levels. At the cellular level, researchers are investigating the processes of cardiac cellular regeneration and death, genetic sequencing, and the effects of atrial natriuretic peptide hormones, homocysteine, and other biomarkers. This new knowledge about the function of cardiac myocytes has affected the treatment of patients with heart disease by the application of new knowledge to the macroscopic level with innovative and improved operative techniques. Refinements in anesthetic management, preprocedure and postprocedure care, operative procedures for heart failure, and technological advances have expanded patients’ choices and provided new learning opportunities for perioperative nurses. Understanding the geometry in valvular dysfunction, the long-term patency of grafted vessels, and approaches to operating on life-threatening dissections and aneurysms of the aorta also has stimulated new surgical procedures. Procurement techniques and the availability of cryopreserved grafts such as aortic conduits and heart valves have greatly improved the survival of individuals afflicted with congenital and acquired valve disease. Mechanical ventricular assist devices have expanded beyond serving only as a bridge to heart transplantation by also serving as end-destination therapy in selected patients. The growing demand for minimally invasive, endovascular techniques—developed in the interventional laboratories—is increasingly reflected in traditional operating rooms (ORs) where previously “open” procedures are currently often
performed via a percutaneous, endovascular route. Early discharge, streamlining of services, and an emphasis on financial considerations have also challenged nurses to design and deliver care in innovative ways that positively affect patient outcomes. This chapter addresses the trends and illustrates evidence to assist the perioperative nurse in providing optimal care for the patient undergoing cardiac operative and other invasive procedures.

**ANATOMY AND PHYSIOLOGY**

The heart (Fig. 23.1) is a four-chambered muscular organ about the size of a fist located in the mediastinal cavity between the lungs, posterior to the sternum, and anterior to the esophagus and the descending aorta. The heart’s inferior surface comes in contact with the diaphragm. Enclosed in a pericardial sac, the cardiac muscle is composed of three layers: the epicardium, the myocardium, and the endocardium. Any one or all three layers may suffer ischemic injury, depending on the severity of myocardial infarction. The heart is oriented toward the left side of the chest and rotated toward the left side. The right ventricular surface and the apex of the left ventricle are immediately visible upon entry of the chest and incision of the pericardium. Two concepts are important for understanding the orientation of the heart and cardiac anatomy and physiology: (1) the preponderance of electrical activity of the heart travels in a line from the right shoulder to the left foot, and (2) the point of maximal intensity is the fourth intercostals space, mid-clavicular line, which is the position of the left ventricle.

The heart is divided into right and left halves, separated by a septal wall. Each half is made up of two cavities. The upper, atrial cavities empty into their respective ventricles on each side. Thus the right atrium (RA) empties into the right ventricle (RV) and the left atrium (LA) empties into the left ventricle (LV). The right atrium receives oxygen-desaturated blood from the venous system by way of the inferior and superior vena cavae (IVC, SVC) and from the heart’s venous system by way of the...
INTRODUCTION

Transplant surgery, the art and science of removing an organ or tissue from the body and surgically placing it into the body of the same or a different individual provides options for patients with organ failure or injury. Successful transplant extends and improves quality of life for these patients. Usually, only patients with end-stage disease, who have no other medical treatment options, and who meet transplant criteria become transplant surgery candidates (Encyclopedia of Surgery, 2008). As of August 2008, there were approximately 99,220 eligible recipients waiting for an organ transplant in the United States and the list continues to grow. Table 24.1 shows US transplant statistics as reported by the United Network for Organ Sharing (UNOS).

When evaluating patients for possible transplant surgery, transplant specialists consider the patient's age, general physical state, diagnosis, and stage of disease. Patients with the following conditions generally do not meet selection criteria to become a transplant candidate (University of North Carolina, 2008; Encyclopedia of Surgery, 2008):

- Chronic hepatic, pulmonary, or renal disease unless these are target organs for transplant
- Compromised circulation in the lower extremities
- Malignancy
- Active drug or alcohol abuse
- History of behavior pattern or psychiatric illness
- Chronic infections
- Social factors that would affect ability to follow medical regimen do not meet the criteria
Section 3: Operative and Invasive Procedures

Table 24.1 United States Transplant Data

<table>
<thead>
<tr>
<th>Transplant Waiting List as of August 18, 2008</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>76,468</td>
</tr>
<tr>
<td>Pancreas</td>
<td>1,582</td>
</tr>
<tr>
<td>Kidney/Pancreas</td>
<td>2,266</td>
</tr>
<tr>
<td>Liver</td>
<td>16,149</td>
</tr>
<tr>
<td>Intestine</td>
<td>229</td>
</tr>
<tr>
<td>Heart</td>
<td>2,644</td>
</tr>
<tr>
<td>Lung</td>
<td>2,134</td>
</tr>
<tr>
<td>Heart/Lung</td>
<td>97</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Transplants performed January–May 2008</th>
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<tr>
<td>Deceased donor</td>
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<tr>
<td>Living donor</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Donors recovered January–May 2008</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Deceased donor</td>
<td>3,379</td>
</tr>
<tr>
<td>Living donor</td>
<td>2,424</td>
</tr>
</tbody>
</table>


COSTS OF TRANSPLANTS
On a yearly basis, surgeons and other physicians perform approximately 44.9 million inpatient procedures. When compared with the total number of procedures done, transplant surgery makes up a small portion of the total. However, when comparing costs, transplant surgery costs contribute significantly to total healthcare expenditures. Costs vary from region to region, and between hospitals. In addition, costs accelerate if a patient develops complications. Table 24.2 shows examples of typical hospital and physician fees. This table does not include costs related to pre-transplant or followup treatments (CDC, 2005; National Foundation for Transplant, 2007).

TYPES OF TRANSPLANT GRAFTS

Autograft
An autograft is “tissue derived from an individual for implantation exclusively on or in the same individual” (AORN, 2008, p. 610). Examples of autograft tissues include skin for a skin graft, vein extraction for coronary artery bypass graft surgery, and reimplantation of a functioning kidney in a different anatomical location such as the iliac artery, iliac vein, or bladder.

Allograft
A patient given an allograft receives an organ or tissue taken from a living or nonliving genetically nonidentical donor of the same species. Allografts constitute the majority of human transplants. Allograft recipients must take immunosuppressive drugs for the rest of their lives in order to prevent transplant rejection (Types of Transplants, 2008).
INTRODUCTION

Contrary to public and media perception, plastic surgery is much more than cosmetic procedures—facelifts, breast implants, and lip augmentations. It is not limited to one anatomical region of the body or organ system. Plastic surgery is both aesthetic and reconstructive; indeed, sometimes the arenas of aesthetics and reconstruction blend in the surgeon's efforts to restore appearance as well as function. One common thread, however, is the plastic surgeon's ability to manipulate and transfer tissue, whether it is skin, digits, muscle flaps, or micro-vascular structures. While based on sound surgical principles, plastic and reconstructive surgery is a specialty that is creative, innovative, and, in many respects, without boundaries.

ANATOMY

Integumentary System

The integument, or skin, is the largest organ of the human body. It forms a protective, pliable covering over the entire exterior surface. It works by acting as a crucial barrier to prevent the introduction of harmful organisms and also regulates body temperature. At the various openings of the body (the mouth, nares, anus, urethra, and vagina), the skin is continuous with mucous membrane linings. The skin contains three layers: the epidermis, dermis, and subcutaneous tissue (Fig. 25.1).

The epidermis is the outermost layer of the skin. It comes from the Greek word derma, meaning skin. It does not contain any blood vessels and relies on deeper layers of the skin for its nutrients and oxygen. The dermis contains numerous specialized structures: the
hair, the nails, and integumentary glands. The subcutaneous layer contains fat, connective tissue, blood vessels, and nerves.

The skin of an adult has a surface area of about 1.8 cm (3000 square inches) and may weigh anywhere from 3–5 pounds. It is thickest on the palms, the soles, and the back, and thinnest on the tympanic membrane and over the eyelids. The attachment of the skin varies from loose to tight. It is separated from the underlying structures in most parts of the body by a subcutaneous tissue called the superficial fascia (hypodermis). The superficial fascial system provides support for the surface tissues of the body. It also allows the muscles that underlie most of the skin to move freely. At some points where the superficial fascia is minimal and no muscles underlie the skin, as on the anterior surface of the tibia, the skin attaches to the periosteum of the bone. In plastic and reconstructive procedures, it plays a major role in providing support when tissue has been rearranged.

Skin color is caused in part by the pigment carotene (yellow), which is in the surface layer and in thin skin, and by the color of the circulating blood, which shows through to give the flesh appearance. The intensity of the flesh color depends on the state of contraction or dilation of the superficial vessels and on the extent of oxygenation of the blood. The difference in color among individuals and ethnic groups is due to the concentration of the pigment melanin. Skin grafting takes into account the difference in thickness and coloration from various areas of the body, especially when grafted skin is placed in a visible location.

Function

The functions of the skin are many. Basically, the skin stands as a protective barrier against the ever-changing and often adverse conditions of the external environment, and adapts itself to them. Skin receptors provide an awareness of this external environment. As skin wears, it adapts by the thickening of the stratum corneum to form calluses if necessary. It prevents the body from drying. The oiled surface of the skin sheds water, and its pigment helps to protect the body from harmful ultraviolet radiation. Skin is an effective first line of defense against infectious organisms.
INTRODUCTION
Neurosurgery can be one of the most complex, time consuming, detail-oriented, and demanding surgeries a nurse will participate in. Providing for the needs of the team, including anesthesia, the surgeons, the scrub personnel, and ancillary staff while caring for the patient can be a challenge for the most seasoned nurse.

Neurosurgical procedures, in the crudest forms, have been performed since the sixteenth century BC. Documents on papyrus from Egypt describe treatment of head and vertebral column injuries. William Keen of Philadelphia was the first surgeon in the United States to remove a brain tumor. This was accomplished in 1888 (Phillips, 2007). The father of modern neurosurgery is Harvey Cushing (1869–1939). He reduced the mortality rate for meningiomas from 96 to 5 percent and he established the first school of neurosurgery at Harvard (Phillips, 2007).

Technology has exploded in recent years, with rapid advances seen in neurosurgery. Neuro monitoring, image-guided tumor resection, navigation systems, artificial discs, resorbable plates, robotics, and coiling for aneurysms are just a few. Keeping abreast of technology is perhaps the greatest challenge for the perioperative nurse.

Neurosurgery primarily involves the structures of the central nervous system (CNS); the brain, spinal cord, and supporting structures, and the peripheral nervous system (PNS), those structures outside the CNS. This chapter will address surgery involving the brain and spinal cord.
ANATOMY

The nervous system is one of the most complex and least understood body systems (Ferrara, 2007). The nurse’s ability to understand basic neuro-anatomy will help in anticipating the needs of the surgical team and the patient.

Scalp

The brain is protected by several layers of tissue. The scalp consists of a thick subcutaneous layer of fat, which is richly supplied with blood vessels, and the galea aponeurotica, a thick fibrous tissue layer. The subaponeurotic space, under the galea and subgalea space, provide the mobility of the scalp. Blood supply is from branches of the external carotid arteries.

Skull

The skull consists of twenty-eight bones, eight in the cranium, that provide protection for the brain. This rigid cavity has a volume of 1400 to 1500 mL and contains the brain, which weighs less than three pounds. The bone consists of three layers, the outer and inner are solid hard bone and the middle layer is soft, spongy cancellous bone. This provides strength with a minimum of weight. The bones forming the cranial cavity are the frontal, parietal (two), occipital, temporal (two), ethmoid, and sphenoid. The irregular bony seams that join the bones are called sutures and can be used as landmarks during surgery. The only movable bone is the mandible. The frontal, parietal, and occipital bones form the top of the cranium and the temporal bones and the wings of the sphenoid form the sides. The cranial floor is formed from the sphenoid and cribiform plate (Fig. 26.1).

The skull consists of three cavities called fossae; anterior, middle, and posterior. The anterior fossae contain the frontal lobes. The middle fossae contain the temporal lobes, the upper brain stem, and the sella turcica. The brain stem (pons and medulla) and the cerebellum are contained in the posterior fossa.

Figure 26.1
Bones and sutures, right side of the skull.
INTRODUCTION
This chapter describes urological procedures as they pertain to the nursing and the operative and invasive procedure team. Content includes anatomy of the genitourinary system for the male and female, a discussion of the management and care of the patient undergoing a urological operative procedure, and the role of the nursing staff, descriptions of various procedures and urological instruments, and potential complications.

A team approach is essential in carrying out urological surgery. The nursing team plays a major role in the care of the patient before, during, and after a urological operative or invasive procedure. Key components of this role include assessment and planning for each patient. Safe positioning often presents a challenge, particularly for elderly and compromised patients having procedures in the lateral and lithotomy positions. See Chapter 8 for in-depth information concerning patient positioning. As with all operative and invasive procedures, the nurse advocates for the patient during the procedure. The nurse provides and directs patient care and ensures that nursing care team members correctly prepare and operate the sophisticated equipment associated with urological surgery such as lasers, ureteroscopes, and lithotripsy instruments. After the procedure, the nurse evaluates the patient's response to the nursing care given and provides education that assists the patient in the rehabilitation process.

Urological surgery investigates and manages diseases of the urological system in both males and females to include diseases and malformations of the adrenal glands, kidneys, ureters, bladder, male genitalia (penis, urethra, prostate gland, and scrotum), and female
genitalia. Urology offers a broad spectrum of treatment modalities, which include open procedures, endoscopic procedures, laser therapy, lithotripsy, and robotics, which have made open procedures less invasive.

The practice of urology goes back to antiquity. Illustrated and written documents describe procedures such as circumcision and lithotomy. Circumcision is present in Egyptian hieroglyphs depicting circumcision. Ancient specialists practiced lithotomy. Hippocrates, however, admonished, ”I will not use the knife, even upon those suffering from stones, but I will leave this to those who are trained in this craft” (Hippocratic Oath, Fourth Century B.C.E.). Since that time, urological surgery has progressed from circumcisions and lithotomies to a specialty that encompasses a wide range of diseases and procedures to include operative intervention for trauma to the genitourinary system and cancer therapy. Surgery provides solutions for many congenital abnormalities that affect the urinary tract. The past 20 years have also brought about dramatic changes in the approach to stone disease with the evolution of equipment such as the extracorporeal shock wave lithotriptor and sophisticated endoscopic and laser equipment. In addition, the urologist manages and treats complications involving the bladder and the ureters that may result from standard surgical procedures on adjacent organs (eg, colon or uterus).

ANATOMY

Abdominal Wall

An operative procedure on the urinary tract requires incisions through the abdominal wall musculature. The abdominal wall, which extends from the rib cage to the bony pelvis, consists of anterior, anterolateral, and posterolateral walls.

Two paired, segmented muscles, surrounded by fascial layers, form the anterior abdominal wall (Fig. 27.1). Known as the rectus abdominis muscles, they extend from the pubic crest to fifth, sixth, and seventh ribs, where they insert. A fibrous envelope called the rectus sheath surrounds these muscles. This sheath represents
INTRODUCTION
The term orthopedic is derived from the Greek words orthos, meaning straight, and pais, meaning child, since orthopedic surgeons originally dealt with bone deformities in children (The Free Dictionary, 2008). Orthopedic surgeons treat deformities, diseases, and injuries of bones and joints and their related structures, which include tendons, ligaments, muscles, and nerves. The specialty focuses equally on the prevention and the correction of a deformity or disability and not just on surgical intervention.

ANATOMY
The musculoskeletal system is comprised of bones, joints between bones, muscles, tendons, ligaments, and cartilage. As a whole, it is responsible for body shape and support, protection of internal organs, and locomotion.

Bones
The skeletal system consists of 206 bones, which comprise the supportive framework of the body and its appendages (Fig. 28.1). Bone forms by the process of ossification through either an intramembranous or an endochondral phase. Bone from intramembranous ossification forms directly from osteoblasts without a preexisting cartilage model and is normally found in flat, irregular, and short bones and in the diaphysis of the long bones. The process begins with the secretion of an intercellular substance composed of calcium salts, by osteoblasts. This deposit of calcium salts is known as calcification. Osteoblasts, surrounded by the matrix of calcium salts, form a network of trabeculae, which become entrapped and then fuse. The trapped
cells are then termed osteocytes. The periosteum is formed by the fibrous membrane that surrounds the growing bone mass.

The second type of ossification is endochondral, referring to bone formation by replacement of a preexisting cartilage model. Found in the growth and development of most long bones, it is the process used in fracture healing. The first step involves the calcification of cartilage, which is subsequently removed by cells called osteoclasts. Osteoblasts then repopulate the area and secrete osteoid. Most bones develop from a combination of intramembranous and endochondral ossification. In the diaphyseal, or shaft portion of the bone, blood vessels, along with osteoblasts, arise from the newly formed periosteum and, by means of intramembranous ossification, allow bones to grow circumferentially. The epiphyseal ends of the bone use endochondral ossification. This provides longitudinal and, to a lesser degree, circumferential growth. As the ossification proceeds, the cartilaginous model grows in length at the epiphyseal ends. The area between the diaphysis and the epiphysis is called the growth plate: it remains cartilaginous until early adulthood, to allow an increase in bone length. At maturity, longitudinal growth ceases and bone replaces the growth plate.

Bones formed by endochondral and membranous ossification remodel themselves continuously, with the destruction of old bone and the formation of new bone. This remodeling and replacement vary in different parts of the body, depending on body needs and injury.

Bones are classified according to their shape: short, long, flat, and irregular. Long bones are those of the limbs (eg, femur and humerus) and are longer than they are wide. Bones of the ankle and wrist are classified as short and are about equal in length and width. Examples of flat and irregular bones are the ribs and the vertebral column.
CHAPTER 29

Gynecological and Obstetrical Surgery

Joyce A. Cox
Mary A. Rogers

INTRODUCTION

Gynecological surgery refers to all operative and invasive procedures that involve the female reproductive organs and related structures (bladder, vasculature, rectum, musculature, and lymphatics), particularly those situated in the pelvis and perineum. From an operative perspective, the reproductive structures include the uterus, the cervix, the ovaries, the fallopian tubes, the vulva, and the vagina. With the advancement of technology, many gynecological procedures are now performed using minimally invasive techniques. The addition of robotics has allowed many complex minimally invasive procedures to be performed with added precision.

Obstetrical surgery refers to operative procedures on the gravid uterus. Obstetrical procedures include cerclages and cesarean sections.

Fetal surgery is operative intervention by reaching inside the uterus to help a fetus that has a correctable problem. The UCSF Fetal Treatment Center comments that “… it is surprisingly new because our ability to detect fetal problems has advanced so rapidly over the last few decades. While many diseases can now be accurately diagnosed before birth by genetic and imaging techniques, only a few require intervention before birth.” Animal research began in the 1960s and the first human fetal interventions were performed in the early 1980s (The Regents of the University of California, 2008).

This chapter includes the most frequent gynecological and obstetrical operative procedures, as well as an overview of fetal operative procedures (DeCherney & Nathan, 2003).
ANATOMY

External Genitalia

The external genitalia consist of the mons pubis (veneris), the clitoris, the labia majora and minora, the hymen, Bartholin's glands, and the orifice of the vagina (Fig. 29.1). Collectively, the external genitalia are referred to as the vulva. The mons pubis is an area of fatty tissue and coarse skin that lies over the symphysis pubis. After puberty, this area is covered with hair. The clitoris is an erectile structure; it is located beneath the anterior commissure formed by the labia majora and is partially hidden by the anterior ends of the labia minora. It is analogous to the corpora cavernosa in the male. The labia majora are long folds of skin filled with subcutaneous fat that run downward and backward from the mons pubis. The labia majora are embryologically homologous to the scrotum of the male. The labia minora are two delicate folds of fat-free, hairless skin. They lie between the labia majora, and their lateral surfaces are in contact with the smooth surfaces of the labia majora. They enclose the vestibule of the vagina, into which the vaginal and urethral orifices enter. The hymen is a thin mucous membrane that partially covers the entrance of the vagina in young females. The membrane remains intact until coitus but its presence is not reliable as a test of virginity. Analogous to Cowper's glands in the male, Bartholin's glands lie on either side of the vagina and behind the hymen. They secrete mucus or lubricant at the time of coitus.

Internal Genitalia

The internal genitalia include the vagina, the uterus and its ligaments, the ovaries, and the fallopian tubes (Figs. 29.2 and 29.3).
INTRODUCTION
The field of otorhinolaryngological surgery (ie, ear, nose, throat, head, and neck surgery) has diversified during the past 50 years. The numerous operative or invasive procedures involving this part of the anatomy have led to subspecialty training in certain fields. The goals of most procedures in the ear, nose, and throat and in the head and neck are the elimination of chronic infections, the extirpation of tumors, the preservation or improvement of hearing, and the manipulation of the food and air passages when obstructed or injured.

This chapter focuses on the common procedures in the ear, within the nose and paranasal sinuses, and within the soft tissues of the oropharynx and head and neck.

ANATOMY
Ears
The ears are special sense organs involved in enabling hearing as well as maintaining balance. They are divided into external, middle, and inner regions. The external ear is made up of the visible auricle and the external auditory canal. The ear and canal act as a funnel for the transmission of air vibrations that are eventually transformed into understandable sound. The external auditory canal ends at the tympanic membrane, or eardrum. The eardrum is the division between the external ear and the middle ear.

On the other side of the tympanic membrane is the middle ear cavity, or tympanic cavity. Within the middle ear cavity are the three bones that are involved in the transmission and modification of
sound energy. This energy is transported to the inner ear through the oval window. The first bone is called the malleus ("hammer"), the second is the incus ("anvil"), and the third bone is the stapes ("stirrup"). The footplate of the stapes sits within the oval window.

The inner ear is located deep within the temporal bone. It is composed of a bony portion as well as a membranous portion. The membranous portion contains a special fluid that is placed in motion when sound energy is transmitted from the tympanic membrane through the bones of hearing. Within the area called the bony labyrinth are the vestibule, the semicircular canals, and the cochlea. The vestibule and the semicircular canals are involved in balance mechanisms. The cochlea is the organ of hearing.

**Nose and Paranasal Sinuses**

The nose is made up of a combination of bone, cartilage, and mucous membrane ([Fig. 30.1](#)). The upper third of the external nose is composed of the nasal frontal, ethmoid, and maxillary bones. The lower two thirds of the nose are made up of cartilage. The internal nose contains openings on each side called the nares. The posterior openings into the nasopharynx are called choanae. The anterior skin-lined portion of the nasal cavity is called the vestibule.

The nasal septum divides the nose into two chambers lined by mucous membrane. The septum can become deviated and cause obstruction of the nasal airway. The nasal cavity communicates with the ear through the eustachian tube. The hard and soft palates divide the nasal cavity from the oral cavity. The lateral wall of the nasal cavity contains mucous membrane-lined bony projections called turbinates, or conchae ([Fig. 30.2](#)). Usually, there are bilateral inferior, middle, and superior turbinates. Rarely seen is a fourth turbinate called the supreme turbinate.

![Figure 30.1](#)

*Figure 30.1*

External portion of the nose.
Sight is man's richest sense, his link to the world and its wealth of imagery. Vision begins with light, the abundant rain of the sun's energy falling through space to touch and warm the earth. Light projects value, tone, and shadow into nature. The eye, keen to this kaleidoscopic effect, then relates what it senses to the brain, perception's ultimate seat.

—Loel Wertenbaker (1984)

INTRODUCTION
Operative procedures involving the eye encompass ophthalmic surgery. “Ophthalmology” is a combination of the Greek words “ophthalmos,” which means eye, and “logos,” meaning study. Developments in the specialty of ophthalmology have advanced as have the tools available to surgeons, revolutionizing prevention, operative interventions, and cures for diseases and afflictions associated with the structures of the eye.

ANATOMY
The eyes are organs of soft tissue that are cradled inside two bony structures. Seven bones of the skull (the frontal, lacrimal, ethmoid, maxilla, zygomatic, sphenoid, and palatine) make up the sockets. A lining of fat absorbs shocks to the eyes and provides a well-lubricated area for the constant motion. When the eyes are open, the central nervous system of the body becomes exposed to outside elements. This phenomenon happens nowhere else in the human body. Because of this, any stimuli near the eye will cause the eyes to shut with lightning speed. The eyelid, also called the palpebra, is the protective covering for the eye. Its function is not only to protect and cleanse the eye but also to provide lubrication of the cornea so it does not dry out. The skin on the palpebra is the thinnest skin on the human body. There are two muscles of the eyelid—the orbicularis oculi, which closes
the lids as it contracts, and the levator palpebrae superioris, which opens the eye on contraction. The conjunctiva is a mucous membrane that lines the inner surface of the eyelids. It is relatively thick, except for the central portion, the cornea. The cornea is very thin, movable, and transparent.

All animals that breathe air have the ability to produce tears. The human, however, is the only one that cries. The lacrimal glands are responsible for the secretion of tears, and several ducts carry the tears from the eye to the nasal cavity for excretion. Tears contain an enzyme called lysozyme that functions as an antibacterial agent to reduce the chance of eye infections. “Crying” is when the lacrimal glands secrete excessive fluid. The result is that the nose fills with fluid as the ducts carry the excess away, while the rest spills over the edges of the eyelids. The response of “crying” is a parasympathetic nerve reaction of the central nervous system.

The six muscles that give the eye its movement are:

- Superior rectus—moves the eye upward and toward the midline
- Inferior rectus—moves the eye downward and toward the midline
- Medial rectus—moves the eye toward the midline
- Lateral rectus—moves the eye away from the midline
- Superior oblique—moves the eye downward and away from the midline
- Inferior oblique—moves the eye upward and away from the midline

The extrinsic eye muscles can be moved with great precision because the motor units contain the fewest muscle fibers. There are only 5 to 10 fibers contained in eye muscles—fewer than any other muscle in the body. The eyes are anatomically aligned, which causes them to move together. This feature of the eye involves complex motor adjustments such as the relaxation of one muscle and the contraction of its counterpart. The result of uncoordinated eye movement is termed strabismus.

The cornea is the transparent covering of the eye. It has often been referred to as “the window of the soul.” It is mostly connective tissue with a thin layer of surface epithelium. The cornea is transparent because it contains few cells and no blood vessels. The cells and collagenous fibers are arranged in an unusual, regular pattern. The cornea is, however, well supplied with nerve fibers that enter at the margin and radiate toward the center. The cornea has numerous pain receptors with a low reaction threshold.

The sclera—continuous with the cornea—is the white portion of the eye. It serves as the attachment for the extrinsic muscles and protects the eye.

The middle tunic of the eye comprises the choroid coat, the ciliary body, and the iris. The choroid coat is loosely joined to the sclera and is woven with blood vessels that provide nourishment to surrounding tissues. The choroid also contains melanocytes which keep the inside of the eye dark by absorbing excess light. The ciliary body extends forward from the choroid and forms an internal ring around the front of the eye. It contains the ciliary processes and muscles. The iris is the most anterior portion of the middle or vascular tunic. It is identified as the colored portion of the eye. The iris divides the anterior chamber, which is between the cornea and the iris, and the posterior chamber, which lies between the iris and the lens. It is made of a flat bar of circular, smooth muscle fibers surrounding the pupil. By expansion and contraction, the iris controls the amount of light that enters the eye through the
INTRODUCTION
The word trauma refers any injury, whether physical or emotional. From a medical perspective, trauma describes a serious or critical bodily injury, wound, or shock (MedicineNet, 2008). Physical injury whether unintentional (eg, sports accidents) or intentional (eg, battery) is a surgical disease. Most patients admitted to a level I trauma center require three to six operative procedures. The perioperative trauma nurse must have a strong foundation in operative and invasive procedures and be able to function as a generalist in providing expeditious care to address the complexity of the human response to traumatic injury. Trauma occurs suddenly and unexpectedly. The nurse must recognize that not only the presenting patient but also his or her family is experiencing an episode of crisis and tremendous stress in dealing with the sequelae of a traumatic incident. The trauma population presents challenges commensurate with the type and severity of injury.

Many advances in the care of the critically injured before 1960 were made by the military. Mortality rates of 8% in World War I decreased to 4.5% in World War II, to 2.5% during the Korean War, then to less than 2% by the time of the Vietnam conflict. However, it was not until 1966 that healthcare providers began to apply the military experience of trauma care to the civilian population (Beachley, 2009).

SOCIETAL IMPACT
Trauma is a major public health problem in terms of cost and years of life lost. While the concept of traumatic injury as a recognized societal affliction has remained unchanged since early civilization,
the incidence, magnitude, cause, mechanism of injury, and treatment of traumatic injury have changed significantly (Beachley, 2009). In 2004, there were 167,184 injury deaths in the US; the most common cause of injury death was motor vehicle crashes, with a total of 44,933 deaths. Among people 65 years of age and older, falls are the most common cause of nonfatal injuries and injury death. In addition, unintentional injury accounts for over 2 million years of potential life lost before 65 years of age (Weigelt, Brasel, & Klein, 2009).

**Trauma Population**

Injury is the most underrecognized healthcare issue facing the US today. For people between 1 and 45 years of age, unintentional injury alone is the leading cause of death, and the fifth leading cause of death for all ages in the US. Among young people ages 15 to 24 years, three out of every four deaths were injury related in 2003. In addition, injury—unintentional, homicide and suicide combined—is the leading cause of premature death for young people and therefore is the leading cause of years of potential life lost before 75 years of age. The highest injury-related death rates are seen in the elderly; the death rates for people over 75 years of age are nearly three times those of the general population (Fowler, 2009).

Risk of injury from different causes varies by several factors: age, sex, race, income and environment. Death rates from injuries are highest among patients 75 years of age and older. The injury rate is highest for people between 15 and 34 years of age due to their participation in high-risk activities; the lowest injury rate is seen in children 5 to 14 years of age. Injury rates are highest for males between 15 to 24 years of age; the mortality risk for males is 4.6 times higher than that for females, most likely because of male involvement in hazardous activities. Native Americans have the highest death rate from unintentional injury, regardless of income; African Americans have the highest homicide rate; Caucasians and Native Americans have the highest suicide rates. The rate of unintentional injury is higher in low-income areas than in wealthy areas (Weigelt, Brasel, & Klein, 2009).

Alcohol not only contributes to trauma-producing events, it also increases the severity of injury. Alcohol abuse is a major contributing factor in motor vehicular crashes and in home, industrial, recreational, crime, suicide, and domestic violence traumatic events. There were 75,766 deaths attributable to alcohol in the US in 2001. While the involvement of alcohol in trauma has decreased by approximately 25% in the past decade, conservative estimates still implicate both alcohol and illegal drugs in 19% of the 2.2 million trauma patients who are hospitalized annually (Fowler, 2009).

Rural and urban environments have different patterns of injury: the intentional injury rate is higher in large urban areas; homicide is highest in cities. Rural areas have a higher suicide rate; in addition, the overall mortality rates from injury are higher in rural areas in comparison to urban communities. Both rural and urban environments share poisoning and falls as common unintentional injuries (Weigelt, Brasel, & Klein, 2009).

**Cost**

According to Whalen (2009), trauma patients average a 12-day hospital stay and it ranks second to cancer in total healthcare expenditures. The total costs of fatal and nonfatal unintentional injuries in 2003 totaled $602.7 billion, which equates
INTRODUCTION
Worldwide, 16.7 million people die of cardiovascular diseases each year. In 2001, cardiovascular disease (CVD) contributed to virtually one-third of worldwide deaths. By 2010, CVD will lead as the cause of death in developing countries. By 2020, CVD will cause nearly 25 million deaths worldwide. Globally, approximately 32 million myocardial infarctions and cardiovascular accidents occur each year, resulting in approximately 12.5 million deaths per year. Clearly, cardiovascular disease has no geographic, gender, socioeconomic, or political boundaries (American Heart Association, 2004). This chapter provides an overview of cardiac catheterization and electrophysiology.1

Cardiac Catheterization
Many of the deaths from myocardial infarction occur because of blocked coronary arteries secondary to atherosclerosis. Traditionally, the preferred treatment option was Coronary Artery Bypass Graft (CABG) surgery. Now technological advances, such as drug eluting stents (DES) and intravascular catheters, have created less invasive options for patients and growth for hospitals and specialists in cardiology. In 1990, surgeons and cardiologists2 performed approximately an equal number of coronary artery bypass graft (CABG) and percutaneous coronary interventions (PCI). Today the number of operative interventions has decreased and the number of percutaneous coronary interventions has increased (Table 33.1).
Electrophysiology

Coronary atherosclerosis or other disease processes can damage heart muscle, leading to impaired cardiac electrical activity, which can result in sudden death. For these at-risk patients, electrophysiology provides a potentially lifesaving alternative. Electrophysiology tests map the exact location of the aberrant intracardiac electrical signals and provide treatment options for the patient when the standard ECG, Holter monitor, event recorder, stress test, echocardiogram, or angiogram ordered by the cardiologist cannot provide enough information to evaluate the arrhythmia. During an electrophysiology test, a physician electrophysiologist, with advanced training in the diagnosis and treatment of arrhythmias, determines the exact location of an arrhythmia, and often corrects it during the same procedure. Intervention offers a permanent cure and, in many cases, eliminates the need for heart medications (Encyclopedia of Surgery, 2007).

CARDIAC CATHETERIZATION

From the inception of this technology it has changed from a basic diagnostic procedure used to visualize the coronary anatomy into a dynamic care modality providing palliative care for patients with atherosclerotic coronary lesions. As technology progressed, the most dramatic changes happened in the last thirty years. In the 1970s the images were being captured on 35 mm cine radiographic film, and today imaging technology has leaped forward with digital imaging video loops and data being stored on a computer server. In the past, physicians could only view these images with special 35 mm film projectors. Now caregivers can view the images at a computer desktop display. In addition, physicians can remotely view images throughout an organization or at their office. Along with imaging, catheter technology leapedfrogged with the development of angioplasty balloons and stent development. Advances in pharmacology and the development of drugs have improved outcomes and patient survival. Cardiac catheterization as a minimally invasive procedure will continue to forge a new frontier in cardiac care.

The Cardiac Catheterization Team

At the forefront of changing cardiac practice are minimally invasive interventions performed by cardiologists. The cardiac catheterization team consists of cardiologists, cardiovascular technology professionals, radiology technologists, and registered nurses. These multidisciplinary teams provide care to patients with an emphasis on patient safety and quality outcomes. Registered nurses have led the way in helping create an environment that supports best practice, which has allowed for

Table 33.1 2005 US Cardiac Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number of Procedures</th>
<th>% Men</th>
<th>% Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angioplasty†</td>
<td>1,271,000</td>
<td>874,000</td>
<td>397,000</td>
</tr>
<tr>
<td>Cardiac Revascularization (CABG)</td>
<td>469,000</td>
<td>325,000</td>
<td>145,000</td>
</tr>
</tbody>
</table>

† 1,265,000 angioplasties were percutaneous coronary interventions. American Heart Association, 2008.
INTRODUCTION
In the 1970s and 1980s, gastrointestinal (GI) procedures were performed in the operating room suite or in a special dedicated operating room. GI procedures were seldom performed in a location other than the operating room (OR). Today, a few institutions still perform these procedures under those circumstances; however, many have a special GI laboratory with dedicated surgical personnel whose location may be away from the OR, or they may have OR staff cross-trained to float to the GI lab. In addition, these procedures may be performed at the bedside by GI nursing personnel. Other institutions may have special dedicated areas in an ambulatory setting. What used to be a trend is more commonplace with gastroenterologists opening GI laboratories in an ambulatory setting in outpatient centers or in their offices.

Gastrointestinal procedures are performed on the GI tract, which includes the upper GI region, the lower GI region, and the associated organs. Most of the procedures are performed for diagnostic or therapeutic reasons. Patients may have much anxiety regarding outcomes or may be experiencing pain caused by the pathological process. For this reason, nurses must be attuned to the needs of the clientele. Patient assessment, support, and education are important components of this process.

The GI laboratory personnel work in a fast-paced, highly technical area in which patients are monitored before, during, and after a procedure. State-of-the-art equipment is used by nursing personnel to care for patients who may have potentially life-threatening complications. It is therefore not uncommon for nurses to be advanced cardiac life support (ACLS)-certified, have become a certified gastroenterology
registered nurse (CGRN) by the Certification Board of Gastroenterology Nurses and Associates (CBGNA), and to possess a high level of communication skills. In addition, the GI nurse may be working with varied personnel such as a gastroenterologist, an anesthesiologist, a nurse anesthetist, a physician assistant, a licensed vocational nurse, a GI technician, an instrument room technician, a nurse practitioner, and a patient care partner. In working in this environment, the nurse must possess a high level of specialized training.

**GASTROINTESTINAL NURSING**

The GI nurse is a highly trained member of the team and cares for patients with gastrointestinal problems and their families. The Society of Gastroenterology Nurses and Associates (SGNA) is an organization for GI nurses and associates whose membership included more than 8,000 members by the end of 2007. The roles they perform range from equipment management and cleaning to performing screening procedures or case management. The society defines the nursing care and standards that apply to GI nurses and has issued formal opinions on topics related to practice (Tables 34.1 and 34.2). The specialty requires (1) knowledge of nursing process, anatomy and physiology, moderate sedation/analgesia, pathophysiology, pharmacology, infection control, and Occupation Safety and Hazard Administration (OSHA) guidelines, and (2) the ability to use advanced technological methods for diagnostic and therapeutic endoscopy and emergency situations. The nurse must be knowledgeable in assessment, planning, intervention, and evaluation in order to provide effective care. The effective care is the result of the training required, which usually consists of on-the-job training with a mentor and physician endoscopist.

National certification in GI registered nursing (CGRN) is offered by the Certification Board of Gastroenterology Nurses and Associates (CBGNA). It requires clinical experience and successful completion of a written test that is based on a core curriculum for GI nurses. Recertification is available through the organization. A certificate is also available for licensed practical nurses (LPNs) and licensed vocational nurses (LVNs). SGNA Associates can earn recognition as a GI Technical Specialist (GTS). A certificate is an indication of competency, not of advanced practice. Advanced practice nurses such as nurse practitioners may work in a GI center. Management positions usually require advanced experience and education.

A team approach is vital to working effectively in this environment. The team works toward facilitation of an uneventful procedure. The physician, nurse, and ancillary personnel work closely for the good of the patient. The nurse acts as a patient advocate and uses assessment skills before, during, and after a procedure. Assessment skills, knowledge of procedures, and recognition of early signs of complications before, during, and after a procedure are hallmarks of the GI nurse.

In addition, the nurse needs to understand the patient’s level of health and have the specialty knowledge to recognize the onset of complications and of how to manage potential patient complications. It is because of this knowledge that the nurse can take appropriate action that may prevent complications. To prevent complications during and after a procedure, the nurse must be vigilant and able to communicate with the physician and other members of the team.
"The apparition was so awful that Wilhelm Conrad Röntgen wondered if he had taken leave of his senses. He could hardly have been more surprised if he had looked into a mirror and no reflection stared back. It was approaching midnight on November 8, 1895. For some time scientists had been reporting bizarre apparitions when they electrified the thin gas in vacuum tubes. The English physicist William Crookes, who saw unearthly luminous clouds floating in the air, had become convinced that he was producing ectoplasm, much beloved of Victorian seances, and had turned to spiritualism as a result. In Germany Röntgen was doing similar experiments and now, alone in the night, his imagination ran wild." (Imaging Life, 2008).

The history of medical imaging began in Germany in 1895. Wilhelm Conrad Röntgen (Fig. 35.1) was studying the effect of cathode-ray tubes and how they emitted light. On the evening of November 8, Röntgen noticed a glowing fluorescent screen too far from the tube to be affected by the cathode rays. After many weeks Röntgen discovered that the impact of cathode rays on the glass vacuum tube had generated a new invisible ray. The rays had the power to travel across space and penetrate objects, and the images could be recorded on photographic plates. By Christmas Röntgen had written a paper on his new kind of rays, which he called “X” rays to denote their unknown quality. Wilhelm Conrad Röntgen won the Nobel Prize in 1901 for his discovery of X-rays (Imaging Life, 2008).
The ability to visualize inside the human body without opening it revolutionized medicine. From these revolutionary beginnings the specialty of interventional radiology has emerged. The evolution of X-rays, fluoroscopy, CT, and MRI have paved the way for image-guided therapies such as radiofrequency ablation and microwave in minimally invasive cancer treatment.

**INTERVENTIONAL RADIOLOGY**

Imaging by radiant energy is the specialized field of medicine that encompasses radiology. Radiologists are medical doctors who have completed a four-year residency program studying the interpretation and diagnoses of radiological examinations. Following residency, extended training is available in the more specialized areas, one of which is interventional radiology. As the number of imaging technologies has expanded, so too has the field of interventional radiology. Some of the technologies used by interventional radiologists to gain access to organs and organ systems within the body include:

- General X-rays (many types)
- Magnetic resonance imaging (MRI)
- Computed tomography (CT)
- Diagnostic ultrasound
- Fluoroscopy

The interventional radiologist uses image-guided systems along with a growing array of instruments, catheters, stents, balloons, and specialized equipment to diagnosis and treat diseases. Interventional radiology overlaps with many surgical specialties such as general surgery, cardiac surgery, and vascular surgery. For this
Clinical Aspects of Operative Pain

Mary Beth Kean

DEFINITION OF PAIN
The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage and described in terms of such damage" (Task Force on Taxonomy of the International Association for the Study of Pain, 1994). This definition reflects the complexity of the pain experience involving physiologic and interpretive/emotional components. McCaffery (1979) defines pain as "what the experiencing person says it is and exists whenever he or she says it does." This definition best reflects the subjective nature of pain and the requirement for clinicians to believe patient reports. See Table 36.1 for a glossary of pain-related terms.

SCOPE OF THE PROBLEM
The United States Congress has designated the years between 2000 and 2010 as the Decade of Pain Control and Research. Significant efforts to improve the management of pain have yielded results in the form of published guidelines, position statements, state and federal law revisions, and, most recognizably, the Joint Commission of Healthcare Accreditation Organization's pain management standard implementation in 2001 (Gordon et al., 2002). Adherence to published guidelines combined with institutional commitment to making pain management a valued part of the culture can result in improved outcomes for postsurgical populations.

Despite these efforts, patients receiving analgesics continue to experience moderate to severe pain following operative procedures.
Table 36.1 | Glossary of Pain Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aberrant drug-related behavior</strong></td>
<td>Culture-bound determination of problematic drug-related behavior ranging from unsanctioned analgesic dose escalations in times of pain flare or requesting specific medications to injecting oral formulations or forging prescriptions</td>
</tr>
<tr>
<td><strong>Addiction</strong></td>
<td>A primary, chronic, neurobiologic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations; involves compulsive desire to use a drug despite continued harm</td>
</tr>
<tr>
<td><strong>Allodynia</strong></td>
<td>The presence of pain from a stimulus that is not normally painful</td>
</tr>
<tr>
<td><strong>Analgesia</strong></td>
<td>Insensibility to pain without loss of consciousness</td>
</tr>
<tr>
<td><strong>Anesthesia</strong></td>
<td>Loss of sensation and usually of consciousness without loss of vital functions artificially produced by the administration of one or more agents that block the passage of pain impulses along the nerve pathways to the brain</td>
</tr>
<tr>
<td><strong>Central sensitization</strong></td>
<td>Process by which pain is amplified and maintained centrally as in the spinal cord or brain in addition to the processes in the peripheral tissues; Thought to underlie some types of allodynia or hyperalgesia</td>
</tr>
<tr>
<td><strong>Controlled substances</strong></td>
<td>Medications regulated by law as to possession and use</td>
</tr>
<tr>
<td><strong>Endorphins</strong></td>
<td>Any of a group of endogenous peptides (as enkephalin and dynorphin) that are found especially in the brain and produce some of the same pain relief effects as the opioids</td>
</tr>
<tr>
<td><strong>Hyperalgesia</strong></td>
<td>A phenomenon whereby stimuli that are normally painful produce exaggerated pain</td>
</tr>
<tr>
<td><strong>Multimodal analgesia</strong></td>
<td>A combination regimen using two or more medications, interventional and nonpharmacologic techniques allowing for the reduced doses of medications and, therefore, reduced side effect profile</td>
</tr>
<tr>
<td><strong>Neuropathic pain</strong></td>
<td>Pain that is caused by a lesion or dysfunction of the nervous system</td>
</tr>
<tr>
<td><strong>Neuroplasticity</strong></td>
<td>The brain’s ability to reorganize itself by forming new neural connections throughout life; allows neurons in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment (MedicineNet.com, 2008)</td>
</tr>
<tr>
<td><strong>Neurotransmitter</strong></td>
<td>A substance (as norepinephrine or serotonin) that transmits a nerve impulse across a synapse</td>
</tr>
<tr>
<td><strong>Nociceptor</strong></td>
<td>A receptor for painful stimuli</td>
</tr>
<tr>
<td><strong>Opioid induced hyperalgesia</strong></td>
<td>A clinical phenomenon characterized by increasing pain in patients who are receiving increasing doses of opioids</td>
</tr>
<tr>
<td><strong>Physical dependence</strong></td>
<td>A state of adaptation that is manifested by a drug class-specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood levels of the drug, or administration of an antagonist</td>
</tr>
<tr>
<td><strong>Preemptive analgesia</strong></td>
<td>Involves the introduction of an analgesic regimen before the onset of noxious stimuli, with the goal of preventing sensitization of the nervous system to subsequent stimuli that could amplify pain</td>
</tr>
<tr>
<td><strong>Pseudo-addiction</strong></td>
<td>A term used to describe behavior that appears like addictive “drug-seeking” behavior but is actually an effort to obtain pain relief; behaviors from pseudo-addiction are said to be distinguished from addictive behaviors when the behaviors resolve after treatment of pain</td>
</tr>
</tbody>
</table>
Care of the Pediatric Patient

Kelly Kollar
Rose Moss

All children should be tirelessly noisy, playful, grubby-handed except at meal times, soiling and tearing such clothes as they need to wear, bringing not only the joy of childhood into the house but the dust and mud as well; in short, everything that makes the quiet and order of sickness and nursing impossible.

—George Bernard Shaw (1856–1950)

A pediatric operative or invasive procedure is not a procedure on a small adult. Not only are the procedures often exclusive to pediatric patients, but interventions throughout the procedure period also differ markedly. Pediatric patients vary from neonates to adolescents and young adults; thus, the nurse providing care during the operative and invasive procedures must possess knowledge of the stages of growth and development.

These are relatively simple statements with overwhelming implications for all staff caring for children within the operative and invasive procedure setting. The care of children is a unique and freestanding specialty. Instruments must be modified drastically for the variance in the size of pediatric patients. Appropriate-sized suture material and needles must also be available.

The impetus to develop pediatric surgery as a separate entity began with a few pioneers more than 50 years ago. The first organization for pediatric surgeons in North America was founded in 1948. Entire hospitals dedicated solely to the care of children were built. W. Potts clearly saw the need to develop pediatric surgery as a unique and separate entity when he said, “I have often wondered what sort of scar, how deep and how serious, is left on the heart of a child who is torn from his parents and suddenly tossed into a hospital environment associated in his mind with insecurity and pain” (Potts, 1956).
Now, however, most practicing clinicians in pediatric surgery believe that pain management is an integral part of care (Burrington, 1996).

In facilities that care for children, qualified pediatric nurses should be in senior positions to ensure children’s needs are addressed. Often the pediatric population is poorly represented at strategic levels. The use of multidisciplinary teams including surgeons, anesthesia professionals, pediatricians, and pediatric nurses is imperative to address the specific needs of children (Smith & Dearmun, 2006).

**FAMILY CENTERED CARE**

Today’s parents are savvy and know most organizations are adopting the philosophy of family centered care. Family centered care is complex and has broad definitions. It allows parents and families more freedom to come and go as the family sees fit. This type of care structure helps to limit anxiety and stress on families rather than having to adhere to the strict visitation guidelines of the past.

To alleviate anxiety in the pediatric population, a variety of techniques can be used. The use of other trained staff such as child life specialists, social workers, and nursing assistances, can help reduce anxiety. Age-appropriate teaching about what to expect, distraction techniques, role playing, play, and allowing comforting items to remain with the child will lower the child’s anxiety level. Education of the family and child preprocedurely can take place at an anesthetic assessment visit or the day of the procedure. Efforts to educate can include traditional question answer sessions, pamphlets, or videos. Often a liaison will relay information about progress of the surgical or invasive procedure to the family. If there is not a liaison, the nurse may update the family on progress; however this should be included in preprocedure teaching so the family is not alarmed when called for the update (Wisselo, Stuart, & Muris, 2004).

Parents and children alike do not always feel like an organization is best addressing their specific needs. In the past, doctors and nurses may have come across as aloof and distant. To ensure that care is family centered, help your facility to support parents and children in their various roles. Provide access to media that parents need during their stay at the hospital. Provide children with age appropriate toys. Provide time and space for families to be together. Parents strive to comfort and support their sick child and, as care givers, nurses need to support them. Offer open communication. Consider the spiritual and emotional needs of all the members involved. Offer families choices if applicable, allow them to maintain some control, and give personalized care. A liaison or concierge can be extremely comforting to families while waiting for a surgical outcome (Miceli & Clark, 2004).

Even though family-centered care is the goal for most of today’s pediatric facilities, current literature shows that it is not always optimized. Healthcare workers often find it difficult to relinquish control as parents take over some of the care of their child. Parents want to have communication about care expectations. The care providers need to communicate who is responsible for what care is given to children. Nurses are accepting of parents participating in care of their child. If work routines can be established, it can decrease the frustrations of all care providers; parents and staff (Ygge, Lindholm, & Arnetz, 2006).
INTRODUCTION
Healthcare financing and reimbursement, societal trends, national and state healthcare policies, and the emergence of hospitals predominately focused on acute-care services have significantly affected the delivery of healthcare to the aging population. In 2003, adults over 65 years of age comprised only 12 percent of the population, yet they accounted for one out of three hospital stays, and had a mean length of stay 1.7 days longer than the non-elderly (Russo & Elixhauser, 2006). Physiological changes and greater incidence of pathological processes associated with aging place the elderly patient at a greater risk for complications for any given operative procedure compared to the middle-aged patient.

AFFECT OF THE AGING POPULATION ON THE HEALTHCARE DELIVERY SYSTEM
Delivery methods have changed to meet the needs of the aging population. For example, in the United States, outpatient operative procedures account for more than 60% of the procedures, with speculations that the percentage will increase to nearly 75% by 2018 (eMedicine-Health, 2008). Hospitals continue to add outpatient surgery centers; more freestanding ambulatory surgery facilities continue to open. These facilities provide care relevant to the needs of the elderly.

Elderly patients benefit from outpatient operative and invasive procedures, because of convenience, lower cost, and reduced stress. However, unlike younger patients, the elderly still require thorough medical evaluations before any operative or invasive procedure to determine the most appropriate setting for the procedure. For
example, while age alone does not exclude an elderly patient as a candidate for an outpatient procedure, age does affect the reaction to certain anesthetic agents and related medications. Excretion of short-acting drugs often takes a longer time. In addition, an elderly patient may also have more underlying medical conditions that could potentially make an outpatient procedure riskier (New York-Presbyterian Hospital, 2008).

**LEGAL IMPLICATIONS**

**Informed Consent**

Informed consent, while important for all patients, particularly affects the older patient because of physiological changes that may affect cognition and thus affect ability to make a reasonable decision about the proposed treatment or intervention. In order to give informed consent, patients should receive information in terms they can understand and comprehend (Guido, 2006). The person obtaining informed consent should:

1. Briefly, yet completely explain the proposed treatment and/or procedure, which would include the diagnosis and the nature or purpose of the procedure.
2. Provide the name and the qualifications of the person and assistants performing the procedure.
3. Discuss the potential for serious harm, risks, or side effects that may occur during the procedure, including death, blood loss, pain, discomfort, nausea, and vomiting.
4. Discuss the likelihood of success of the proposed treatment or procedure.
5. Explain the patient's right to refuse the treatment or procedure, which would include the prognosis if the patient refuses the proposed treatment or procedure.
6. Inform the patient that alternative care and/or support would continue should the patient refuse the proposed treatment or care.
7. Explain practical alternatives to the proposed treatment or procedure, including the risks associated with doing nothing at all.

The physician has the ultimate responsibility for obtaining informed consent (see Fig. 38.1). Consequently, the nurse should not explain a procedure, the possible complications, and any available alternatives for the purposes of obtaining informed consent. As necessary, however, the nurse should clarify the statements made by the physician. If the patient expresses uncertainties or has questions about the proposed treatment or procedure, the physician should provide clarification and answer questions.

Failure to obtain informed consent from the elderly patient could be construed as negligence or battery. Negligence refers to a failure to give care to a patient according to minimally acceptable standards, which includes obtaining operative or invasive procedure consent. Consent forms should contain important facts, such as major potential complications of anesthesia or the procedure. Failure to mention these facts when obtaining a patient's signature could be a breach of duties and considered negligence. Battery occurs when someone does something physical to the patient that he or she does not want done, such as wrong site operative procedures.