

UNIT 13 Integumentary Function

Case Study

MANAGING AND PREVENTING SKIN CANCER



You are a nurse working in an outpatient dermatology clinic. A 22-year-old White woman with a family history of melanoma presents to the clinic with three moles that look atypical. She undergoes excision and biopsy of the moles. One week later she returns to the clinic for her results. Two of the moles are within

normal limits; however, one mole on her right shoulder is positive for melanoma *in situ*. The dermatologist recommends a total excision of the area with 2.5 cm (1 in) margins. As the patient is leaving the clinic, she asks you if this is the best treatment option and what she can do to prevent further skin cancers. What is the evidence base for managing melanoma *in situ*? What evidence-based recommendations will you make to help her prevent further skin cancers?

QSEN Competency Focus: Evidence-Based Practice (EBP)

The complexities inherent in today's health care system challenge nurses to demonstrate integration of specific interdisciplinary core competencies. These competencies are aimed at ensuring the delivery of safe, quality patient care (Institute of Medicine, 2003). The Quality and Safety Education for Nurses project (Cronenwett, Sherwood, Barnsteiner, et al., 2007; QSEN, 2020) provides a framework for the knowledge, skills, and attitudes (KSAs) required for nurses to demonstrate competency in these key areas, which include **patient-centered care, interdisciplinary teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics**.

Evidence-Based Practice Definition: Integrate best current evidence with clinical expertise and patient/family preferences and values for delivery of optimal health care.

SELECT PRE-LICENSURE KSAs	APPLICATION AND REFLECTION
	Knowledge
<p>Differentiate clinical opinion from research and evidence summaries</p> <p>Describe reliable sources for locating evidence reports and clinical practice guidelines</p>	<p>Identify the sources you would use for evidence-based reports and clinical guidelines for managing abnormal dermatologic skin findings in this patient as well as in others who have similar risk factors. Identify the evidence base for skin cancer prevention recommendations.</p>
	Skills
<p>Read original research and evidence reports related to area of practice</p> <p>Locate evidence reports related to clinical practice topics and guidelines</p>	<p>What is the strength of the evidence for management of melanoma <i>in situ</i> and for melanoma prevention in those with a family history?</p> <p>What criteria will you use to judge the strength of the evidence you have identified?</p>
	Attitudes
<p>Appreciate the importance of regularly reading relevant professional journals</p>	<p>Reflect upon what you learned by reviewing current evidence-based practice. Think about how patients rely on the best evidence to determine the most effective treatment. If a patient with a melanoma <i>in situ</i> were being treated in 10 years' time, do you think the same evidence-based guidelines or reports will be in use?</p>

Cronenwett, L., Sherwood, G., Barnsteiner, J., et al. (2007). Quality and safety education for nurses. *Nursing Outlook*, 55(3), 122–131; Institute of Medicine. (2003). *Health professions education: A bridge to quality*. Washington, DC: National Academies Press; QSEN Institute. (2020). *QSEN Competencies: Definitions and pre-licensure KSAs; Evidence based practice*. Retrieved on 8/15/2020 at: qsen.org/competencies/pre-licensure-ksas/#evidence-based_practice

55 Assessment of Integumentary Function

LEARNING OUTCOMES

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

1. Describe the structures and functions of the skin, hair, and nails.
2. Discriminate between normal and abnormal assessment findings of the skin, hair, and nails.
3. Recognize and evaluate the major alterations in skin, hair, and nails by applying the patient's health history and physical assessment findings.
4. Compare and contrast the patterns and typical distributions of primary and secondary skin lesions.
5. Distinguish common skin manifestations associated with systemic disease.
6. Identify the common diagnostic tests used in evaluating skin disorders and related nursing implications.

NURSING CONCEPTS

- Assessment
Cellular Regulation
Tissue Integrity

GLOSSARY

- alopecia:** loss of hair from any cause
- ecchymosis:** bleeding into the skin and tissue, initially evidenced by varied color (e.g., purple, black) that gradually fades to green, yellow, or brown over time
- erythema:** redness of the skin caused by dilation of the capillaries due to injury, irritation, inflammation, or various skin conditions
- hirsutism:** the condition of having excessive hair growth
- hyperpigmentation:** increase in the melanin of the skin, resulting in an increase in pigmentation
- hypopigmentation:** decrease in the melanin of the skin, resulting in a loss of pigmentation
- keratin:** an insoluble, fibrous protein that forms the outer skin layer
- keratinocytes:** arising from the innermost layer of the epidermis, synthesize the insoluble protein, keratin
- Langerhans cells:** dendritic clear cells in the epidermis that carry surface receptors for immunoglobulin and complement and that are active participants in delayed hypersensitivity of the skin
- melanin:** the substance responsible for coloration of the skin
- melanocytes:** cells of the skin that produce melanin
- Merkel cells:** cells of the epidermis that play a role in transmission of sensory messages
- petechiae:** pinpoint red spots that appear on the skin as a result of blood leakage into the skin
- rete ridges:** undulations and furrows that appear at the lower edge of the epidermis at the dermal junction where these two skin layers are cemented together
- sebaceous glands:** glands that exist within the epidermis and secrete sebum to keep the skin soft and pliable
- sebum:** fatty secretion of the sebaceous glands
- telangiectasias:** vascular structures; red marks on the skin caused by distention of the superficial blood vessels
- vitiligo:** a localized or widespread condition characterized by destruction of the melanocytes in circumscribed areas of the skin, resulting in white patches
- Wood light:** ultraviolet light used for diagnosing skin conditions

In the United States, as many as one in three people will have a skin disorder or disease at any given time. Skin disorders are commonly observed in inpatient and outpatient nursing practice settings. The assessment of the skin

can provide important information about the general health of the patient or clues to systemic conditions that manifest in the skin.

Any medical treatment can suddenly induce an episode of skin symptoms such as itching, skin discomfort, or rash. The psychological stress of illness or various personal and family problems may be exhibited outwardly as dermatologic disorders. In certain systemic conditions, such as hepatitis and some cancers, dermatologic manifestations may be the first sign of the disorder and the main reason a patient seeks health care.

Anatomic and Physiologic Overview

The skin is the largest organ system of the body and is essential for human life. It participates in many vital body functions; it forms a barrier between the internal and external environment protecting the body from pathogens, helps regulate temperature and water loss, and provides sensory input.

Anatomy of the Skin, Hair, Nails, and Glands of the Skin

Skin

The skin is composed of three layers: epidermis, dermis, and subcutaneous tissue (Fig. 55-1). The epidermis is an outermost layer of stratified epithelial cells, composed predominantly of keratinocytes. It ranges in thickness from about 0.05 mm on the eyelids to about 1.5 mm on the palms of the hands and soles of the feet. Four distinct layers compose the epidermis; from innermost to outermost, they are the stratum germinativum, stratum granulosum, stratum lucidum, and stratum corneum. Each layer becomes more differentiated (i.e., mature and with more specific functions) as it rises from the basal stratum germinativum layer to the outermost stratum corneum layer.

Epidermis

The epidermis, which is contiguous with the mucous membranes and the lining of the ear canals, consists of live, continuously dividing cells called **keratinocytes**, which differentiate and randomly migrate upward. These cells synthesize keratin; eventually they become metabolically inactive and form a thick and protective outer layer. This external layer, called the stratum corneum, is almost completely replaced every 3 to 4 weeks. The dead cells contain large amounts of **keratin**, an insoluble, fibrous protein that forms the outer barrier of the skin and has the capacity to repel pathogens and prevent excessive fluid loss from the body. Keratin is the principal hardening ingredient of the hair and nails.

Melanocytes are the special cells of the epidermis that are primarily involved in producing the pigment **melanin**, which colors the skin and hair. A person's normal skin color is determined by the amount of melanin produced. Most of the skin of people who are dark skinned and the darker areas of the skin on people who are light skinned (e.g., the nipple) contain larger amounts of melanin and are not related to numbers of melanocytes. Normal skin color depends on race and varies from pale, almost ivory, to deep brown, almost pure black. Systemic disease can affect skin color. For example, insufficient oxygenation of the blood will induce cyanosis (a bluish hue in the skin of individuals who are light skinned), significant liver disease manifests as jaundice or icterus (a yellow green skin tone), and **erythema** (a pink or red skin shade caused by dilation of the capillaries) is seen when there is inflammation or fever.

Production of melanin is influenced by several factors including a hormone secreted from the hypothalamus of the brain called *melanocyte-stimulating hormone*. It is believed that melanin production responds in a protective manner with increased ultraviolet light in sunlight.

Two other types of cells are common to the epidermis: Merkel and Langerhans cells. **Merkel cells** are not fully understood but may have a role as receptors that transmit stimuli to the axon (long projection of a nerve cell) through a chemical synapse. **Langerhans cells** are believed to play a significant role in cutaneous immune system reactions. These accessory cells of the afferent immune system process invading antigens and transport the antigens to the lymph system to activate the T lymphocytes.

The characteristics of the epidermis vary in different areas of the body. It is thickest over the palms of the hands and soles of the feet and contains increased amounts of keratin. The thickness of the epidermis can increase with friction and pressure and can result in calluses forming on the hands or corns forming on the feet.

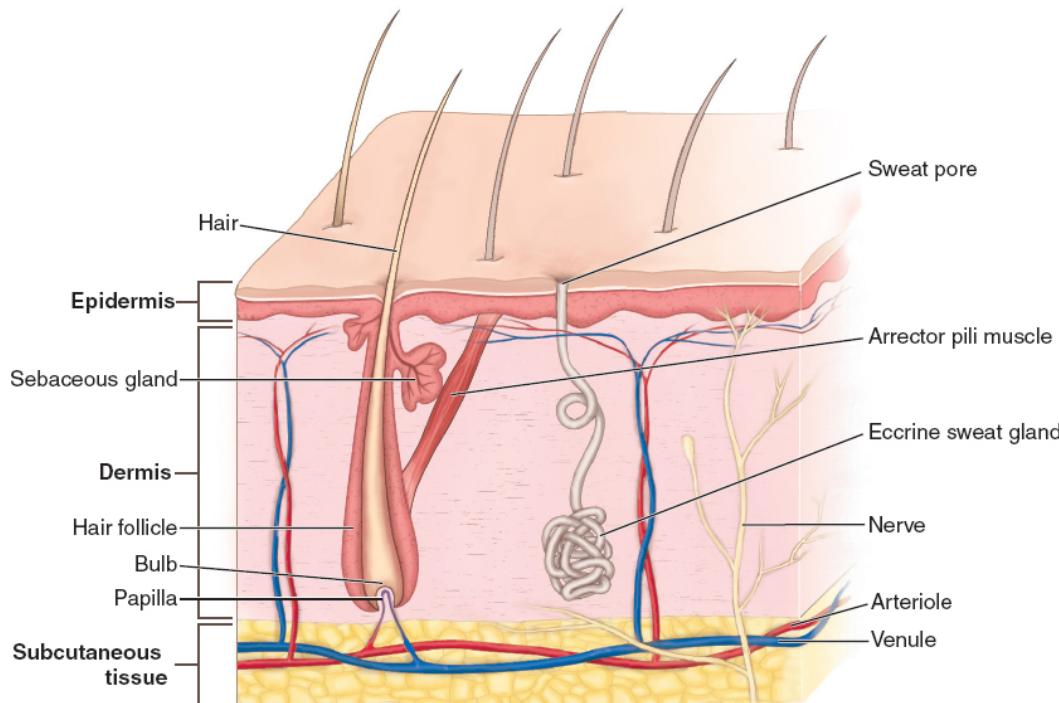


Figure 55-1 • Anatomic structures of the skin.

The junction of the epidermis and dermis is an area of undulations and furrows called **rete ridges** on the epidermal side and dermal papillae on the dermal side. Anchors found in this junction hold together the epidermis and dermis, permitting the free exchange of essential nutrients between the two layers. This interlocking between the dermis and epidermis produces ripples on the surface of the skin. On the fingertips, these ripples are called **fingerprint**s. They are a person's most individual physical characteristic, and they rarely change over time (Wilhelmi & Molnar, 2018).

Dermis

The dermis makes up the largest portion of the skin, the connective tissue between the epidermis and subcutaneous tissue. It provides strength and structure in the form of collagen and elastic fibers. It is composed of two layers: papillary and reticular. Collagen fibers are loosely organized in the papillary dermis and are more tightly packed in the reticular dermis. The dermis also contains blood and lymph vessels, nerves, sweat and sebaceous glands, and hair roots.

Subcutaneous Tissue

The subcutaneous tissue, or hypodermis, is the innermost layer of the skin. It is primarily adipose and connective tissue, which provides a cushion between the skin layers and the muscles and bones. This layer also protects the nerve and

vascular structures that transect the layers. It promotes skin mobility, molds body contours, and insulates the body. The subcutaneous tissues and the amount of fat deposited are important factors in body temperature regulation.

Hair

An outgrowth of the skin, hair is present over the entire body except for the palms and soles. The hair consists of a root formed in the dermis and a hair shaft that projects beyond the skin. It grows in a cavity called a *hair follicle*. Proliferation of cells in the bulb portion of the follicle causes the hair to form (see Fig. 55-1).

Throughout a person's life, hair follicles undergo continuous cycles of growth, transition, and rest. The rate of growth varies; beard growth is the most rapid, followed by hair on the scalp, axillae, thighs, and eyebrows. The growth (anagen) phase may last 2 to 6 years for scalp hair, the involution (catagen) phase lasts 2 to 3 weeks, followed by the telogen or resting phase, which lasts 2 to 3 months. During telogen, hair is shed from the body. The hair follicle independently recycles into the growing phase spontaneously (Nicol, 2016). Growing and resting hairs can be found side by side on all parts of the body. About 90% to 95% of the hair follicles on a normal scalp are in the growing (anagen) phase, around 1% are involuting (catagen), and 5% to 10% are in the shedding (telogen) phase at any one time. A person will typically shed approximately 100 scalp hairs each day (Habif, Dinulos, Chapman, et al., 2018).

There is a small bulge on the side of the hair follicle that houses the stem cells that migrate down to the follicle root and begin the hair shaft reproduction cycle. These bulges also contain the stem cells that migrate upward to reproduce skin. The location of these cells on the side of the hair shaft, rather than at the base, is a factor in hair loss. In conditions in which inflammation causes damage to the root of the hair, regrowth is possible. However, if inflammation causes damage to the side of the hair follicle, stem cells are destroyed, and the hair will not grow.

In certain locations on the body, hair growth is controlled by sex hormones. The most obvious example is the growth of hair on the face (i.e., beard, mustache), chest, and back, which is controlled by the male hormones known as androgens. Both men and women produce and need androgens, but in differing amounts. Women with higher levels of the androgen testosterone have hair in the areas generally thought of as masculine, such as the face, chest, and lower abdomen. This is often a normal genetic variation, but if it appears along with irregular menses and weight changes, it may indicate a hormonal imbalance (Habif et al., 2018).

Hair in different parts of the body serves different functions. The hairs of the eyes (i.e., eyebrows, lashes), nose, and ears filter out dust, bugs, and airborne debris. The hair of the skin provides thermal insulation in mammals

with hair or fur. This function is enhanced during cold or fright by piloerection (i.e., hairs standing on end), caused by contraction of the tiny erector muscles attached to the hair follicle. The piloerector response that occurs in humans is probably vestigial (i.e., rudimentary), no longer serving its original purpose.

Hair color is supplied by varying amounts of melanin within the hair shaft. Gray or white hair reflects the loss of pigment. Hair quantity and distribution can be affected by endocrine conditions. For example, Cushing's syndrome causes **hirsutism** (i.e., excessive hair growth), especially in women, and hypothyroidism (i.e., underactive thyroid) causes changes in hair texture. Various factors can cause localized or generalized loss of hair, or **alopecia**. Chemotherapy and radiation therapy cause reversible hair thinning or weakening of the hair shaft. Several autoimmune disorders, including systemic lupus erythematosus and alopecia areata, cause hair loss in smaller defined areas. Folliculitis of the scalp will cause inflammation of the hair roots and may result in scarring hair loss.

Nails

On the dorsal surface of the fingers and toes, a hard, transparent plate of keratin, called the *nail*, overlies the skin. The nail grows from its root, which lies under a thin fold of skin called the *cuticle*. Nail functions include scratching and protecting the highly developed sensory functions of fingers and toes to assist in grasping small items. The nails can also be of psychosocial importance as related to grooming and appearance (Nicol, 2016).

Nail growth is continuous throughout life, with an average growth of 0.1 mm daily. Growth is faster in fingernails than toenails and tends to slow with aging. Complete regeneration of a fingernail takes about 6 months, whereas toenail regeneration takes approximately 18 months (Bolognia, Schaffer, & Cerroni, 2017).

Glands of the Skin

There are two types of skin glands: **sebaceous glands** and sweat glands (see Fig. 55-1). The sebaceous glands are associated with hair follicles. The ducts of the sebaceous glands empty **sebum** (fatty secretions) onto the space between the hair follicle and the hair shaft, thus lubricating the hair and rendering the skin soft and pliable.

Sweat glands are found in the skin over most of the body surface, but they are most heavily concentrated in the palms of the hands and soles of the feet. Only the glans penis, clitoris, labia minora, the margins of the lips, the external ear, and the nail bed are devoid of sweat glands. Sweat glands are subclassified into two categories: eccrine and apocrine.

The eccrine sweat glands are found in all areas of the skin. Their ducts open directly onto the skin surface. The thin, watery secretion called *sweat* is

produced in the basal coiled portion of the eccrine gland and is released into its narrow duct. Sweat is composed predominantly of water and contains about half of the salt content of blood plasma. Sweat is released from eccrine glands in response to elevated ambient temperature and elevated body temperature. The rate of sweat secretion is under the control of the sympathetic nervous system. Excessive sweating of the palms and soles, axillae, forehead, and other areas may occur in response to pain and stress.

The apocrine sweat glands are larger than eccrine sweat glands and are located in the axillae, periumbilical area, nipple, anal region, scrotum, and labia majora. Their ducts generally open onto hair follicles. The apocrine glands become active at puberty. In women, they enlarge and recede with each menstrual cycle. Apocrine glands produce an oily sweat that is sometimes broken down by bacteria, such as *Corynebacterium* species, to produce the characteristic underarm odor. Specialized apocrine glands called *ceruminous glands* are found in the external ear, where they produce cerumen (i.e., wax).

Functions of the Skin

Protection

The skin covering most of the body is no more than 1 mm thick, but intact skin provides highly effective protection against invasion by bacteria and other foreign matter. The thickened skin of the palms and soles protects against the effects of the constant trauma that occurs in these areas.

The stratum corneum—the outer layer of the epidermis—provides the most effective barrier to epidermal water loss and penetration of environmental factors such as ultraviolet radiation, chemicals, microbes, and insect bites.

Various lipids are synthesized in the stratum corneum and are the basis for the barrier function of this layer. These are long-chain lipids that are suited for water-resistant ceramides, cholesterol, and free fatty acids (Bolognia et al., 2017). The presence of these lipids in the stratum corneum creates a relatively impermeable barrier for water loss and for the entry of toxins, microbes, and other substances that contact the surface of the skin.

Some substances do penetrate the skin but meet resistance in trying to move through the channels between the cell layers of the stratum corneum. Microbes and fungi, which are part of the body's normal flora, cannot penetrate unless there is a break in the skin barrier.

The basal layer, at the junction of the epidermis and dermis, is composed of collagen, anchoring fibers, and macromolecules. The basal layer serves four functions. It acts as a support structure for tissue organization and a template for regeneration; it provides selective permeability for migration of cells and proteins; it is a physical barrier between different types of cells; and it binds the epithelium to underlying cell layers (Bolognia et al., 2017).

Sensation

The receptor endings of nerves in the skin allow the body to constantly monitor the conditions of the immediate environment. The main functions of the receptors in the skin are to sense temperature, pain, light touch, and pressure (or heavy touch). Different nerve endings respond to each of the different stimuli. Although the nerve endings are distributed over the entire body, they are more concentrated in the head and distal extremities.

Fluid Balance

The stratum corneum—the outermost layer of the epidermis—has the capacity to absorb water, thereby preventing an excessive loss of water and electrolytes from the internal body and retaining moisture in the subcutaneous tissues. When skin is damaged, as occurs with a severe burn, large quantities of fluids and electrolytes may be lost rapidly, possibly leading to circulatory collapse, shock, and death (see [Chapter 57](#)).

The skin is not completely impermeable to water. Small amounts of water continuously evaporate from the skin surface. This evaporation, called *insensible perspiration*, amounts to approximately 500 mL daily in an average-sized adult (Norris, 2019). Insensible water loss varies with temperature, both body and ambient. In a person with a fever, the loss can increase in a predictable fashion, approximately 12% for every 1°C (1.8°F) increase in body temperature (Norris, 2019).

Temperature Regulation

The body, in the process of creating energy, continuously produces heat as a result of the metabolism of food. This heat is dissipated primarily through the skin. Three major physical processes are involved in loss of heat from the body to the environment. The first process—radiation—is the transfer of heat to another object of lower temperature situated at a distance. The second process—conduction—is the transfer of heat from the body to a cooler object in contact with it. The third process—convection, which consists of movement of warm air molecules away from the body—is the transfer of heat by conduction to the air surrounding the body.

Evaporation from the skin aids heat loss by conduction. Heat is conducted through the skin into water molecules on its surface, causing the water to evaporate. The water on the skin surface may be from insensible perspiration, sweat, or the environment.

Normally, all these heat loss mechanisms are used. When the ambient temperature is extremely high, evaporation becomes the only effective means to disperse generated body heat.

Under normal conditions, metabolic heat production is balanced by heat loss, and the internal temperature of the body is maintained constant at

approximately 37°C (98.6°F). The rate of heat loss depends primarily on the surface temperature of the skin, which is a function of the skin blood flow. Under normal conditions, the total blood circulated through the skin is approximately 450 mL/min, or 10 to 20 times the amount of blood required to provide necessary metabolites and oxygen. Blood flow through these skin vessels is controlled primarily by the sympathetic nervous system. Increased blood flow to the skin results in more heat delivered to the skin and a greater rate of heat loss from the body. In contrast, decreased skin blood flow reduces the skin temperature and helps conserve heat for the body. When the temperature of the body begins to fall, as occurs on a cold day, the blood vessels of the skin constrict, thereby reducing heat loss from the body (Bolognia et al., 2017).

Sweating is another process by which the body can regulate the rate of heat loss. Sweating does not occur until the core body temperature exceeds 37°C (98.6°F), regardless of skin temperature. In extremely hot environments, the rate of sweat production may be as high as 1 L/h. Under some circumstances (e.g., emotional stress), sweating may occur as a reflex and may be unrelated to the need to lose heat from the body (Bolognia et al., 2017).

Vitamin Production

Skin exposed to ultraviolet light can synthesize vitamin D (cholecalciferol). Vitamin D is essential for preventing osteoporosis and rickets, a condition that causes bone deformities and results from a deficiency of vitamin D, calcium, and phosphorus. Estimations vary on the amount of sunlight necessary for this synthesis to occur since numerous individual and environmental variables make a uniform recommendation difficult. In some projections, most people would need 5 to 30 minutes of sun exposure twice a week. No studies to date have determined if vitamin D synthesis in the skin can occur without increasing skin cancer risk (Office of Dietary Supplements, National Institutes of Health, 2019). Adequate amounts of Vitamin D should be obtained from a healthy diet and supplementation rather than intentional sun exposure (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015).

Immune Response Function

The skin functions not only as a barrier defense against environmental hazards, but also produces immune responses. The skin has the capacity to generate innate and adaptive immune responses (Bolognia et al., 2017). Innate immune functions of the skin include the closely packed layers of the stratum corneum, the nonspecific inflammatory response of pattern recognition receptors, and a chemical environment that inhibits microbial colonization (Norris, 2019). The Langerhans cells of the skin are part of adaptive immunity. They function as

antigen-presenting cells, with the ability to transport foreign substances to nearby lymph nodes for cell-mediated immune reaction (Norris, 2019).

Gerontologic Considerations

The skin undergoes many physiologic changes associated with normal aging that affect functioning; these changes include decreased dermal thickness, degeneration of collagen, decreased sebum production, and increased vascular fragility (Norris, 2019). Other factors such as lifetime of excessive sun exposure, systemic diseases, and poor nutrition can increase the range of skin conditions and the rapidity with which they appear. In addition, certain medications (e.g., antihistamine, antibiotic, and diuretic agents) are photosensitizing and increase the damage that results from sun exposure.

The visible changes in the skin of older adults include dryness, wrinkling, uneven pigmentation, and various proliferative lesions. Cellular changes associated with aging include a thinning at the junction of the dermis and epidermis. The result of this thinning is fewer anchoring sites between the two skin layers, which means that even minor injury or stress to the epidermis can cause it to shear away from the dermis. This phenomenon may account for the increased vulnerability of aged skin to trauma. With increasing age, the epidermis and dermis thin and flatten, causing wrinkles, sags, and overlapping skin folds ([Fig. 55-2](#)).



Figure 55-2 • Hands with skin atrophy common to aging skin.

Loss of the subcutaneous tissue substances of elastin, collagen, and fat diminishes the protection and cushioning of underlying tissues and organs,

decreases muscle tone, and results in the loss of the insulating properties of fat.

Cellular replacement slows as a result of aging. As the dermal layers thin, the skin becomes fragile and transparent. The blood supply to the skin also changes with age. Vessels, especially the capillary loops, decrease in number and size. These vascular changes contribute to the delayed wound healing commonly seen in the older adult patient. The dry scaly skin common in aging is likely the consequence of decreased water retention by an impaired stratum corneum and the decreased number and functional ability of sweat and sebaceous glands (Bolognia et al., 2017). Reduced androgen levels are thought to contribute to declining sebaceous gland function.

Hair growth gradually diminishes, especially over the lower legs and dorsum of the feet. Thinning is common in the scalp, axillae, and pubic areas. Other functions affected by normal aging include the barrier function of skin, sensory perception, and thermoregulation.

Damage from excessive sun exposure, called photoaging, has detrimental effects on the normal aging of skin. A lifetime of outdoor work or outdoor activities (e.g., construction work, lifeguarding, sunbathing) without prudent use of covering clothing and sunscreens can lead to profound wrinkling, increased loss of elasticity, mottled, pigmented areas, cutaneous atrophy, and benign or malignant lesions.

Many skin lesions are part of normal aging. Recognizing and differentiating these lesions enables the examiner to assist the patient to feel less anxious about changes in skin. **Chart 55-1** summarizes some skin lesions that are expected to appear as the skin ages. These are normal and require no special attention unless the skin becomes infected or irritated.

Assessment

When caring for patients with dermatologic disorders, the nurse obtains important information through the health history and direct observations. The nurse's skill in physical assessment and an understanding of the anatomy and function of the skin can ensure that deviations from normal are recognized, reported, and documented.

Chart 55-1



Benign Changes in the Skin of the Older Adult

- Cherry angiomas (bright red “moles”)
- Diminished hair, especially on scalp and pubic area
- Dyschromias (color variations)
 - Solar lentigo (liver spot)
 - Melasma (dark discoloration of the skin)
 - Lentigines (freckles)
- Neurodermatitis (itchy spots)
- Seborrheic keratoses (crusty brown “stuck-on” patches)
- Spider angiomas (see [Chapter 43, Fig. 43-3](#))
- Telangiectasias (red marks on skin caused by stretching of the superficial blood vessels)
- Wrinkles
- Xerosis (dryness)
- Xanthelasma (yellowish waxy deposits on upper and lower eyelids)

Health History

During the health history interview, the nurse asks about use of hair and skin products, as well as any family and personal history of skin allergies; allergic reactions to food, medications, and chemicals; previous skin conditions; and skin cancer (Weber & Kelley, 2018). The health history addresses the onset, signs and symptoms, location, and duration of any pain, itching, rash, or other discomfort experienced by the patient. The names of cosmetics, soaps, shampoos, and other personal hygiene products are obtained if there have been any recent skin conditions noticed with the use of these products. The patient is questioned about nonprescription or herbal preparations that are being used. [Chart 55-2](#) lists selected questions useful in obtaining appropriate information, and [Chart 55-3](#) provides genetic factors influencing skin conditions.

Unfolding Patient Stories: Vincent Brody • Part 2



Recall from **Chapter 3 Vincent Brody**, with chronic obstructive pulmonary disease (COPD), who spends most of the day in a recliner chair smoking and has a poor nutritional intake due to shortness of breath. He is admitted to the hospital with COPD exacerbation. What are factors related to his diagnosis? What background information can influence skin breakdown? Describe the skin assessment performed by the nurse.

Care for Vincent and other patients in a realistic virtual environment: [vSim\(the-point.lww.com/vSimMedicalSurgical\)](https://the-point.lww.com/vSimMedicalSurgical). Practice documenting these patients' care in DocuCare (the-point.lww.com/DocuCareEHR).

Physical Assessment

Assessment of the skin involves the entire skin area, including the mucous membranes, scalp, hair, and nails. The skin reflects a person's overall health, and alterations commonly correspond to disease in other organ systems. Inspection and palpation are techniques commonly used in examining the skin. The room must be well lighted and warm. A penlight may be used to highlight lesions. The patient completely disrobes and is adequately draped. Gloves are worn during skin examination.

The general appearance of the skin is assessed by observing color, temperature, moisture or dryness, skin texture (rough or smooth), lesions, vascularity, mobility, and the condition of the hair and nails. Skin turgor, possible edema, and elasticity are assessed by palpation.

Assessing Skin Color

The color gradations that occur in people with dark skin are largely determined by genetics; they may be described as light, medium, or dark. In people with dark skin, melanin is produced at a faster rate and in larger quantities than in people with light skin. Healthy dark skin has a reddish base or undertone. The buccal mucosa, tongue, lips, and nails normally are pink. The skin of exposed portions of the body, especially in sunny, warm climates, tends to be more pigmented than the rest of the body. Almost every process that occurs on the skin causes some color change. For example, **hypopigmentation** (i.e., loss of pigmentation) may be caused by a fungal infection, eczema, or **vitiligo** (i.e., white patches); **hyperpigmentation** (i.e., increase in pigmentation) can occur after sun injury or as a result of aging. Dark pigment responds with discoloration after injury or inflammation, and patients with dark skin more often experience postinflammatory hyperpigmentation than those with lighter

skin. The hyperpigmentation eventually fades but may require months to do so.

Chart 55-2



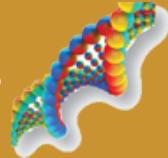
ASSESSMENT

Assessing for Skin Disorders

Patient history relevant to skin disorders may be obtained by asking the following questions:

- When did you first notice this skin problem? (In addition, investigate duration and intensity.)
- Has it occurred previously?
- Are there any other symptoms?
- What site was first affected?
- What did the rash or lesion look like when it first appeared?
- Where and how fast did it spread?
- Do you have any itching, burning, tingling, or crawling sensations?
- Is there any loss of sensation?
- Is the problem worse at a particular time or season?
- How do you think it started?
- Do you have a history of hay fever, asthma, hives, eczema, or allergies?
- Who in your family has skin problems or rashes?
- Did the eruptions appear after certain foods were eaten? Which foods?
- When the problem occurred, had you recently consumed alcohol?
- What relation do you think there may be between a specific event and the outbreak of the rash or lesion?
- What medications are you taking?
- What topical medication (ointment, cream, salve) have you put on the lesion (including over-the-counter medications)?
- What skin products or cosmetics do you use?
- What is your occupation?
- What in your immediate environment (plants, animals, chemicals, infections) might be precipitating this disorder? Is there anything new, or are there any changes in the environment?
- Does anything touching your skin cause a rash?
- How has this affected you (or your life)?
- Is there anything else you wish to talk about in regard to this disorder?

Chart 55-3



GENETICS IN NURSING PRACTICE

Integumentary Conditions

Integumentary conditions influenced by genetic factors include the following:

Autosomal Dominant:

- Ehlers–Danlos
- Legius syndrome
- Loeys–Dietz syndrome
- Neurofibromatosis type 1
- Tuberous sclerosis

Autosomal Recessive:

- Albinism
- Congenital ichthyosis

X-Linked Dominant:

- Incontinentia pigmenti

X-Linked Recessive:

- Hypohidrotic ectodermal dysplasia
- Pseudoxanthoma elasticum

Inheritance pattern is not distinct; however, there is a genetic predisposition for the disease:

- Ectodermal dysplasias
- Eczema
- Port-wine stain
- Psoriasis

Nursing Assessments

Refer to [Chapter 4, Chart 4-2: Genetics in Nursing Practice: Genetic Aspects of Health Assessment](#)

Family History Assessment Specific to Skin Disorders

- Assess for family members in the past three generations with integumentary impairment or abnormalities.
- Inquire about the nature and type of skin lesions and age at onset (e.g., skin involvement with incontinentia pigmenti occurs in the first few weeks of life with blistering of the skin, whereas lesions of neurofibromatosis type 1 may appear in early childhood through adulthood).
- Note gender of affected individuals (e.g., mostly females with incontinentia pigmenti, mostly males with hypohidrotic ectodermal dysplasia).

- Inquire about the presence of other clinical features, such as unusual hair, teeth, or nails; thrombocytopenia; recurrent infections.

Patient Assessment

- Assess for related clinical features, such as sparse eyebrows and eyelashes, abnormally shaped teeth, alopecia, nail abnormalities (e.g., hypohidrotic ectodermal dysplasia).
- Assess for related alterations in vision, such as nystagmus or strabismus; albinism; retinal abnormalities (e.g., pseudoxanthoma elasticum); Lisch nodules and/or optic glioma (neurofibromatosis type 1).
- Perform a thorough skin assessment.
- Inquire about sensitivity to the sun.
- Obtain history of wounds and delayed healing time.
- Assess for receding gum line (as seen with Ehlers–Danlos).
- Assess, record location and size of all skin lesions (e.g., *café-au-lait* spots, port-wine stains, bruises).
- Assess for abdominal pulsations or distention (abdominal aneurysm common in Loeys–Dietz syndrome).
- Inspect skin for presence and location of freckles (axillary freckles are associated with genetic disorders). Inquire if freckles were present upon birth and if the amount or location of freckles has grown.

Genetics Resources

The Ehlers–Danlos Society, www.ehlers-danlos.com

Neurofibromatosis Network, www.nfnetwork.org

See [Chapter 6, Chart 6-7](#) for components of genetic counseling.

Changes in skin color in people with dark skin are more noticeable and may cause more concern because the discoloration is more readily visible. Because of the increased activity of melanocytes in darker skin, pigment changes can become obvious and cause great psychological discomfort. Some variation in skin pigment levels is considered normal. Examples include the pigmented crease across the bridge of the nose, some pigmented streaks in the nails, and pigmented spots on the sclera of the eye. Women often develop a dark line along the midline of the lower abdomen during pregnancy (Weber & Kelley, 2018).

[Table 55-1](#) provides an overview of select color changes in people who are light and dark skinned.

Cyanosis

Cyanosis is the bluish discoloration that results from a lack of oxygen in the blood ([Fig. 55-3](#)). It appears with shock or with respiratory or circulatory compromise. In people with light skin, cyanosis manifests as a bluish hue to

the lips, fingertips, and nail beds. Other indications of decreased tissue perfusion include cold, clammy skin; a rapid, thready pulse; and rapid, shallow respirations. The conjunctivae of the eyelids are examined for pallor and **petechiae** (i.e., pinpoint red spots that result from blood leakage into skin) (see Chapter 29, Fig. 29-4).

In a person with dark skin, the skin usually assumes a grayish cast. To detect cyanosis, the areas around the mouth and lips and over the cheekbones and earlobes should be observed.

Ecchymosis

Ecchymosis results from blood leaking into the skin and appears as varied discoloration (e.g., purple, black) which fades to green, yellow, or brown hues over time. It is most often seen following trauma (e.g., skin being struck with a solid object, fall) (Bickley & Szilagyi, 2017; Weber & Kelley, 2018). It is easier to observe in patients who have lighter skin color and may be seen more frequently in older adults due to increased skin fragility associated with collagen loss, decreased elasticity, and ultraviolet damage. The nurse should assess for unusual patterns or changes in ecchymoses that may indicate health disorders or abuse (Bickley & Szilagyi, 2017).

TABLE 55-1 Select Color Changes in Light and Dark Skin

Etiology	Light Skin	Dark Skin
Pallor		
Anemia—decreased hematocrit		
Shock—decreased perfusion, vasoconstriction	Generalized pallor	Brown skin appears yellow-brown, dull; black skin appears ashen gray, dull. (Observe areas with least pigmentation: conjunctivae, mucous membranes.)
Local arterial insufficiency	Marked localized pallor (lower extremities, especially when elevated)	Ashen gray, dull; cool to palpation
Albinism—total absence of pigment melanin	Whitish pink	Tan, cream, white
Vitiligo—a condition characterized by destruction of the melanocytes in circumscribed areas of the skin (may be localized or widespread)	Patchy, milky white spots, often symmetric bilaterally	Same
Cyanosis		
Increased amount of unoxygenated hemoglobin:	Dusky blue	Dark but dull, lifeless; only severe cyanosis is apparent in skin, and may appear grayish. (Observe conjunctivae, oral mucosa, nail beds.)
Central—chronic heart and lung diseases cause arterial desaturation	Nail beds dusky	
Peripheral—exposure to cold, anxiety		
Erythema		
Hyperemia—increased blood flow through engorged arterial vessels, as in inflammation, fever, alcohol intake, blushing	Red, bright pink	Purplish-gray tinge, but difficult to see. (Palpate for increased warmth with inflammation, taut skin, and hardening of deep tissues.)
Polycythemia—increased red blood	Ruddy blue in face, oral mucosa, conjunctivae,	Well concealed by pigment. (Observe for redness in lips.)

cells, capillary stasis	hands and feet	
Carbon monoxide poisoning	Bright, cherry red in face and upper torso	Cherry red nail beds, lips, and oral mucosa
Venous stasis—decreased blood flow from area, engorged venules	Dusky rubor of dependent extremities (a prelude to necrosis with pressure injury)	Easily masked. (Use palpation to identify warmth or edema.)
Jaundice		
Increased serum bilirubin concentration (>2 mg/dL) due to liver dysfunction or hemolysis, as after severe burns or some infections	Yellow first in sclerae, hard palate, and mucous membranes; then over skin	Check sclerae for yellow near limbus; do not mistake normal yellowish fatty deposits in the periphery under eyelids for jaundice. (Jaundice is best noted at junction of hard and soft palate, on palms.)
Carotenemia—increased level of serum carotene from ingestion of large amounts of carotene-rich foods	Yellow-orange tinge in forehead, palms and soles, and nasolabial folds, but no yellowing in sclerae or mucous membranes	Yellow-orange tinge in palms and soles
Uremia—kidney injury causes retained urochrome pigments in the blood	Orange-green or gray overlying pallor of anemia; may also have ecchymoses and purpura	Easily masked. (Rely on laboratory and clinical findings.)
Brown-Tan		
Addison disease—cortisol deficiency stimulates increased melanin production	Bronzed appearance, an “external tan”; most apparent around nipples, perineum, genitalia, and pressure points (inner thighs, buttocks, elbows, axillae)	Easily masked. (Rely on laboratory and clinical findings.)
<i>Café-au-lait</i> spots—caused by increased melanin pigment in basal cell layer	Tan to light brown, irregularly shaped, oval patch with well-defined borders	Often not visible in the person who is very dark skinned

Adapted from Taylor, S. C., Kelly, A. P., Lim, H., et al. (2016). *Dermatology for skin of color* (2nd ed.). New York: McGraw-Hill Medical; Weber, J. W., & Kelley, J. H. (2018). *Health assessment in nursing* (6th ed.). Philadelphia, PA: Wolters Kluwer.

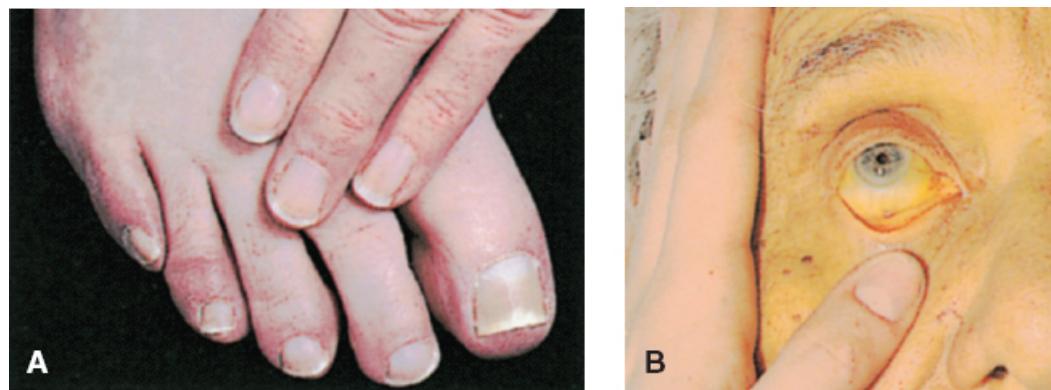


Figure 55-3 • Examples of skin color changes: (A) the bluish tint of cyanosis and (B) the yellow hue of jaundice. Reprinted with permission from Weber, J. W., & Kelley, J. H. (2018). *Health assessment in nursing* (6th ed.). Philadelphia, PA: Wolters Kluwer.

Erythema

Erythema is redness of the skin caused by the dilation of capillaries. In people who are light skinned, it is easily observable. To determine possible inflammation, the skin is palpated for increased warmth and for smoothness (i.e., edema) or hardness (i.e., intracellular infiltration). Because dark skin tends to assume a purple-gray cast when an inflammatory process is present, it may be difficult to detect erythema.

Jaundice

Jaundice, a yellowing of the skin, is directly related to elevations in serum bilirubin and is often first observed in the sclerae and mucous membranes (see Fig. 55-3).

Assessing Rash

In instances of pruritus (i.e., itching), the patient is asked to indicate which areas of the body are involved. The skin is then stretched gently to decrease the reddish tone and make the rash more visible. Pointing a penlight laterally across the skin may highlight the rash, making it easier to observe. The differences in skin texture are then assessed by running the tips of the fingers lightly over the skin. The borders of the rash may be palpable. The patient's mouth and ears are included in the examination (rubeola, or measles, causes a red cast to appear on the ears, and skin cancers are quite common on the top of the ears). The patient's temperature is assessed, and the lymph nodes are palpated especially in the axillae, inguinal fold, and popliteal area (behind the knees).

Assessing Skin Lesions

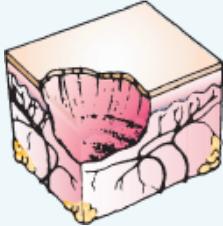
Skin lesions are the most prominent characteristics of dermatologic conditions. They vary in size, shape, and cause and are classified according to their appearance and origin. Skin lesions can be described as primary or secondary. Primary lesions are the initial lesions and are characteristic of the disease itself. Secondary lesions result from changes in primary lesions resulting from external causes, such as scratching, trauma, infections, or changes caused by wound healing. Depending on the stage of development, skin lesions are further categorized by type and appearance ([Table 55-2](#)).

A preliminary assessment of the eruption or lesion helps identify the type of dermatosis (i.e., abnormal skin condition) and indicates whether the lesion is primary or secondary. At the same time, the anatomic distribution of the eruption or lesion should be observed because certain diseases more regularly affect certain sites of the body and are distributed in characteristic patterns and shapes ([Figs. 55-4](#) and [55-5](#)). To determine the extent of the regional distribution, the left and right sides of the body should be compared while the color and shape of the lesions are assessed. The degree of pigmentation of the patient's skin may affect the appearance of a lesion. Lesions may be black, purple, or gray on dark skin and tan or red in patients with light skin. A metric ruler is used to measure the size of the lesions so that any further extension can be compared with this baseline measurement. After observation, the nurse palpates the lesions with gloves on to determine their texture, shape, and border and to see if they are soft and filled with fluid or hard and fixed to the surrounding tissue.

TABLE 55-2 Primary and Secondary Skin Lesions

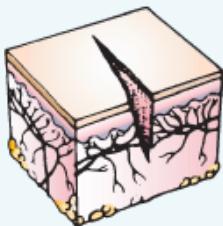
Lesion	Description	Examples
Primary Lesions		
MACULE, PATCH	<p>Flat, nonpalpable skin color change (color may be brown, white, tan, purple, red)</p> <ul style="list-style-type: none"> <i>Macule:</i> <1 cm; circumscribed border <i>Patch:</i> >1 cm; may have irregular border 	Freckles, flat moles, petechia, rubella, vitiligo, port-wine stains, ecchymosis
PAPULE, PLAQUE	<p>Elevated, palpable, solid mass with a circumscribed border</p> <p>Plaque may be coalesced papules with flat top</p> <ul style="list-style-type: none"> <i>Papule:</i> <0.5 cm <i>Plaque:</i> >0.5 cm 	<i>Papules:</i> Elevated nevi, warts, lichen planus <i>Plaques:</i> Psoriasis, actinic keratosis
NODULE, TUMOR	<p>Elevated, palpable, solid mass that extends deeper into the dermis than a papule</p> <ul style="list-style-type: none"> <i>Nodule:</i> 0.5–2 cm; circumscribed <i>Tumor:</i> >1–2 cm; tumors do not always have sharp borders 	<i>Nodules:</i> Lipoma, squamous cell carcinoma, poorly absorbed injection, dermatofibroma <i>Tumors:</i> Larger lipoma, carcinoma
VESICLE, BULLA	<p>Circumscribed, elevated, palpable mass containing serous fluid</p> <ul style="list-style-type: none"> <i>Vesicle:</i> <0.5 cm <i>Bulla:</i> >0.5 cm 	<i>Vesicles:</i> Herpes simplex/zoster, varicella, poison ivy, second-degree burn (blister) <i>Bulla:</i> Pemphigus, contact dermatitis, large burn blisters, poison ivy,

WHEAL	Elevated mass with transient borders; often irregular; size and color vary Caused by movement of serous fluid into the dermis; does not contain free fluid in a cavity (e.g., as a vesicle does)	bullous impetigo Urticaria (hives), insect bites
PUSTULE	Pus-filled vesicle or bulla	Acne, impetigo, furuncles, carbuncles
CYST	Encapsulated fluid-filled or semisolid mass in the subcutaneous tissue or dermis	Sebaceous cyst, epidermoid cysts
Secondary Lesions		
EROSION	Loss of superficial epidermis that does not extend to dermis; depressed, moist area	Ruptured vesicles, scratch marks
ULCER	Skin loss extending past epidermis; necrotic tissue loss; bleeding and scarring possible	Stasis ulcer of venous insufficiency, pressure injury

**FISSURE**

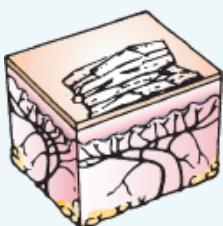
Linear crack in the skin that may extend to dermis

Chapped lips or hands, tinea pedis

**SCALES**

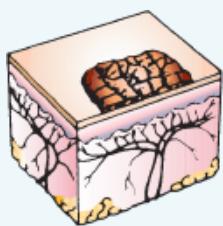
Flakes secondary to desquamated, dead epithelium that may adhere to skin surface; color varies (silvery, white); texture varies (thick, fine)

Dandruff, psoriasis, dry skin, pityriasis rosea

**CRUST**

Dried residue of serum, blood, or pus on skin surface
Large, adherent crust is a scab

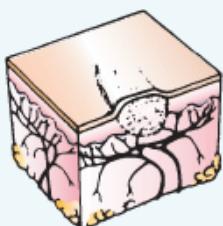
Residue left after vesicle rupture: impetigo, herpes, eczema

**SCAR (CICATRIX)**

Skin mark left after healing of a wound or lesion; represents replacement by connective tissue of the injured tissue

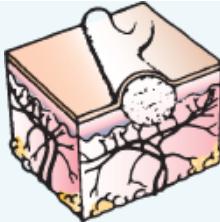
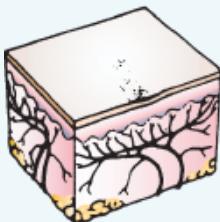
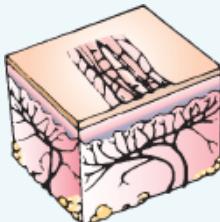
Healed wound or surgical incision

- *Young scars:* Red or purple
- *Mature scars:* White or glistening

**KELOID**

Hypertrophied scar tissue secondary to excessive

Keloid of ear piercing or

	collagen formation during healing; elevated, irregular, red Greater incidence among African Americans	surgical incision
ATROPHY 	Thin, dry, transparent appearance of epidermis; loss of surface markings; secondary to loss of collagen and elastin; underlying vessels may be visible	Aged skin, arterial insufficiency
LICHENIFICATION 	Thickening and roughening of the skin or accentuated skin markings that may be secondary to repeated rubbing, irritation, scratching	Contact dermatitis

Adapted from Bickley, L. S., & Szilagyi, P. G. (2017). *Bates' guide to physical examination and history taking* (12th ed.). Philadelphia, PA: Wolters Kluwer; Weber, J. W., & Kelley, J. H. (2018). *Health assessment in nursing* (6th ed.). Philadelphia, PA: Wolters Kluwer.

Skin lesions are described clearly and in detail on the patient's health record, using precise terminology:

- Color of the lesion
 - Any redness, heat, pain, or swelling
 - Size and location of the involved area
 - Pattern of eruption (e.g., macular, papular, scaling, oozing, discrete, confluent)
 - Distribution of the lesion (e.g., bilateral, symmetric, linear, circular)

If acute open wounds or lesions are found on inspection of the skin, a comprehensive assessment should be made and documented. This assessment should address the following issues:

- *Wound bed*: Inspect for necrotic and granulation tissue, epithelium, exudate, color, and odor.
- *Wound edges and margins*: Observe for undermining (i.e., extension of the wound under the surface skin), and evaluate for condition of

skin (i.e., necrotic).

- *Wound size:* Measure in centimeters, as appropriate, to determine diameter and depth of the wound and surrounding erythema.
- *Surrounding skin:* Assess for color, suppleness and moisture, irritation, and scaling.

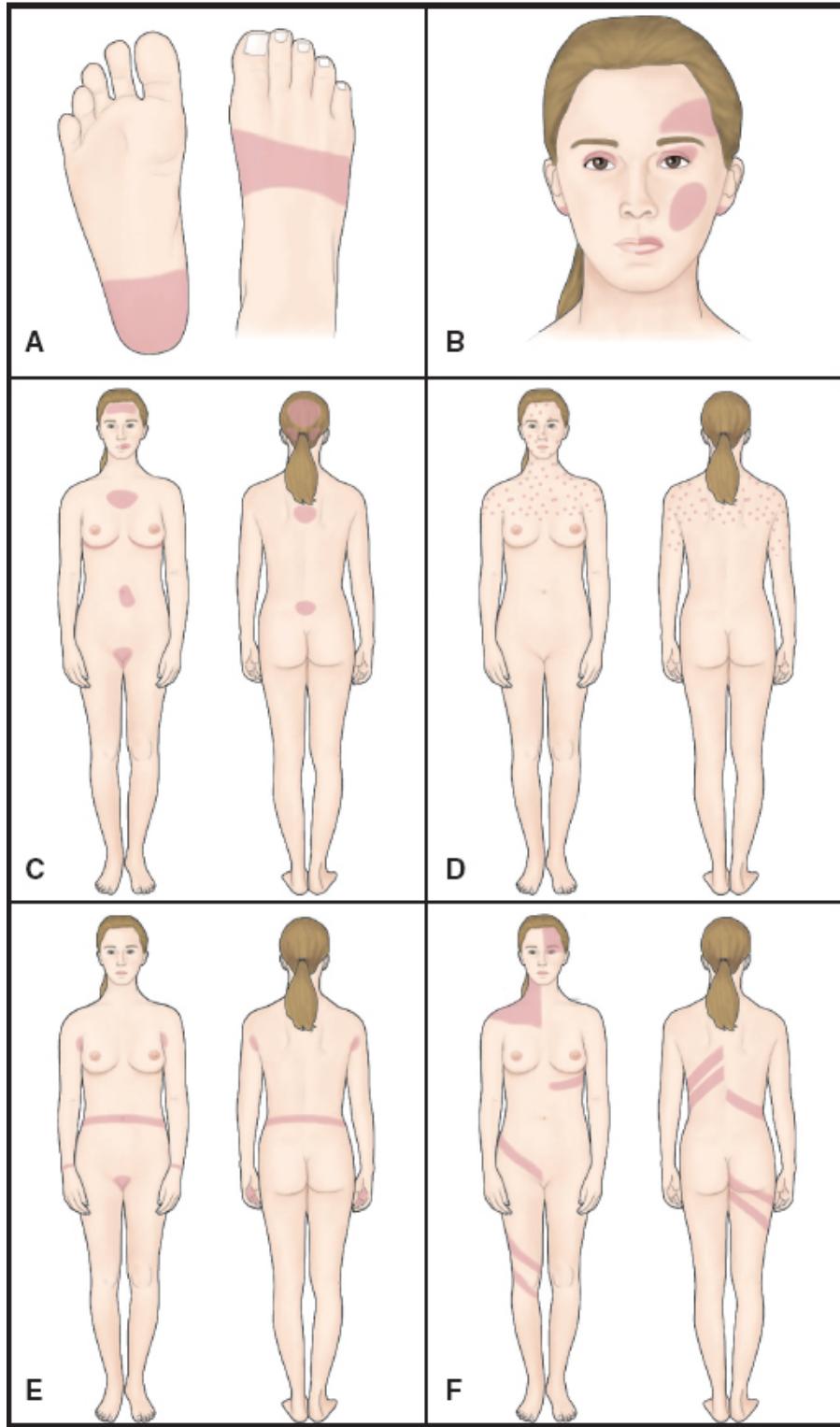


Figure 55-4 • Anatomic distribution of common skin disorders. **A.** Contact dermatitis (shoes). **B.** Contact dermatitis (cosmetics, perfumes, earrings). **C.** Seborrheic dermatitis. **D.** Acne. **E.** Scabies. **F.** Herpes zoster (shingles).

It is also important for the nurse to assess for other signs and symptoms associated with new skin lesions, such as pain, burning, or pruritus (see the Nursing Research Profile in [Chart 55-4](#)).

Assessing Vascularity and Hydration

After the color of the skin has been evaluated and lesions have been inspected, an assessment of vascular changes in the skin is performed. A description of vascular changes includes location, distribution, color, size, and the presence of pulsations. Common vascular changes include petechiae, ecchymoses, **telangiectasias** (vascular structures), and angiomas ([Table 55-3](#)).

Skin moisture, temperature, and texture are assessed primarily by palpation. The turgor (i.e., elasticity) of the skin, which decreases in normal aging, may be a factor in assessing the hydration status of a patient. To assess skin turgor, the skin should be gently pinched between the thumb and forefinger. The skin is observed to see how long it takes to return to baseline. People who are dehydrated or those with dry skin will display decreased skin turgor, where the skin remains tented after being pinched rather than returning to normal almost immediately. Edema is indicated when the skin appears tense and shiny, when a finger gently pressed into the skin leaves an indentation or “pit” (see Chapter 25, Fig. 25-2). Assessing the depth of the pit and length of time to resolution indicates the extent of edema (Bickley & Szilagyi, 2017).

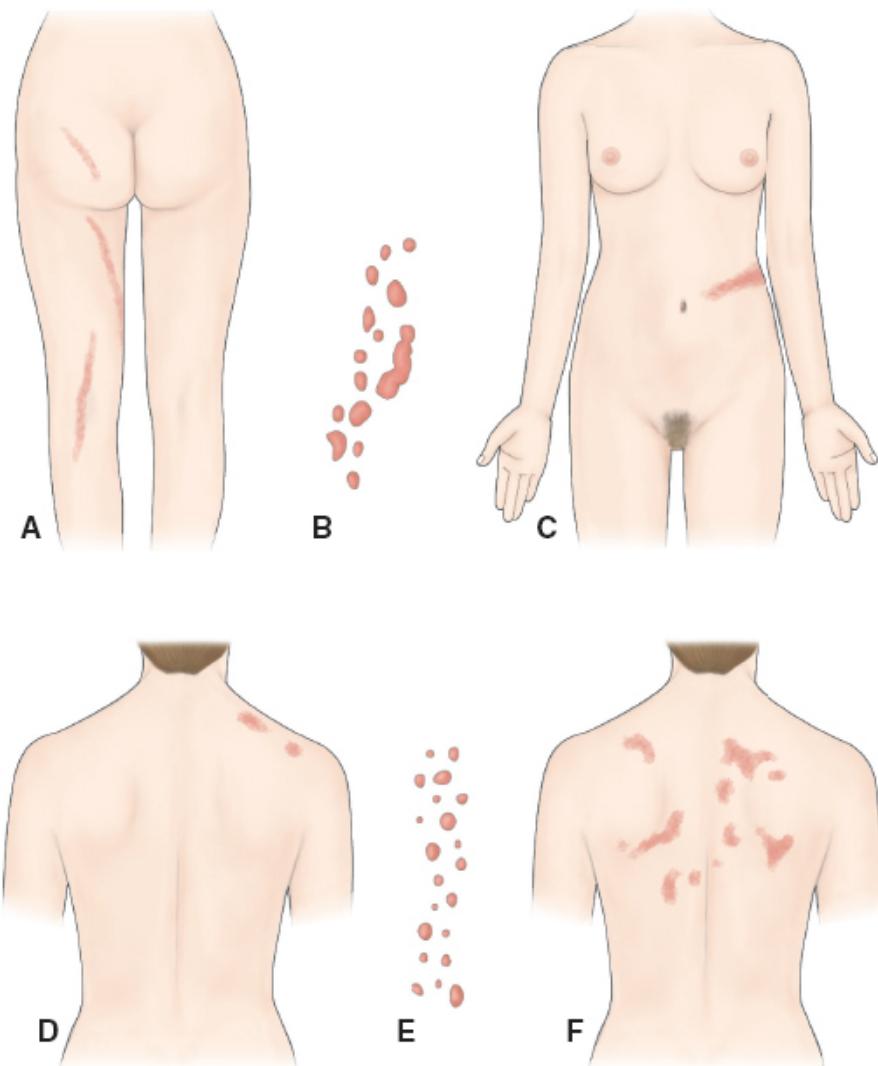


Figure 55-5 • Skin lesion configurations. **A.** Linear (in a line). **B.** Annular and arciform (circular or arcing). **C.** Zosteriform (linear along a nerve route). **D.** Grouped (clustered). **E.** Discrete (separate and distinct). **F.** Confluent (merged).

Assessing the Nails

A brief inspection of the nails includes observation of configuration, color, and consistency. Many alterations in the nail or nail bed reflect local or systemic abnormalities in progress or resulting from past events (Fig. 55-6). Beau lines, a transverse depression in the nails, may reflect retarded growth of the nail matrix because of severe illness or, more commonly, local trauma. Ridging, hypertrophy, and other changes may also be visible because of local trauma. Paronychia, an inflammation of the skin around the nail, is usually accompanied by tenderness and erythema. Pitted surface of the nails is a definite indication of psoriasis. Spoon-shaped nails can indicate severe iron-

deficiency anemia. The angle between the normal nail and its base is 160 degrees. When palpated, the nail base is usually firm. Clubbing of the nails is manifested by a straightening of the normal angle (180 degrees or greater) and softening of the nail base. The softened area feels spongelike when palpated (Bickley & Szilagyi, 2017). Clubbing can be a normal variant, but it is most often associated with pulmonary disease and can be a sign of chronic hypoxia (Norris, 2019).

Chart 55-4



NURSING RESEARCH PROFILE

Supporting Self-Care for Radiation-Related Skin Discomfort

Montpetit, C., & Singh-Carlson, S. (2018). Engaging patients with radiation related skin discomfort in self-care. *Canadian Oncology Nursing Journal = Revue Canadienne de Nursing Oncologique*, 28(3), 191–200.

Purpose

Radiation dermatitis is a common side effect associated with radiation treatment for breast cancer. Patients undergoing radiation treatment experience varying levels of symptom severity. Some will experience significant discomfort affecting daily life and the ability to perform routine activities. This study evaluated the experience of using InterDry Ag dressing, a moisture-wicking fabric dressing impregnated with antimicrobial silver, and its effectiveness on decreasing skin irritation in women receiving radiation treatment for a diagnosis of breast cancer.

Design

A radiation oncology nurse (RON) affiliated with a regional cancer agency recruited participants for this descriptive study at the onset of their radiation treatment. Individuals were asked to participate if they were able to speak and read English fluently, had no allergy to silver, were receiving radiation treatment for breast cancer, and had developed a skin reaction from the radiation treatment. Skin assessments and skin care education (e.g., application of dressings, use of saline compressions and moisturizers) were provided to all participants receiving radiation. The InterDry Ag dressing was utilized in participants with moderate erythema, pruritus, or burning and evaluated during therapy using the National Cancer Institute: Common Terminology Criteria for Adverse Events (NCI CTCAE) (version 4.03) radiation dermatitis tool. In addition, a questionnaire to assess participants' discomfort and ease of dressing use was administered 5 days after dressing application. Follow-up was also conducted both 1-week (via telephone) and 2-week (in-person) post radiation by the RON. Descriptive statistics were generated to assess study variables (e.g., demographics, erythema, pain, pruritus) and content analysis was conducted to synthesize responses to open-ended questions included in the survey.

Findings

Eighteen participants with a median age of 42 (range 36 to 74 years), completed the study. Breast characteristics (e.g., size, skin tone) and cancer treatment were variable. Skin assessments completed by the RON (5 days post application) noted reductions in pain reported for the chest wall and inframammary fold and improved pruritus for the axilla and chest wall. At 2 weeks post application, the majority of participants either agreed or strongly agreed that the dressing was easy to use (100%) and that it decreased pain (90%), pruritus (88%), and burning (78%); 95% of participants would recommend the dressing to others. Qualitative findings reinforced symptom

improvement with use of the dressing; however, some participants noted that it was difficult to keep the dressing in place.

Nursing Implications

This small descriptive study demonstrated preliminary support for the effectiveness of and satisfaction with InterDry Ag dressing in improving the symptoms of radiation dermatitis experienced by women receiving radiation treatment for breast cancer. In addition, participants expressed feelings of safety, control over self-care problems, a sense of emotional support, and satisfaction with the nurse–patient relationship that developed in response to ongoing assessment and follow-up. Nurses should be aware that options are available to minimize radiation-associated skin discomfort for patients with breast cancer and that regular interaction between the patient and nurse may contribute to more satisfactory and personalized cancer care. However, experimental studies that include larger, more diverse samples and collect data using valid and reliable scales over time are necessary to provide stronger evidence of the benefits of the InterDry Ag dressing.

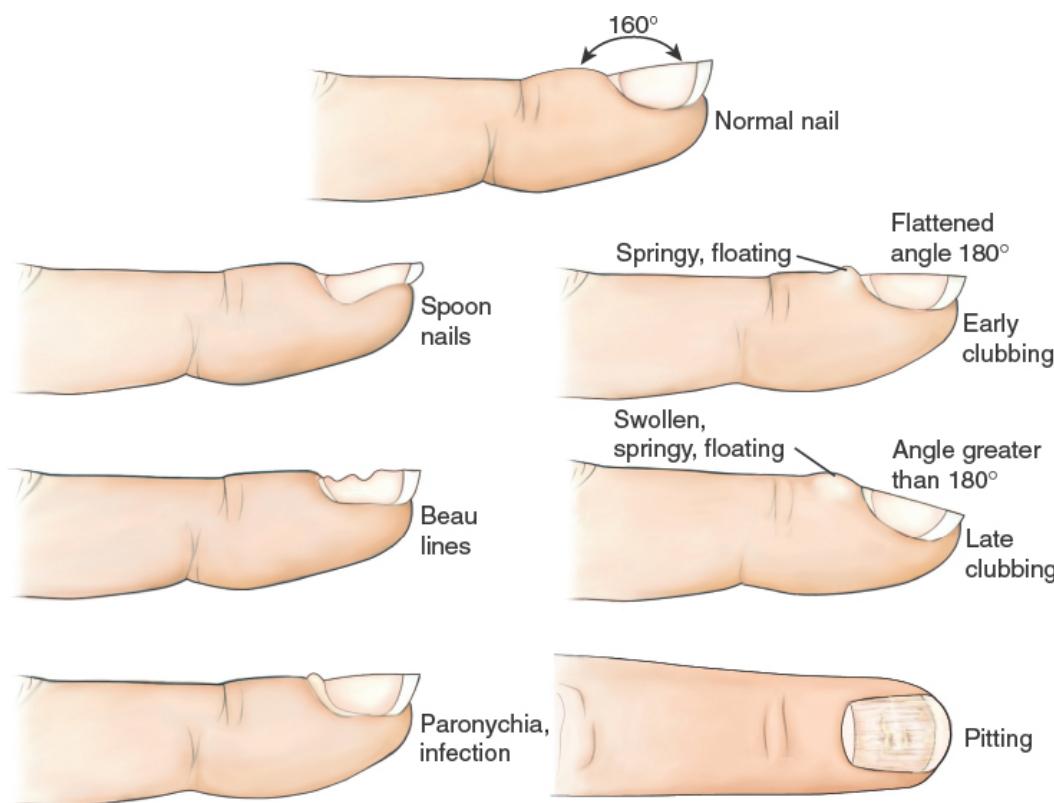
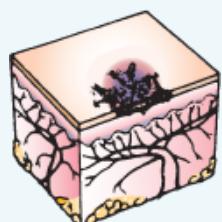


Figure 55-6 • Common nail disorders.

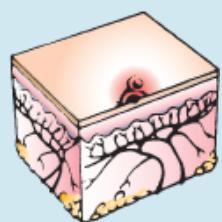
TABLE 55-3 Vascular Lesions

PETECHIA (PL. PETECHIAE)

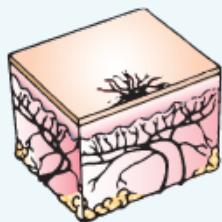
Round red or purple macule
Small (1–2 mm)
Secondary to blood extravasation
Associated with bleeding tendencies or emboli to skin

ECCHYMOSIS (PL. ECCHYMOSES)

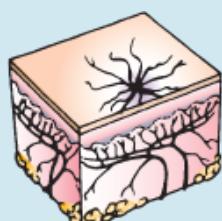
Round or irregular macular lesion
Larger than petechia
Color varies and changes—purple, black, yellow, and green hues
Secondary to blood extravasation
Associated with trauma, bleeding tendencies

CHERRY ANGIOMA

Papular and round
Red or purple
Noted on trunk, extremities
May blanch with pressure
Normal age-related skin alteration
Usually not clinically significant

SPIDER ANGIOMA

Red, arteriole lesion
Central body with radiating branches
Noted on face, neck, arms, trunk
Rare below the waist
May blanch with pressure
Associated with liver disease, pregnancy, vitamin B deficiency

TELANGIECTASIA (VASCULAR STRUCTURE)

Shape varies—spiderlike or linear
Color bluish or red
Does not blanch when pressure is applied
Noted on legs, anterior chest
Secondary to superficial dilation of venous vessels and capillaries
Associated with increased venous pressure states (varicosities)

Adapted from Bickley, L. S., & Szilagyi, P. G. (2017). *Bates' guide to physical examination and history taking* (12th ed.). Philadelphia, PA: Wolters Kluwer; Weber, J. W., & Kelley, J. H. (2018). *Health assessment in nursing* (6th ed.). Philadelphia, PA: Wolters Kluwer.

Assessing the Hair

The hair assessment is carried out by inspection and palpation. Gloves are worn by the examiner, and the examination room should be well lighted. The hair is separated so that the condition of the skin underneath can be easily seen. The examiner notes the color, texture, and distribution of hair shafts. The wooden end of a cotton swab can be used to make small parts in the hair so that the scalp can be inspected. Any abnormal lesions, evidence of itching, inflammation, scaling, or signs of infestation (i.e., lice or mites) are documented.

Color and Texture

Natural hair color ranges from white to black. Hair begins to turn gray or white with age, when loss of melanin in the hair shaft becomes apparent. Loss of melanin in hair can occur at a younger age and may be due to heredity or genetic traits. The person with albinism (i.e., partial or complete absence of pigmentation) has a genetic predisposition to white hair from birth. The natural state of the hair can be altered by using hair dyes, bleaches, and curling or relaxing products. The use of these products has varying impact on hair, depending on its natural characteristics. For example, the use of straightening chemicals on the hair of most people can cause extensive breakage and hair loss (Bobonich & Nolen, 2014; Richardson, Agidi, Eaddy, et al., 2017).

The texture of scalp hair ranges from fine to coarse, silky to brittle, oily to dry, and shiny to dull, and hair can be straight, curly, or kinky. Dry, brittle hair may result from the overuse of hair dyes, hair dryers, and curling irons or from endocrine disorders, such as thyroid dysfunction. Oily hair is usually caused by increased secretion from the sebaceous glands close to the scalp. If the patient reports a recent change in hair texture, the underlying reason is pursued; the alteration may arise simply from the overuse of commercial hair products or from changing to a new shampoo.

Distribution

Body hair distribution varies with location. Hair over most of the body is fine, except in the axillae and pubic areas, where it is coarse. Pubic hair, which develops at puberty, forms a diamond shape extending up to the umbilicus in cisgender boys and men. Cisgender female pubic hair resembles an inverted triangle. If the pattern found is more characteristic of the opposite gender, it may indicate an endocrine disorder and further investigation is in order. Racial differences in hair are expected, such as straight hair in people of Asian descent and curly, coarse hair in people of African descent.

Men tend to have more body and facial hair than women. Alopecia can occur over the entire body or be localized to a specific area. Scalp hair loss may be patchy or may range from generalized thinning to total baldness. When assessing scalp hair loss, it is important to investigate the underlying cause with the patient. Patchy hair loss may be from habitual hair pulling or twisting; excessive traction on the hair (e.g., braiding too tightly); excessive use of dyes, straighteners, and oils; chemotherapeutic agents (e.g., doxorubicin, cyclophosphamide); bacterial or fungal infection; or moles or lesions on the scalp. Well-defined patches of localized hair loss generally indicate the condition called *alopecia areata*. The precise mechanism is unknown but may be triggered by an interaction between genetic and environmental factors. Regrowth in most cases is spontaneous and occurs in 1 to 3 months, though in some rarer patterns, the hair loss is recurrent or even permanent (Habif et al., 2018).

Hair Loss

The most common cause of male pattern hair loss or baldness is androgenic alopecia, which affects more than half of the male population and is believed to be related to heredity, aging, and androgen (male hormone) levels. Androgen is necessary for male pattern hair loss to develop. The pattern of hair loss begins with receding of the hairline in the frontal temporal area and may progress to gradual thinning and complete loss of hair over the top of the scalp and crown. The typical pattern of male hair loss is illustrated in [Figure 55-7A](#). Although androgenic alopecia is considered a male disorder, millions of women experience female pattern hair loss, which is typically not seen with other signs of hyperandrogenism. For women complete baldness is rare; the typical pattern of hair loss is seen on the vertex scalp, sparing the frontal area (Nicol, 2016) ([Fig. 55-7B](#)).

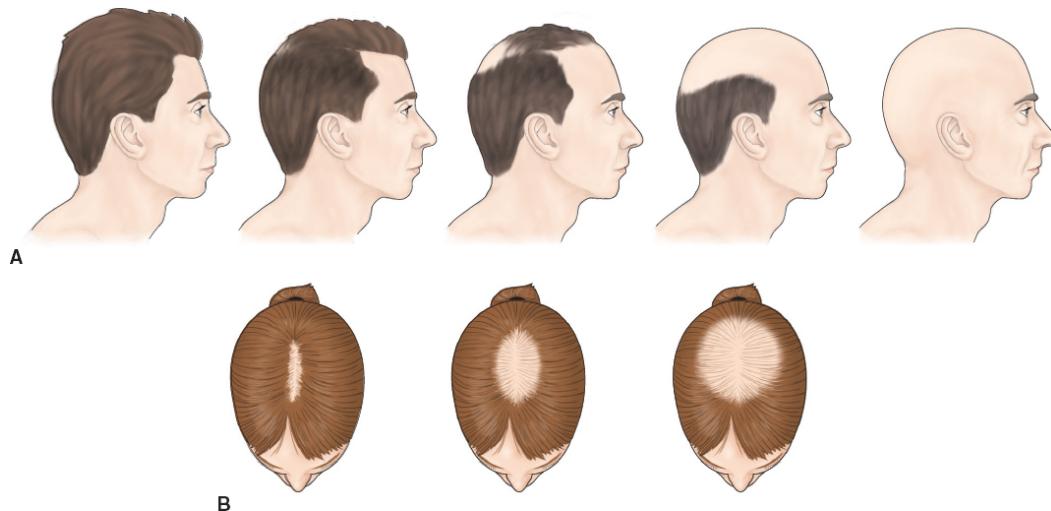


Figure 55-7 • Hair loss. **A.** Progression of male pattern hair loss. **B.** Progression of female pattern hair loss.

Other Changes

Male pattern hair distribution may be seen in some women at the time of menopause, when the hormone estrogen is no longer produced by the ovaries. In women with hirsutism, excessive hair may grow on the face, chest, shoulders, and pubic area. If menopause is ruled out as the underlying cause, other hormonal changes related to pituitary or adrenal dysfunction must be investigated.

Because patients with skin conditions may be viewed negatively by others, these patients may experience psychological distress and avoid interactions and intimacy. Skin conditions can lead to isolation, job loss, and economic hardship as well as poor self-esteem.

Some conditions may lead to feelings of depression, frustration, self-consciousness, poor self-image, and rejection. Itching and skin irritation (features of many skin diseases) may be constant sources of physical distress. These discomforts may result in loss of sleep, anxiety, and depressive symptoms, all of which reinforce the general distress and fatigue that frequently accompany skin disorders.

For patients experiencing physical and psychological discomforts, the nurse needs to provide understanding, explanations of the problem, appropriate education related to treatment, nursing support, and encouragement. It is imperative to overcome any aversion that may be felt when caring for patients with unattractive skin disorders. The nurse should show no sign of hesitancy when approaching patients with skin disorders. Such hesitancy only reinforces the psychological trauma of the disorder.

Skin Consequences of Select Systemic Diseases

Diabetes

Because diabetes causes changes in circulation and cell nutrition, it can have a great impact on skin status. Some of the more common skin conditions encountered in diabetes are discussed in this section. Further information can be found in [Chapter 46](#).

Diabetic Dermopathy

Diabetic dermopathy (shin spots or pigmented pretibial papules) is a frequent occurrence in people with diabetes. These lesions are found most often on the lower anterior legs. They are thought to be caused by diabetes-associated changes in the small vessels that supply the skin and trauma. Each cluster starts as dull red papules that slowly coalesce to brownish atrophic patches (Nicol, 2016).

Stasis Dermatitis

Stasis dermatitis is an eczematous eruption that occurs on the lower legs of patients with venous insufficiency. It is very common in patients with diabetes. Large vessels are damaged, compromising circulation to the lower arms and legs. The skin suffers from lack of nutrients, becoming very dry and fragile. Minor injuries heal slowly, and ulcers form easily. It initially presents with variable erythema and scale and pruritus. When chronic, it leads to permanent changes in skin color, hyper- or hypopigmentation, and either fragile or thicker skin texture (fibrosis).

Skin Infections

Bacterial infections may appear as small pimples around hair follicles (i.e., folliculitis). The most frequently affected sites include the lower legs, lower abdomen, and buttocks. Sometimes, these lesions enlarge to become furuncles or carbuncles. Furuncles begin in a hair follicle, progressively enlarging and invading deeper into tissue to form an abscess. Carbuncles are formed by multiple contiguous lesions (Habif et al., 2018). The skin of patients with diabetes is prone to bacterial and fungal infections. If the blood glucose level is not well controlled, these infections may be very slow to heal.

Fungal infections are quite common in areas that remain moist (under breasts, upper thighs, in axillae). *Candida* (i.e., yeast) infections appear beefy red and often have small pustules around the border of the area, with the skin appearing moist and raw.

Dermatophyte infections are dry and only minimally red, with more scale. Common sites are the toenails and feet.

Nurses must be alert to the signs of these common infections. If necessary, they should bring them to the attention of the patient's primary provider and help the patient or family learn basic skin maintenance techniques.

Leg and Foot Ulcers

Because of changes in peripheral nerves, patients with diabetes do not always sense minor injuries to the lower legs and feet. Infections begin and, if untreated, may lead to ulcerations. Ulcerations are often not noticed and become quite large before being treated. Ulcerations unresponsive to treatment are a leading cause of diabetic foot and leg amputations (Johnson, Osburne, Rispoli, et al., 2018).

Human Immune Deficiency Virus Disease

Cutaneous signs may be the first manifestation of human immune deficiency virus (HIV), appearing in more than 90% of people who are HIV infected as immune function deteriorates. These skin signs correlate with low CD4⁺ counts. Some disorders such as Kaposi sarcoma, oral hairy leukoplakia, facial molluscum contagiosum, and oral candidiasis may suggest that CD4⁺ counts are less than 200 to 300 cells/mcL. Skin infections, both bacterial and viral, are common and will appear more severe than expected. Acute flare of chronic conditions such as seborrhea or acne may indicate a new infection. Being sensitive to these changes can alert the nurse so that early interventions can be initiated (Schwartz, 2019).

Diagnostic Evaluation

A wide range of diagnostic studies may be performed in patients with altered integumentary function. The nurse educates the patient about the purpose, what to expect, and any possible side effects related to these examinations prior to testing. The nurse also notes trends in results because they provide information about whether lesions are primary or secondary, disease progression, and the patient's response to therapy.

Skin Biopsy

Performed to obtain tissue for microscopic examination, a skin biopsy may be obtained by shave, excision, or by a skin punch instrument that removes a small core of tissue. Biopsies are performed on skin nodules, plaques, blisters, and other lesions to rule out malignancy, to aid in diagnosis, and to perform additional testing such as Gram stain for bacteria or periodic acid–Schiff (PAS) for fungal elements.

Patch Testing

Performed to identify substances to which the patient has developed an allergy, patch testing involves applying the suspected allergens, such as nickel or

fragrances, to normal skin under occlusive patches. Patients wear these occluded strips on their backs for 48 hours, and the area is assessed after 72 hours. The development of redness, fine elevations, or itching is considered a weak positive reaction; fine blisters, papules, and severe itching indicate a moderately positive reaction; and blisters, pain, and ulceration indicate a strong positive reaction. The nurse educates the patient on means to avoid the reactive allergens, which is often quite difficult, due to the prevalence of many of these substances in the patient's environment.

Skin Scrapings

Tissue samples are scraped from suspected fungal lesions with a scalpel blade that has been moistened with oil so that the scraped skin adheres to the blade. The scraped material is transferred to a glass slide, covered with a coverslip, and examined microscopically. The spores and hyphae of dermatophyte infections, as well as infestations such as scabies, can be visualized.

Tzanck Smear

The Tzanck smear is a test used to examine cells from blistering skin conditions, such as herpes zoster, varicella, herpes simplex, and all forms of pemphigus. The secretions from a suspected lesion are applied to a glass slide, stained, and examined.

Wood Light Examination

Wood light is a special lamp that produces long-wave ultraviolet rays, which result in a characteristic blue to dark purple fluorescence. The color of the fluorescent light is best seen in a darkened room, where it is possible to differentiate epidermal from dermal lesions and hypo- and hyperpigmented lesions from normal skin. The patient is reassured that the light is not harmful to skin or eyes. Lesions that still contain melanin almost disappear under ultraviolet light, whereas lesions that are devoid of melanin increase in whiteness with ultraviolet light.

Clinical Photographs

Photographs are taken to document the nature and extent of the skin condition and are used to determine progress or improvement resulting from treatment. They are sometimes used to track the status of moles to document if the characteristics of the mole are changing.

Nursing Implications

The nurse may be responsible to ensure that consent forms are completed for surgical procedures and for clinical photography, that all specimens collected are managed according to protocol, that a log is maintained tracking specimens to and from the laboratory, and that results are received in a timely manner. The nurse educates the patient regarding appropriate care of surgical sites and implication of test results.

CRITICAL THINKING EXERCISES

1  As a recent graduate nurse, you are aware that the U.S. Preventive Service Task Force (USPSTF) has given a grade B recommendation for providing sun protection education for individuals who are fair skinned, parents of young children, adolescents, and young adults. You share this recommendation with a patient, and the patient asks you to explain what a grade B recommendation means. How would you respond? Discuss sun protection behaviors you will include when providing this education. What other factors found when performing a skin examination or in the patient's history may make sun protection counseling advisable outside of this recommendation?

2  A 28-year-old woman who has rheumatoid arthritis was recently diagnosed with vitiligo and is expressing concerns about living with this condition. She has questions about how to protect her skin and how to cope with feelings of embarrassment. She also wants to know if her children are at risk for developing this condition. In providing patient education, which question will you address first? What education and resources will you provide and how will you counsel the patient to prioritize her physical, psychological, and emotional health?

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Resources

- American Academy of Dermatology Association (AAD), www.aad.org/public
 Centers for Disease Control and Prevention, Skin Cancer,
www.cdc.gov/cancer/skin/index.htm
- Dermatology Atlas (DermIS), a cooperation between the Department of Clinical Social Medicine (University of Heidelberg) and the Department of Dermatology (University of Erlangen), www.dermis.net/dermisroot/en/home/index.htm
- National Institutes of Health, National Institute on Aging, Skin Care and Aging, www.nia.nih.gov/health/skin-care-and-aging
- New Zealand Dermatology Society (DermNet NZ), www.dermnetnz.org
- Skin Cancer Foundation (lists approved sunscreens and other sun protection products), www.skincancer.org

56 Management of Patients with Dermatologic Disorders

LEARNING OUTCOMES

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

1. Describe the medical and nursing management of the patient with a wound, pruritus, dermatologic secretory disorder, infections of the skin, parasitic skin diseases, or noninfectious inflammatory dermatoses.
2. Use the nursing process as a framework for care of the patient with a pressure injury, or with a blistering disorder including toxic epidermal necrolysis and Stevens–Johnson syndrome.
3. Discuss the medical and nursing management of the patient with skin tumors (benign, malignant, and metastatic).
4. Identify the medical and nursing management of the patient undergoing plastic or cosmetic procedures.

NURSING CONCEPTS

Functional Ability
Mobility
Tissue Integrity

GLOSSARY

acantholysis: separation of epidermal cells from each other due to damage or abnormality of the intracellular substance

bullae: large, fluid-filled blisters

carbuncle: localized skin infection involving several hair follicles

cheilitis: inflammation of the lips

comedones: the primary lesions of acne, caused by sebum blockage in the hair follicle

cytotoxic: destructive of cells

débridement: removal of necrotic or dead tissue by mechanical, surgical, chemical, or autolytic means

dermatitis: any inflammation of the skin

dermatosis: any abnormal skin lesion

epidermopoiesis: development of epidermal cells

furuncle: localized skin infection of a single or a few hair follicles (*synonym:* boil)

hydrophilic: a material that absorbs moisture

hydrophobic: a material that repels moisture

hygroscopic: a material that absorbs moisture from the air

lichenification: thickening of the horny layer of the skin (*synonym:* scaling)

liniments: lotions with added oil for increased softening of the skin

pressure injury: localized area of skin breakdown and/or underlying soft tissue damage due to prolonged pressure and insufficient blood supply; formerly known as *pressure ulcer*

pruritus: itching

pyodermas: pus-forming bacterial skin infections

sinus tract: course or path of tissue destruction occurring in any direction from the surface or edge of a wound (*synonym:* tunneling)

slough: soft, moist avascular (devitalized) tissue; may be white, yellow, tan, gray, or green; may be loose or firmly adherent

striae: bandlike streaks on the skin, distinguished by color, texture, depression, or elevation from the tissue in which they are found; usually purplish or white

suspensions: liquid preparations in which powder is suspended, requiring shaking before use

tinea: a common superficial fungal infection on the skin or scalp (*synonym:* ringworm)

undermining: area of destroyed tissue that extends extensively under intact skin along the periphery of a wound

xerosis: overly dry, rough skin

Dermatologic disorders are encountered frequently by nurses across many practice settings. Nursing management of patients with dermatologic disorders can range from simple interventions such as administering topical and systemic medications for prevention to treating complex pressure injuries. The nurse can also be instrumental in educating patients how to care for their skin and provide self-care for wounds. The objectives of nursing interventions are to prevent additional skin and tissue damage, prevent secondary infection, reverse the inflammatory process, and relieve the symptoms.

SKIN CARE

Some skin problems are markedly aggravated by soap and water; therefore, bathing routines are modified according to the condition. Denuded skin, whether the area of desquamation is large or small, is excessively prone to damage by chemicals, trauma, and even bathing. Friction occurs when skin rubs against another surface, which may happen when the skin is vigorously dried with a towel, resulting in damage to the epidermal and upper dermal skin layers (Bryant & Nix, 2016).

Protecting the Skin

The goal of routine skin care should be to maintain the acidic pH of the skin; therefore, alkaline soaps should be avoided. No-rinse, pH-balanced soap is the best. Moisturizing products, such as emollients and humectants, can be applied to help maintain skin moisture. Emollients moisturize and soften the skin; conversely, humectants attract water to moisturize skin with **xerosis** (very dry, rough skin) (Doughty & McNichol, 2016).

Basic skin care in bathing a patient with a skin disorder is as follows:

- A mild, lipid-free soap or soap substitute is used (e.g., Dove sensitive skin™, Cetaphil™, CeraVe™, VANICREAM™).
- The area is rinsed completely and blotted dry with a soft cloth.
- Deodorant soaps are avoided.
- Laundry detergents and fabric softener free of fragrance are used.

Special care is necessary when changing dressings. Sterile saline, or another prescribed solution, helps loosen crusts, remove exudates, or free an adherent dry dressing.

Preventing Secondary Infection

Skin lesions should be regarded as potentially infectious, and proper safety precautions should be observed until the diagnosis is established. Most lesions with purulent drainage contain infectious material. The nurse and primary provider must adhere to standard precautions and wear gloves when inspecting the skin or changing a dressing. The use of standard personal protective equipment (PPE) and proper disposal of any contaminated dressing is carried out according to the Occupational Safety and Health Administration (OSHA) regulations (OSHA, 2011).

Wound Dressing Care



Dressings can be categorized in several ways. An overview of select types of dressings and their indications is provided; however, this is not an exhaustive list of dressing types.

Passive dressings have only a protective function and maintain a moist environment for natural healing. They include those that just cover the area (e.g., DuoDERMTM, TegadermTM) and may remain in place for several days. *Interactive dressings* are capable of absorbing wound exudate while maintaining a moist environment in the area of the wound and allowing the surrounding skin to remain dry. They include hydrocolloids, alginates, and hydrogels. It is thought that interactive dressings are able to modify the physiology of the wound environment by modulating and stimulating cellular activity and by releasing growth factors (Dabiri, Damstetter, & Phillips, 2016). *Active dressings* improve the healing process and decrease the healing time. They include skin grafts and biologic skin substitutes. Both interactive and active dressings create a moist environment at the interface of the wound with the dressing.

Wicker dressings are ropelike dressings used to manage sinus tracts or wounds that have undermining (see later discussion of sinus tracts and undermining in Pressure Injuries). These are effective at absorbing drainage. Wicker dressings can be plain or antimicrobial. *Filler dressings* are best for deeper wounds; these fill the contour of the wound, allowing the wound to heal by secondary intention. *Cover dressings* are appropriate for surface wounds and also can be used as a secondary dressing over filler dressings. These dressings can be absorptive or hydrating, plain or antimicrobial (Doughty & McNichol, 2016).

Because so many wound care products are available, it is often difficult to select the most appropriate product for a specific wound. Selection of products should be made carefully because of their expense. Both clinical

efficacy and health-related outcomes (e.g., decreased pain, increased mobility) should be used to measure the success of a wound care product. Even with the availability of a large variety of dressings, an appropriate selection can be made if certain principles are maintained. These principles are referred to as the five rules of wound care (Dabiri et al., 2016).

1. *Rule 1: Categorization.* The nurse learns about dressings by generic category and compares new products with those that already make up the category. The nurse becomes familiar with indications, contraindications, and side effects. The best dressing may be created by combining products in different categories to achieve several goals at the same time. These categories are discussed in subsequent sections.
2. *Rule 2: Selection.* The nurse selects the safest and most effective, easy-to-use, and cost-effective dressing possible. Nurses follow the primary provider's prescriptions for dressings. They must be prepared to give the primary provider feedback about the dressing's effect on the wound, ease of use for the patient, and other considerations when applicable.
3. *Rule 3: Change.* The nurse changes dressings based on patient, wound, and dressing assessments, not on standardized routines.
4. *Rule 4: Evolution.* As the wound progresses through the phases of wound healing, the dressing protocol is altered to optimize healing. It is rare, especially in cases of chronic wounds, that the same dressing material is appropriate throughout the healing process. The nurse educates the patient or family caregiver about wound care and ensures that the family has access to appropriate dressing choices.
5. *Rule 5: Practice.* Practice with dressing material is required for the nurse to learn the performance parameters of the particular dressing. Refining the skills of applying appropriate dressings correctly and learning about new dressing products are essential nursing responsibilities. Dressing changes should not be delegated to unlicensed personnel; these techniques require the knowledge base and assessment skills of professional nurses.

TABLE 56-1

Functions and Actions of Wound Dressings

Function	Action	Example
Absorption	Absorbs exudates	Alginates, composite dressings, foams, gauze, hydrocolloids, hydrogels
Antimicrobial	Alters wound bed bioburden	Alginates, foams, collagens, composites, contact layers, hydrogels, transparent films, impregnated dressings, wound fillers
Cleansing	Removes purulent drainage, foreign debris, and devitalized tissue	Acetic acid, saline, sodium hypochlorite (Dakin's solution), Vashe Wound Solution™
Débridement	<p><i>Autolytic</i>—covers a wound and allows enzymes to self-digest sloughed skin</p> <p><i>Chemical or enzymatic</i>—applied topically to break down devitalized tissue</p> <p><i>Mechanical</i>—removes devitalized tissue with mechanical force</p>	Absorption beads, pastes, powders; alginates; composite dressings; foams; gelling fiber; hydrate gauze; hydrogels; hydrocolloids; transparent films; wound care systems Enzymatic débridement agents Wound cleansers, gauze (wet to dry), whirlpool
Diathermy	Produces electrical current to promote warmth and new tissue growth	
Hydration	Adds moisture to a wound	Gauze (saturated with saline solution), hydrogels, wound care systems
Maintain moist environment	Manages moisture levels in a wound and maintains a moist environment	Composites, contact layers, foams, gauze (impregnated or saturated), hydrogels, hydrocolloids, transparent films, wound care systems
Manage high-output wounds	Manages excessive quantities of exudates	Pouching systems
Pack or fill dead space	Prevents premature wound closure or fills shallow areas and provides absorption	Absorbent beads, powders, pastes; alginates; composites, foams; gauze (impregnated and nonimpregnated)
Protect and cover wound	Provides protection from the external environment	Composites, compression bandages/wraps, foams, gauze dressings, hydrogels, hydrocolloids, transparent film dressings

Protect periwound skin	Prevents moisture and mechanical trauma from damaging delicate tissue around wound	Composites, foams, hydrocolloids, pouching systems, skin sealants, transparent film dressings
Provide therapeutic compression	Provides appropriate levels of support to the lower extremities in venous stasis disease	Compression bandages, wraps, graduated compression stockings

Adapted from Miline, C. (Ed.). (2019). *Wound source 2019*. Atlantic Beach, FL: Kestrel Health Information, Inc.

Autolytic Débridement

Autolytic **débridement** is a process that uses the body's own digestive enzymes to break down necrotic tissue. The wound is kept moist with occlusive dressings. Eschar and necrotic debris are softened, liquefied, and separated from the bed of the wound.

Several commercially available products mirror the enzymes that the body produces naturally and are referred to as enzymatic débriding agents; an example is collagenase. Application of these products speeds the rate at which necrotic tissue is removed. This method, although slower than surgical débridement, is more discriminating for tissue removal and does not damage healthy tissue surrounding the wound. When enzymatic débridement is being used under an occlusive dressing, a foul odor and exudate is produced by the breakdown of cellular debris. This odor does not indicate that the wound is infected. The nurse should expect this reaction and help the patient and family understand the reason for the odor. Silver and iodine inactivate collagenase and therefore should not be used with it. Application of collagenase should be nickel thick and changed daily to be effective (Bryant & Nix, 2016).

Categories of Dressings

Table 56-1 provides a guide to the functions and actions of wound dressings.

Occlusive Dressings

Occlusive dressings may be commercially produced or made inexpensively from sterile or nonsterile gauze squares or wrap. Occlusive dressings cover

topical medication that is applied to a skin lesion. The area is kept airtight by using plastic film (e.g., plastic wrap). Plastic film is thin and readily adapts to all sizes, body shapes, and skin surfaces. In general, plastic wrap should be used no more than 12 hours each day. Plastic surgical tape containing a corticosteroid in the adhesive layer can be cut to size and applied to individual lesions. Occlusive dressings are often used to cover surgical incisions for the first 48 hours postoperatively (Doughty & McNichol, 2016).

Moisture-Retentive Dressings

Commercially produced moisture-retentive dressings are efficient at removing exudate because of their higher moisture–vapor transmission rate; some have reservoirs that can hold excessive exudate. A number of moisture-retentive dressings are already impregnated with saline solution, petrolatum, zinc-saline solution, hydrogel, or antimicrobial agents, thereby eliminating the need to coat the skin to avoid maceration. The main advantages of moisture-retentive dressings are improved fibrinolysis, accelerated epidermal resurfacing, reduced pain, fewer infections, less scar tissue, gentle autolytic débridement, and decreased frequency of dressing changes. Depending on the product used and the type of dermatologic conditions encountered, most moisture-retentive dressings may remain in place from 12 to 24 hours; some can remain in place as long as 3 days (Bryant & Nix, 2016; Doughty & McNichol, 2016).

Hydrogels

Hydrogels are polymers with 90% to 95% water content. They are available in impregnated sheets or as gels. Hydrogels provide moisture to maintain a moist wound bed to promote healing. Their high moisture content makes them ideal for autolytic débridement of wounds. They are semitransparent, allowing for wound inspection without dressing removal. They are comfortable and soothing for the painful wound. They require a secondary dressing to keep them in place. Hydrogels are appropriate for partial- and full-thickness, dry to light exudative wounds such as necrotic wounds, minor burns, and radiation burns (Bryant & Nix, 2016; Miline, 2019).

Hydrocolloids

Hydrocolloids are composed of a water-impermeable, polyurethane outer covering separated from the wound by a hydrocolloid material. They are adherent and nonpermeable to water vapor and oxygen. As water evaporates over the wound, it is absorbed into the dressing, which softens and discolors with the increased water content. Hydrocolloids promote

autolysis, reduce the risk for infection and pain, protect the wound, and promote healing (Bryant & Nix, 2016). The dressing can be removed without causing damage to the wound. As the dressing absorbs water, it produces a foul-smelling, yellowish covering over the wound. This is a normal chemical interaction between the dressing and wound exudate and should not be confused with purulent drainage from the wound. Unfortunately, most of the hydrocolloid dressings are opaque, preventing inspection of the wound without removal of the dressing.

Available in sheets and in gels, hydrocolloids are a good choice for both partial- and full-thickness wounds, with light to moderate exudate. They are not recommended for infected wounds and are used cautiously in patients with diabetes (Bryant & Nix, 2016; Miline, 2019). Easy-to-use and comfortable hydrocolloid dressings promote débridement and formation of granulation tissue. Most are changed every 3 to 5 days and most can be submerged in water for bathing or showering.

Foam Dressings

Foam dressings consist of microporous polyurethane with an absorptive **hydrophilic** (water-absorbing) surface that covers the wound and a **hydrophobic** (water-resistant) backing to block leakage of exudate. They are nonadherent; most are designed so that they require a secondary dressing to keep them in place. Adhesive borders are available on some foam dressings, negating the need for a second dressing.

Moisture is absorbed into the foam layer, decreasing maceration of the surrounding tissue. A moist environment is maintained, and removal of the dressing does not damage the wound. The foams are opaque and must be removed for wound inspection. Foams are a good choice for partial- and full-thickness, moderate to heavy exudative wounds. They are especially helpful over bony prominences because they provide contoured cushioning (Bryant & Nix, 2016; Miline, 2019).

Calcium Alginates

Calcium alginates are derived from algae or kelp polysaccharides and consist of very absorbent calcium alginate fibers (Dabiri et al., 2016). They are hemostatic and bioabsorbable and can be used as sheets or mats of absorbent material. As the exudate is absorbed, the fibers turn into a viscous hydrogel. They are useful in areas where the tissue is more irritated or macerated. The alginate dressing forms a moist pocket over the wound while the surrounding skin stays dry. The dressing also reacts with wound fluid, which forms a foul-smelling coating. Alginates work well when packed into a deep cavity, wound, or sinus tract with heavy drainage. They

are nonadherent and require a secondary dressing. Alginates are used for moderate to highly exudative full-thickness wounds, such as pressure injuries, infected wounds, and venous insufficiency ulcers (Bryant & Nix, 2016; Miline, 2019). Wound experts suggest that alginates are superior to other modern dressings for débriding necrotic wounds (Bryant & Nix, 2016).

Antimicrobials

Antimicrobial dressings contain antiseptics, cadexomer iodine, honey, hydrofera blue, mupirocin, or silver to reduce the risk of infection. They are available in many different types of dressings, such as gauze, foams, films, or absorptive or nonadherent materials. Antimicrobial dressings are indicated for partial- or full-thickness wounds that have a risk for infection, such as surgical wounds (Bryant & Nix, 2016; Miline, 2019).

Collagens

Collagen dressings are protein based and derived from animal sources (bovine, equine, porcine, or avian) that promote wound healing. Collagens are used for partial- or full-thickness noninfected wounds with light to moderate drainage, such as pressure injuries, vascular ulcers, skin donor sites, surgical wounds, diabetic ulcerations, and traumatic wounds (Miline, 2019).

Composites

Composite dressings combine components from several dressing types into a single dressing that is absorptive and that provide protection from bacteria and fluids (Bryant & Nix, 2016; Miline, 2019).

Contact Layers

Contact layers are thin, nonadherent, conforming dressings that are directly applied to wounds for protection. They are porous, thus allowing exudate to drain through to a secondary dressing. Contact layers are appropriate for partial- and full-thickness wounds, infected wounds, skin donor sites, and split-thickness skin grafts (Bryant & Nix, 2016; Miline, 2019).

TABLE 56-2

Select Topical Preparations and Medications

Preparation	Indications	Product Name
Moisture barriers	Prevent excess moisture on skin to avoid maceration; protect skin	Calmoseptine™, Cavilon™, Proshield™
Moisturizer creams	Soothe, soften, moisturize, and protect skin	Acid Mantle Cream™, Curél Cream™, Dermasil™, Eucerin™, Lubriderm™, Noxzema Skin Cream™, Remedy™, Resta™
Moisturizer ointments	Soothe, soften, moisturize, and protect skin	Aquaphor Ointment™, Eutra Swiss Skin Cream™, Vaseline Ointment™
Topical anesthetic agents	Relieve pain	Lidocaine of various strengths in the form of spray, ointment, gel; lidocaine 2.5% and prilocaine 2.5%
Topical antibiotic agents	Second-line therapy when infection present; antibiotics are not first choice for treating wounds as they are associated with hypersensitivity reactions and development of antibiotic resistant organisms	Bacitracin™, bacitracin and polymyxin B, mupirocin 2%, erythromycin 2%, clindamycin phosphate 1%, gentamicin sulfate 1%, 1% silver sulfadiazine cream
Topical antimicrobials	Antimicrobial (bactericidal or bacteriostatic)	Acetic acid 0.25%, cadexomer iodine, chlorhexidine 0.02%, honey (medical grade), hydrofera blue, hydrogen peroxide, mupirocin 2%, povidone iodine, silver, sodium hypochlorite, 1% silver sulfadiazine cream

Adapted from Doughty, D., & McNichol, L. (2016). *WOCN Society core curriculum: Wound management*. Philadelphia, PA: Wolters Kluwer; Miline, C. (Ed.). (2019). *Wound source 2019*. Atlantic Beach, FL: Kestrel Health Information, Inc.

Transparent Film Dressings

Transparent film dressings are polymer membranes, permeable to moisture vapors and oxygen, but impermeable to water, liquids, and bacteria. Transparency allows for direct visualization of the wound. The purposes of films are to protect, provide a moist wound bed environment, promote autolysis, and lessen friction. Transparent films are used for partial or

closed wounds with little to no exudate, such as intravenous access sites, skin donor sites, lacerations, and abrasions (Bryant & Nix, 2016; Miline, 2019).

Medical Management

Medical management of skin disorders includes a host of prescribed and over-the-counter (OTC) pharmacologic therapies.

Pharmacologic Therapy

Medicated lotions, creams, ointments, gels, and powders are frequently used to treat skin disorders. In general, moisture-retentive dressings, with or without medication, are used in the acute stage; lotions and creams are reserved for the subacute stage; and ointments are used when inflammation has become chronic and the skin is dry with scaling or **lichenification** (thickening of the horny layer of the skin).

High concentrations of some medications can be applied directly to the affected site with little systemic absorption and with few systemic side effects. However, some medications are readily absorbed through the skin and can produce systemic effects. Because topical preparations may induce allergic contact **dermatitis** (skin inflammation) in patients who are sensitive, any untoward response should be reported immediately and the medication discontinued.

With all types of topical medication, the patient is educated to apply the medication gently but thoroughly and, when necessary, to cover the medication with a dressing to protect clothing. [Table 56-2](#) lists select topical preparations and medications.

Lotions

Lotions are frequently used to replenish lost skin oils or to relieve pruritus. They must be applied every 3 or 4 hours for sustained therapeutic effect. They are usually applied directly to the skin, but a dressing soaked in the lotion can be placed on the affected area. However, if left in place for a longer period, it may crust and cake on the skin.

Lotions are of two types: suspensions and liniments. **Suspensions** consist of either a powder in water that requires shaking before application, or clear solutions, which contain completely dissolved active ingredients. A suspension such as calamine lotion provides a rapid cooling and drying effect as it evaporates, leaving a thin, medicinal layer of powder on the affected skin. **Liniments** are lotions with oil added to prevent crusting. Because lotions are easy to use, therapeutic adherence is generally good.

Powders

Powders usually have a talc, zinc oxide, bentonite, or cornstarch base and are dusted on the skin with a shaker or with cotton sponges. Although their therapeutic action is brief, powders act as **hygroscopic** agents that absorb and retain moisture from the air and reduce friction between skin surfaces and clothing or bedding.

Creams

Creams may be suspensions of oil in water or emulsions of water in oil, with additional ingredients to prevent bacterial and fungal growth. Both may cause an allergic reaction such as contact dermatitis. Oil-in-water creams are easily applied and usually are the most cosmetically acceptable to the patient. Although they can be used on the face, they tend to have a drying effect. Water-in-oil emulsions are greasier and are preferred for drying and flaking dermatoses. Creams usually are rubbed into the skin by hand. They are used for their moisturizing and emollient effects.

Gels

Gels are semisolid emulsions that become liquid when applied to the skin or scalp. They are cosmetically acceptable to the patient because they are not visible after application, and they are greaseless and nonstaining. Water-based gels penetrate the skin more effectively and cause less stinging on application. They are especially useful for acute dermatitis in which there is weeping exudate (e.g., poison ivy) and are applied the same way as creams.

Pastes

Pastes are mixtures of powders and ointments and are used in inflammatory blistering conditions. They adhere to the skin and may be difficult to remove without using an oil (e.g., olive oil, mineral oil). Pastes are applied with a wooden tongue depressor or gloved hand.

Ointments

Ointments retard water loss and lubricate and protect the skin. They are the preferred vehicle for delivering medication to chronic or localized dry skin conditions, such as eczema or psoriasis. Ointments are applied with a wooden tongue depressor or gloved hand.

Sprays and Aerosols

Spray and aerosol preparations may be used on any widespread dermatologic condition. They evaporate on contact and are used infrequently.

Topical Corticosteroids

Corticosteroids are widely used in treating dermatologic conditions to provide anti-inflammatory, antipruritic, and vasoconstrictive effects. The patient is educated to apply this medication according to strict guidelines, using it sparingly but rubbing it into the prescribed area thoroughly. Absorption of topical corticosteroids is enhanced when the skin is hydrated or the affected area is covered by an occlusive or moisture-retentive dressing (Comerford & Durkin, 2020). Inappropriate use of topical corticosteroids can result in local and systemic side effects, especially when the medication is absorbed through inflamed and excoriated skin; it is used under occlusive dressings, or is used for longer time periods on sensitive areas. Local side effects may include skin atrophy and thinning, **striae** (bandlike streaks), and telangiectasias (dilated blood vessels). Thinning of the skin results from the ability of corticosteroids to inhibit skin collagen synthesis. The thinning process can be reversed by discontinuing the medication, but striae and telangiectasia are permanent. Systemic side effects may include hyperglycemia and symptoms of Cushing syndrome (see [Chapter 45](#)). Caution is required when applying corticosteroids around the eyes because long-term use may cause glaucoma or cataracts, and the anti-inflammatory effect of corticosteroids may mask existing viral or fungal infections.

Concentrated (fluorinated) corticosteroids should never be applied on the face or intertriginous areas (i.e., axillae and groin) because these areas have a thinner stratum corneum and therefore absorption is enhanced. Persistent use of concentrated topical corticosteroids in any location may produce acnelike dermatitis, known as steroid-induced acne, and hypertrichosis (excessive hair growth). Because some topical corticosteroid preparations are available without prescription, patients should be cautioned about prolonged and inappropriate use. [Table 56-3](#) lists select topical corticosteroid preparations according to potency.

Intralesional Therapy

Intralesional therapy consists of injecting a sterile suspension of medication (usually a corticosteroid) into or just below a lesion. Although this treatment may have an anti-inflammatory effect, local atrophy and discoloration may result if the medication is injected into subcutaneous fat. Skin lesions treated with intralesional therapy include psoriasis, keloids, and cystic acne. Occasionally, immunotherapeutic and antifungal agents are given as intralesional therapy.

TABLE 56-3

Potency: Select Topical Corticosteroids

Potency	Topical Corticosteroid	Preparations
OTC	0.5–1% hydrocortisone	Cream, lotion, ointment
Lowest	Dexamethasone 0.1%	Cream, ointment, aerosol, gel
	Alclometasone 0.05%	Cream, ointment
	Hydrocortisone 2.5%	Cream, lotion, ointment
Low–medium	Desonide 0.05%	Cream, lotion, ointment
	Fluocinolone acetonide 0.025%	Cream, solution
	Hydrocortisone valerate 0.2%	Cream, solution
	Betamethasone valerate 0.1%	Cream, ointment
	Fluticasone propionate 0.05%	Cream, ointment
Medium–high	Triamcinolone acetonide 0.1–0.5%	Cream, ointment, lotion
	Fluocinonide 0.05%	Cream, ointment, gel
	Desoximetasone 0.05–0.25%	Cream, ointment, gel
	Fluocinolone 0.2%	Cream, ointment
	Diflorasone diacetate 0.05%	Cream, ointment
Very high	Clobetasol propionate 0.05%	Cream, ointment, gel
	Betamethasone dipropionate 0.05%	Cream, ointment, gel
	Halobetasol propionate 0.05%	Cream, ointment

OTC, over the counter.

Adapted from Comerford, K. C., & Durkin, M. T. (2020). *Nursing 2020 drug handbook*. Philadelphia, PA: Wolters Kluwer.

Systemic Medications

Systemic medications are also prescribed for skin conditions. These include corticosteroids for short-term therapy of contact dermatitis or for long-term treatment of a chronic **dermatosis** (skin lesion), such as pemphigus vulgaris. Other frequently used systemic medications include antibiotic, antifungal, antihistamine, sedative, analgesic, tranquilizing, **cytotoxic** (destructive of cells), and immunosuppressive agents.

Nursing Management

Nursing management of the patient prescribed pharmacologic therapy to treat a skin disorder begins with a focused dermatologic health history, direct observation, and a complete physical examination (see Chapter 55). Because of its visibility, a skin condition is usually difficult to ignore or conceal from others and may therefore cause the patient emotional distress.

The major goals for the patient may include maintenance of skin integrity, relief of discomfort, promotion of restful sleep, self-acceptance, knowledge about skin care, and avoidance of complications.

Nursing management for patients who must perform self-care for skin problems, such as applying medications and dressings, focuses on educating the patient about how to cleanse the affected area and pat it dry; apply medication to the lesion while the skin is moist; cover the area with plastic (e.g., Telfa™ pads, plastic wrap, vinyl gloves, plastic bag) if recommended; and cover it with an elastic bandage, dressing, or paper tape to seal the edges. Dressings that contain or cover a topical corticosteroid should be removed for 12 of every 24 hours to prevent adverse events.

Other forms of dressings, such as those used to cover topical medications, include soft cotton cloth and stretchable cotton dressings (e.g., Surgitube™, Tubegauz™) that can be used for fingers, toes, hands, and feet. The hands can be covered with disposable polyethylene or vinyl gloves sealed at the wrists; the feet can be wrapped in plastic bags covered by cotton socks. Gloves and socks that are already impregnated with emollients, making application to the hands and feet more convenient, are also available. When large areas of the body must be covered, cotton cloth topped by an expandable stockinette can be used. Disposable diapers or cloths folded in diaper fashion are useful for dressing the groin and the perineal areas. Axillary dressings can be made of cotton cloth, or a commercially prepared dressing may be used and taped in place or held by dress shields. A turban or plastic shower cap is useful for holding dressings on the scalp. A face mask, made from gauze with holes cut out for the eyes, nose, and mouth, may be held in place with gauze ties looped through holes cut in the four corners of the mask.

Pressure Injury

Pressure injury, formerly called pressure ulcer, is a localized area of necrotic soft tissue that occurs when pressure applied to the skin is greater than the normal capillary closure pressure (approximately 32 mm Hg) over a period of time sufficient to cause tissue injury. Patients who are critically ill have a lower capillary closure pressure and a greater risk of pressure injuries, as are patients who are exposed to prolonged pressure due to immobility, have motor or sensory dysfunction, or have muscular atrophy that reduces padding between the overlying skin and the underlying bone.

A landmark 10-year pressure injury prevalence survey conducted among 918,621 inpatients in the United States from 2006 through 2015 showed an overall decrease in prevalence of pressure injury from 13.5% in 2006 to

9.3% in 2015 (VanGilder, Lachenbruch, Algrim-Boyle, et al., 2017). Despite declining prevalence, pressure injuries nonetheless result in significant pain and suffering, increased morbidity and mortality, higher medical costs and resource use, and lower odds of discharge to the community (VanGilder et al., 2017).

The American Nurses Association tracks hospital-acquired pressure injuries (HAPI) quarterly as part of the National Database of Nursing Quality Indicators® (NDNQI®). In the United States, an estimate of 2.5 million patients in acute care facilities develop HAPIs annually, with approximately 60,000 patient deaths associated with complications from HAPIs. The cost of treatment for a single, full-thickness pressure injury may be as high as \$70,000 with an estimated annual total cost of \$11 billion for pressure injury treatment in the United States (Agency for Healthcare Research & Quality [AHRQ], 2014). All possible efforts to prevent skin breakdown must be made because the treatment of pressure injuries is costly in terms of health care dollars and quality of life for patients at risk.

The initial sign of pressure is erythema (redness of the skin) caused by reactive hyperemia, which normally resolves in less than 1 hour. Unrelieved pressure results in tissue ischemia or anoxia. The cutaneous tissues become broken or destroyed, leading to progressive destruction and necrosis of underlying soft tissue, and the resulting pressure injury is painful and slow to heal.

NURSING PROCESS

The Patient with Pressure Injury

Assessment

Nursing assessment involves identifying and evaluating risk for development of pressure injuries as well as assessment of the skin.

ASSESSMENT OF RISK FACTORS

Immobility, impaired sensory perception or cognition, decreased tissue perfusion, decreased nutritional status, friction and shear forces, increased moisture, and age-related skin changes and comorbidities all contribute to the development of pressure injuries (Doughty & McNichol, 2016). [Chart 56-1](#) lists risk factors for pressure injuries. Scales such as the Braden scale ([Table 56-4](#)) or Norton scale (Norton, McLaren, & Exton-Smith, 1962) may be used to facilitate systematic assessment and quantification of a patient's risk for pressure injury, although the nurse should recognize that the reliability of these scales is not well established for all patient populations.

Chart 56-1



RISK FACTORS

Pressure Injuries

- Advanced age
- Comorbidities, such as diabetes, peripheral vascular disease, cancer, stroke, obesity, cognitive impairment
- Excessive moisture, including incontinence of urine or feces
- Excessive skin dryness
- Friction, shearing forces, trauma
- High-acuity patients, such as those in intensive care units
- History of having recurrent pressure injuries
- Immobility, compromised mobility
- Loss of protective reflexes, sensory deficit/loss
- Malnutrition, hypoproteinemia, anemia, vitamin deficiency
- Medical devices, such as casts, traction, restraints
- Medications, such as analgesics or sedatives
- Poor skin perfusion, edema
- Preexisting skin problems on admission
- Prolonged hospitalization
- Prolonged pressure on tissue
- Smoking
- Surgical procedures >3 hours

Adapted from Doughty, D., & McNichol, L. (2016). *Wound, Ostomy and Continence Nurses Society core curriculum: Wound management*. Philadelphia, PA: Wolters Kluwer.

Specific nursing actions related to assessing risk include:

- Evaluate level of mobility.
- Note safety and assistive devices (e.g., restraints, splints).
- Assess neurovascular status.
- Evaluate circulatory status (e.g., peripheral pulses, edema).
- Note present health problems.
- Evaluate nutritional and hydration status.
- Review the results of the patient's laboratory studies, including hematocrit, hemoglobin, electrolytes, albumin, prealbumin, transferrin, and creatinine.

- Determine presence of incontinence.
- Review current medications.



Quality and Safety Nursing Alert

Pressure injuries are associated with increased costs of treatment and length of hospital stay as well as diminished quality of life for patients. It is imperative that nurses perform a skin assessment on every patient admitted to a hospital, inpatient rehabilitation facility, or skilled nursing facility.

Immobility. When a person is immobile and inactive, pressure is exerted on the skin and subcutaneous tissue by objects on which the person rests, such as a mattress, chair seat, or cast. The development of pressure injuries is directly related to the duration of immobility. If pressure continues long enough, small-vessel thrombosis and tissue necrosis occur and a pressure injury is the result. Weight-bearing bony prominences are most susceptible to pressure injury development because they are covered only by skin and small amounts of subcutaneous tissue. Susceptible areas include the sacrum and coccygeal areas, ischial tuberosities (especially in people who sit for prolonged periods), greater trochanter, heel, knee, malleolus, medial condyle of the tibia, fibular head, scapula, and elbow, with the sacrum and heels the most common sites (Doughty & McNichol, 2016) (Fig. 56-1).

Impaired Sensory Perception or Cognition. Patients with sensory loss, impaired level of consciousness, or paralysis may not be aware of the discomfort associated with prolonged pressure on the skin and therefore may not change their positions to relieve the pressure. This prolonged pressure impedes blood flow, reducing nourishment of the skin and underlying tissues. A pressure injury may develop in a short period of time, sometimes within minutes.

Decreased Tissue Perfusion. Any condition that reduces the circulation and nourishment of the skin and subcutaneous tissue (altered peripheral tissue perfusion) increases the risk of pressure injury development. Patients with diabetes have compromised microcirculation. Similarly, patients with edema have impaired circulation and poor nourishment of the skin tissue. Patients with obesity have large amounts of poorly vascularized adipose tissue, which is susceptible to breakdown.

Nutritional Status. Nutritional deficiencies, anemias, and metabolic disorders also contribute to the development of pressure injuries.

Anemia, regardless of its cause, decreases the blood's oxygen-carrying ability and predisposes the patient to pressure injuries. Maintaining good nutrition and preventing malnutrition are essential to prevent pressure injuries and promote wound healing (Doughty & McNichol, 2016). Serum albumin and prealbumin levels are sensitive indicators of protein deficiency. Serum albumin levels of less than 3 g/dL are associated with hypoalbuminemic tissue edema and increased risk of pressure injuries. Prealbumin levels are more sensitive indicators of protein status than the albumin levels, but they are costlier to assess. The nurse should assess the patient's prealbumin and albumin values and electrolyte panel (Bryant & Nix, 2016).

Friction and Shear. Mechanical forces also contribute to the development of pressure injuries. Friction is the force of rubbing two surfaces against each other and is often caused by pulling a patient over a bed sheet or from a poorly fitted prosthetic device. Shear is the result of exerting a parallel force on the patient's body, such as the resistance between the patient and the chair or bed when the patient slides down (Edsberg, Black, Goldberg, et al., 2016). When shear occurs, tissue layers slide over one another, blood vessels stretch and twist, and the microcirculation of the skin and subcutaneous tissue is disrupted. Evidence of deep tissue damage may be slow to develop and may present through the development of a **sinus tract** (also called tunneling), which is an area of destroyed tissue that extends from the edge of a wound; this results in dead space that is susceptible to abscess formation. The sacrum and heels are most susceptible to the effects of shear. Pressure injuries from friction and shear occur when the patient slides down in bed (Fig. 56-2) or when the patient is positioned or moved improperly (e.g., dragged up in bed). Spastic muscles and paralysis increase the patient's vulnerability to pressure injuries related to friction and shear.

Increased Moisture. Prolonged contact with moisture from perspiration, urine, feces, or drainage produces maceration (softening) of the skin. The skin reacts to caustic substances in the excreta or drainage and becomes irritated. Moist, irritated skin is more vulnerable to pressure breakdown. Once the skin breaks, the area is invaded by microorganisms (e.g., streptococci, staphylococci, *Pseudomonas aeruginosa*, *Escherichia coli*), and infection occurs. Foul-smelling infectious drainage is present. The lesion may enlarge and allow a continuous loss of serum, which may further deplete the body of essential protein needed for tissue repair and maintenance. The lesion may continue to enlarge and extend deep into the fascia, muscle, and

bone, with multiple sinus tracts radiating from the pressure injury. With extensive pressure injuries, life-threatening infections and sepsis may develop, frequently from gram-negative organisms.

TABLE 56-4  Braden Scale for Predicting Pressure Injury Risk

Patient's Name	Evaluator's Name	Date of Assessment			
Sensory Perception Ability to respond meaningfully to pressure-related discomfort	1. Completely Limited Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation OR limited ability to feel pain over most of body.	2. Very Limited Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment that limits the ability to feel pain or discomfort over half of body.	3. Slightly Limited Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment that limits its ability to feel pain or discomfort in one or two extremities.	4. No Impairment Responds to verbal commands. Has no sensory deficit that would limit ability to feel or voice pain or discomfort.	
Moisture Degree to which skin is exposed to moisture	1. Constantly Moist Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	2. Very Moist Skin is often, but not always, moist. Linen must be changed at least once a shift.	3. Occasionally Moist Skin is occasionally moist, requiring an extra linen change approximately once a day.	4. Rarely Moist Skin is usually dry, linen only requires changing at routine intervals.	
Activity Degree of physical activity	1. Bedfast Confined to bed.	2. Chairfast Ability to walk severely limited or nonexistent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	3. Walks Occasionally Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	4. Walks Frequently Walks outside room at least twice a day and inside room at least once every 2 hrs during waking hours.	
Mobility Ability to change and control body position	1. Completely Immobile Does not make even slight changes in body or extremity position without assistance.	2. Very Limited Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	3. Slightly Limited Makes frequent though slight changes in body or extremity position independently.	4. No Limitation Makes major and frequent changes in position without assistance.	
Nutrition Usual food intake pattern	1. Very Poor Never eats a complete meal. Rarely eats more than a 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IVs for more than 5 days.	2. Probably Inadequate Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR receives less than optimum amount of liquid diet or tube feeding.	3. Adequate Eats half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen, which probably meets most of nutritional needs.	4. Excellent Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.	
Friction and Shear	1. Problem Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures, or agitation leads to almost constant friction.	2. Potential Problem Moves feebly or requires minimum assistance. During a move, skin probably slides to some extent against sheets, chair, restraints, or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	3. No Apparent Problem Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.	Total Score	

NPO, nothing by mouth; TPN, total parenteral nutrition.
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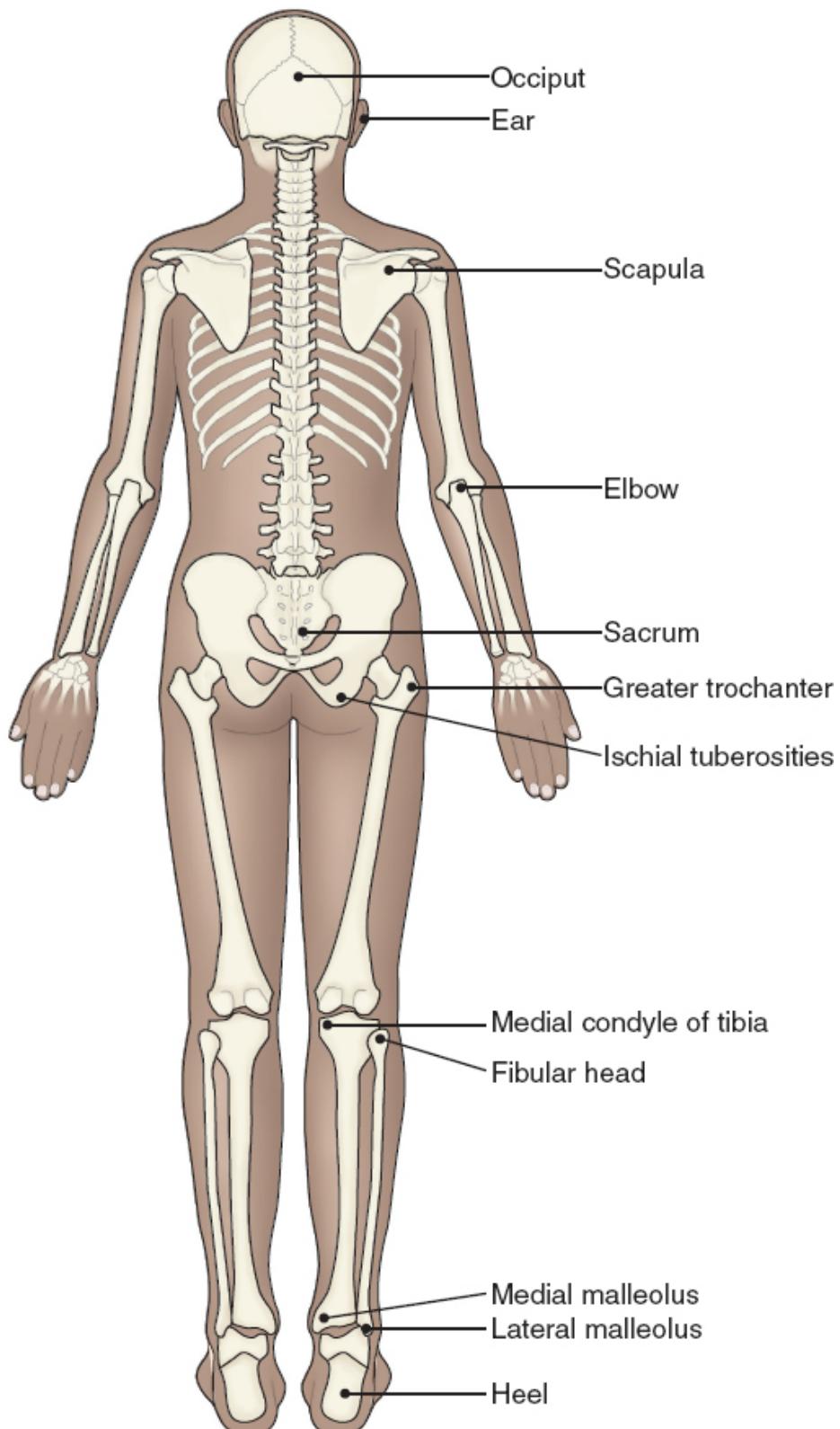


Figure 56-1 • Areas susceptible to pressure injuries.

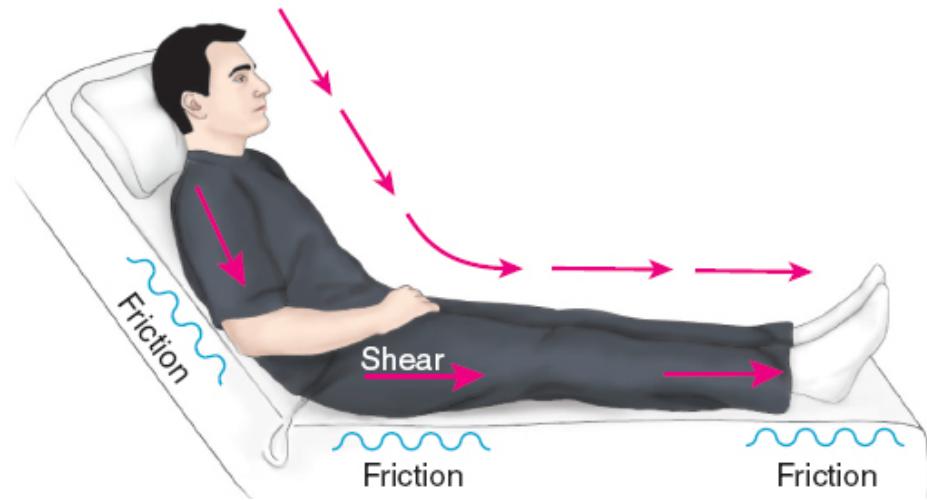


Figure 56-2 • Mechanical forces contribute to pressure injury development. As the person slides down or is improperly pulled up in bed, *friction* resists this movement. *Shear* occurs when one layer of tissue slides over another, disrupting microcirculation of skin and subcutaneous tissue.



Gerontologic Considerations. In older adults, the normal aging process leads to diminished epidermal thickness, dermal collagen, and tissue elasticity. The skin is drier as a result of diminished sebaceous and sweat gland activities. Cardiovascular changes result in decreased tissue perfusion. Muscles atrophy and bone structures become prominent. Diminished sensory perception and reduced ability to reposition oneself contribute to prolonged pressure on the skin. Therefore, older adults are more susceptible to pressure injuries, which cause pain, suffering, and reduced quality of life (Eliopoulos, 2018).



Obesity Considerations. In 2019, an international collaborative comprising members from the European Pressure Ulcer Advisory Panel (EPUAP), the U.S. National Pressure Injury Advisory Panel (NPIAP), and the Pan-Pacific Pressure Injury Alliance (PPPIA) released the third edition of the *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline* (EPUAP, NPIAP, & PPPIA, 2019) to aid clinicians in leveraging the best evidence-based practices to prevent and treat pressure injuries. These updated guidelines include recommendations for adults who have obesity, with specific organization-level considerations, as well as recommendations for bed and equipment selection and repositioning. Please see the NPIAP Web site link at the end of this chapter to review the electronic version of the quick reference guideline.

ASSESSMENT OF SKIN AND EXISTING PRESSURE INJURIES

In addition to assessing risk, nursing actions to assess skin for pressure injuries include:

- Assess total skin condition at least twice a day.
- Inspect each pressure site for erythema.
- Assess areas of erythema for blanching response.
- Palpate the skin for increased warmth.
- Inspect for dry skin, moist skin, and breaks in skin.
- Note amount of drainage (scant to heavy); drainage characteristic (bloody, serosanguinous, serous, purulent); and odor.

If a pressure injury is seen, the nurse documents its size and location and uses a grading system to describe its severity and provides a description of the site ([Chart 56-2](#)). The appearance of purulent drainage or foul odor suggests an infection. With an extensive pressure injury, deep pockets of infection are often present. Drying and crusting of exudate may be present. Infection of a pressure injury may advance to osteomyelitis, pyarthrosis (pus formation within a joint cavity), sepsis, and septic shock.

Diagnosis

NURSING DIAGNOSES

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

- Risk for impaired skin integrity
- Impaired skin integrity associated with immobility, decreased sensory perception, decreased tissue perfusion, decreased nutritional status, friction and shear forces, excessive moisture, or advanced age

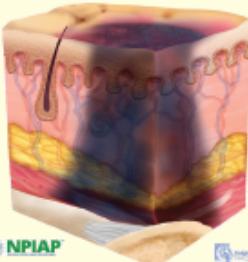
Chart 56-2

Stages in the Development of Pressure Injuries

Deep Tissue Pressure Injury: Persistent Non-Blanchable Deep Red, Maroon or Purple Discoloration

Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood filled blister. Pain and temperature change often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. The wound may evolve rapidly to reveal the actual extent of tissue injury, or may resolve without tissue loss. If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle or other underlying structures are visible, this indicates a full thickness pressure injury (Unstageable, Stage 3 or Stage 4). Do not use DTPI to describe vascular, traumatic, neuropathic, or dermatologic conditions.

Deep Tissue Pressure Injury



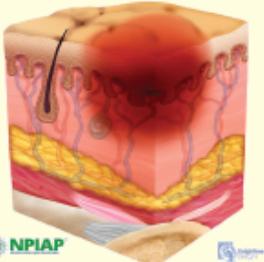
NPIAP

APN

Stage 1 Pressure Injury: Non-Blanchable Erythema of Intact Skin

Intact skin with a localized area of non-blanchable erythema, which may appear differently in darkly pigmented skin. Presence of blanchable erythema or changes in sensation, temperature, or firmness may precede visual changes. Color changes do not include purple or maroon discoloration; these may indicate deep tissue pressure injury.

Stage 1 Pressure Injury - Lightly Pigmented



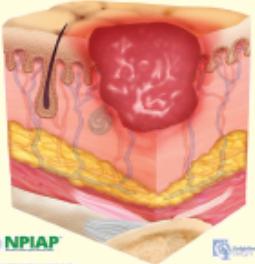
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APN

Stage 2 Pressure Injury: Partial-Thickness Skin Loss with Exposed Dermis

Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister. Adipose (fat) is not visible and deeper tissues are not visible. Granulation tissue, slough and eschar are not present. These injuries commonly result from adverse microclimate and shear in the skin over the pelvis and shear in the heel. This stage should not be used to describe moisture associated skin damage (MASD) including incontinence associated dermatitis (IAD), intertriginous dermatitis (ITD), medical adhesive related skin injury (MARSI), or traumatic wounds (skin tears, burns, abrasions).

Stage 2 Pressure Injury



Stage 3 Pressure Injury: Full-Thickness Skin Loss

Full-thickness loss of skin, in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) are often present. Slough and/or eschar may be visible. The depth of tissue damage varies by anatomical location; areas of significant adiposity can develop deep wounds. Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage and/or bone are not exposed. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.

Stage 3 Pressure Injury



Stage 4 Pressure Injury: Full-Thickness Skin and Tissue Loss

Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining and/or tunneling often occur. Depth varies by anatomical location. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.

Stage 4 Pressure Injury



Unstageable Pressure Injury: Obscured Full-Thickness Skin and Tissue Loss

Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a Stage 3 or Stage 4 pressure injury will be revealed. Stable eschar (i.e. dry, adherent, intact without erythema or fluctuance) on the heel or ischemic limb should not be softened or removed.



Reprinted from European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan-Pacific Pressure Injury Alliance (EPUAP, NPIAP & PPPIA). (2019). *Prevention of pressure ulcers/injuries: Clinical practice guideline* (3rd ed.). Retrieved on 4/15/2020 at: www.internationalguideline.com/guideline

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Planning and Goals

The major goals may include relief of pressure, improved mobility, maintenance of skin integrity, improved sensory perception, improved tissue perfusion, improved nutritional status, minimized friction and shear forces, dry surfaces in contact with skin, and healing of pressure injury, if present.

Nursing Interventions

RELIEVING PRESSURE

Frequent changes of position are needed to relieve and redistribute the pressure on the patient's skin and to promote blood flow to the skin and

subcutaneous tissues. This can be accomplished by instructing the patient to change position or by turning and repositioning the patient. The patient's family members should be educated about how to position and turn the patient at home to prevent pressure injuries. Shifting weight allows the blood to flow into the ischemic areas and helps tissues recover from the effects of pressure. Elevating the head of bed no more than 30 degrees will prevent the patient from sliding down in bed and avoid the effects of shearing (Bryant & Nix, 2016).

For patients who spend long periods in a wheelchair, pressure can be relieved by:

- *Push-ups*: The patient pushes down on armrests and raises buttocks off the seat of the chair ([Fig. 56-3](#)).
- *One half push-up*: The patient repeats the push-up on the right side and then the left, pushing up on one side by pushing down on the armrest.



Figure 56-3 • Wheelchair push-up to prevent ischial pressure injuries. These push-ups should become an automatic routine (every 15 minutes) for the person with paraplegia. The person should stay up and out of contact with the seat for several seconds. The wheels are kept in the locked position during the exercise.

- *Moving side to side:* The patient moves from one side to the other while sitting in the chair.
- *Shifting:* The patient bends forward with the head down between the knees (if able) and constantly shifts in the chair.

POSITIONING THE PATIENT

The degree of ability to move independently—the comfort, fatigue, loss of sensation, overall physical and mental status, and specific disorder—

influences plans for changing position. Patients should be positioned laterally, prone, and dorsally in sequence unless a position is not tolerated or is contraindicated. Generally, those who experience discomfort after 30 to 60 minutes of lying prone need to be repositioned. Patients able to shift their weight every 15 to 20 minutes and move independently may change total position every 2 to 4 hours. Indications for routine repositioning every 2 hours or more frequently include loss of sensation, paralysis, coma, and edema.

In addition to regular turning, small shifts of body weight, such as repositioning of an ankle, elbow, or shoulder, are necessary. The skin is inspected at each position change and assessed for temperature elevation. If redness or heat is noted or if the patient complains of discomfort, pressure on the area must be relieved.

Another way to relieve pressure over bony prominences is the bridging technique, accomplished through the correct positioning of pillows. Just as a bridge is supported on pillars to allow traffic to move underneath, the body can be supported by pillows to allow for space between bony prominences and the mattress. A pillow or commercial heel protector may be used to support the heels off the bed when the patient is supine. Placing pillows superior and inferior to the sacrum relieves sacral pressure. Supporting the patient in a 30-degree side-lying position avoids pressure on the trochanter; wedges can be used to accomplish this. In older adult patients, frequent small shifts of body weight may be effective. Placing a small rolled towel or sheepskin under a shoulder or hip allows a return of blood flow to the skin in the area on which the patient is sitting or lying. The towel or sheepskin is moved around the patient's pressure points in a clockwise fashion. A turning schedule can help the family keep track of the patient's turns.

USING PRESSURE-RELIEVING DEVICES

At times, specialty beds or alternative bed surfaces may be indicated to help relieve the pressure on the skin (EPUAP, NPIAP, & PPPIA, 2019). These are referred to as pressure redistribution surfaces because they aim to redistribute pressure. Ideally, they should also control moisture and temperature and minimize friction. These devices are designed to provide support for specific body areas or to distribute pressure evenly. Pressure redistribution surfaces may include specialty mattresses as well as mattress overlays. The use of pressure redistribution surfaces is particularly important for patients who cannot get out of bed and who are at high risk for pressure injury development.

A patient who sits in a wheelchair for prolonged periods should have wheelchair cushions fitted and adjusted on an individualized basis, using

pressure measurement techniques as a guide to selection and fitting. The aim is to redistribute pressure away from areas at risk for injuries; however, no cushion can eliminate excessive pressure completely. The patient should be reminded to shift weight frequently and to rise for a few seconds every 15 minutes while sitting in a chair.

Static support devices (e.g., high-density foam, air, or liquid mattress overlays) distribute pressure evenly by bringing more of the patient's body surface into contact with the supporting surface. Gel-type flotation pads and air-fluidized beds reduce pressure. The weight of a body floating on a fluid system is evenly distributed over the entire supporting surface. Therefore, as the body sinks into the fluid, additional surface becomes available for weight bearing, body weight per unit area is decreased, and there is less pressure on the body parts.

Soft, moisture-absorbing padding is also useful because the softness and resilience of padding provide for more even distribution of pressure and the dissipation and absorption of moisture, along with freedom from wrinkles and friction. Bony prominences may be protected by gel pads, sheepskin padding, or soft foam rubber beneath the sacrum, the trochanters, heels, elbows, scapulae, and back of the head when there is pressure on these sites. Applying a gentle adhesive foam dressing to the sacral area is an effective pressure injury preventive measure (Doughty & McNichol, 2016).

Specialized beds are designed to prevent pressure on the skin. Air-fluidized beds allow the patient to float. Dynamic support surfaces, such as low-air-loss pockets, alternatively inflate and deflate sections to change support pressure for patients at high risk for pressure injuries and who are critically ill and cannot be repositioned to relieve pressure. Oscillating or kinetic beds change pressure by means of rocking movements of the bed that redistribute the patient's weight and stimulate circulation. These beds may be used with patients who have injuries attributed to multiple trauma. The specific needs of each individual patient are considered when choosing an appropriate pressure redistribution surface (Bryant & Nix, 2016).

IMPROVING MOBILITY

The patient is encouraged to remain active and is ambulated whenever possible. When sitting, the patient is reminded to change positions frequently to redistribute weight. Active and passive exercises increase muscular, skin, and vascular tone. For patients at risk for pressure injuries, turning and exercise schedules are essential, and repositioning must occur around the clock.

IMPROVING SENSORY PERCEPTION

The nurse helps the patient recognize and compensate for altered sensory perception. Depending on the origin of the alteration (e.g., decreased level of consciousness, spinal cord lesion), specific interventions are selected. Strategies to improve cognition and sensory perception may include stimulating the patient to increase awareness of self in the environment, encouraging the patient to participate in self-care, or supporting the patient's efforts toward active compensation for loss of sensation (e.g., a patient with paraplegia lifting up from the sitting position every 15 minutes). A patient with tetraplegia should be weight shifted every 30 minutes while sitting in a wheelchair. When decreased sensory perception exists, the patient and caregivers are taught to inspect potential pressure areas visually every morning and evening, using a mirror if necessary, for evidence of pressure injury development.

IMPROVING TISSUE PERFUSION

Activity, exercise, and repositioning improve tissue perfusion. Massage of erythematous areas is avoided because damage to the capillaries and deep tissue may occur (EPUAP, NPIAP, & PPPIA, 2019).

In patients who have evidence of compromised peripheral circulation (e.g., edema), positioning and elevation of the edematous body part to promote venous return and diminish congestion improve tissue perfusion. In addition, the nurse or family must be alert to environmental factors (e.g., wrinkles in sheets, pressure of tubes) that may contribute to pressure on the skin and diminished circulation and remove the source of pressure.

IMPROVING NUTRITIONAL STATUS

The patient's nutritional status must be adequate, and a positive nitrogen balance must be maintained because pressure injuries develop more quickly and are more resistant to treatment in patients with nutritional disorders. The nurse should assess the patient's nutritional status (see [Chapter 4](#)). To assess the patient's nutritional status in response to therapeutic strategies, the nurse monitors the patient's hemoglobin, prealbumin level, and body weight weekly.

Carbohydrates, proteins, fats, vitamins, and minerals are essential for wound healing (Bryant & Nix, 2016). Iron preparations may be necessary to raise the hemoglobin concentration so that tissue oxygen levels can be maintained within acceptable limits. Ascorbic acid (vitamin C) is necessary for tissue healing. Other nutrients associated with healthy skin include vitamins A, B, D, E, and K, copper, and zinc. With adequate nutrition and hydration, the skin can remain healthy, and damaged tissues can be repaired (Norris, 2019).

REDUCING FRICTION AND SHEAR

Raising the head of the bed by even a few centimeters increases the shearing force over the sacral area; therefore, the semireclining position is avoided in patients at risk. Proper positioning with adequate support is also important when the patient is sitting in a chair.



Quality and Safety Nursing Alert

To avoid shearing forces when repositioning patients, the nurse must lift and avoid dragging patients across a surface. Lift devices should be used to prevent occupational injuries.

MINIMIZING IRRITATING MOISTURE

Continuous moisture on the skin must be prevented by meticulous hygiene measures. It is important to pay special attention to skin folds, including areas under the breasts, arms, and groin, and between the toes. Perspiration, urine, stool, and drainage must be removed from the skin promptly. The soiled skin should be washed immediately with mild soap and water and blotted dry with a soft towel. The skin may be lubricated with a bland lotion to keep it soft and pliable. Drying agents and powders are avoided. Topical barrier ointments (e.g., petroleum jelly) may be helpful in protecting the skin of patients who are incontinent.

Absorbent pads that wick moisture away from the body should be used to absorb drainage. Patients who are incontinent need to be checked regularly and have their wet incontinence pads and linens changed promptly. Their skin needs to be cleansed and dried promptly.

PROMOTING PRESSURE INJURY HEALING

Regardless of the stage of the pressure injury, the pressure on the area must be eliminated because the injured tissue will not heal until all pressure is removed. The patient must not lie or sit on the pressure injury, even for a few minutes. Individualized positioning and turning schedules must be written in the plan of nursing care and followed meticulously.

In addition, inadequate nutritional status as well as fluid and electrolyte abnormalities must be corrected to promote healing. Wounds from which body fluids and protein drain place the patient in a catabolic state and predispose to hypoproteinemia and serious secondary infections. Protein deficiency must be corrected to promote the healing of the pressure injury. Carbohydrates are necessary to “spare” the protein and to provide an energy source. Vitamin C and trace elements,

especially zinc, are necessary for collagen formation and wound healing. (Refer to [Chart 56-2](#) for descriptions of stages of pressure injuries.)

Deep Tissue Pressure Injury. These tissue injuries may evolve rapidly, and immediate pressure relief to the affected area is indicated. Therefore, the nurse must be vigilant in assessing for these types of injuries (EPUAP, NPIAP, & PPPIA, 2019).

Stage 1 Pressure Injury. To permit healing of stage 1 pressure injuries, the pressure is removed to allow increased tissue perfusion, nutritional and fluid and electrolyte balance is maintained, friction and shear are reduced, and moisture to the skin is avoided (EPUAP, NPIAP, & PPPIA, 2019).

Stage 2 Pressure Injury. In addition to measures listed for stage 1 pressure injuries, a moist environment, in which migration of epidermal cells over the injury surface occurs more rapidly, should be provided to aid wound healing in stage 2 pressure injury. The injured area is gently cleansed with sterile saline solution. The use of a heat lamp to dry the open wound is avoided, as is the use of antiseptic solutions that damage healthy tissues and delay wound healing. Semipermeable occlusive dressings, hydrocolloid wafers, or wet saline dressings are helpful in providing a moist environment for healing and in minimizing the loss of fluids and proteins from the body (EPUAP, NPIAP, & PPPIA, 2019).

Stage 3 Pressure Injury. Stage 3 pressure injuries are characterized by extensive tissue damage, including **slough** (i.e., soft, moist avascular tissue, which may be white, yellow, tan, gray, or green and may be loose or firmly adherent), formation of a sinus tract, and undermining (commonly seen in sheer injuries), to name a few. **Undermining** results in extensive tunneling under the edges of the wound; it is distinguished from a sinus tract in that there is a significant portion of the wound edge involved, whereas sinus tract involves only a small portion of the wound edge. Given the extensive damage to tissue and necrosis that characterize stage 3 pressure injuries, they must be débrided (cleaned) to create an area that will heal, in addition to the measures listed for stage 1 pressure injuries. Necrotic, devitalized tissue favors bacterial growth, delays granulation, and inhibits healing. Wound cleaning and dressing are uncomfortable; therefore, the nurse must prepare the patient for the procedure by explaining what will occur and administering prescribed analgesia (EPUAP, NPIAP, & PPPIA, 2019).

Stage 4 Pressure Injury. Surgical interventions are required for these extensive pressure injuries (EPUAP, NPIAP, & PPPIA, 2019). (See the following Other Treatment Methods section.)

OTHER TREATMENT METHODS

Débridement may be accomplished by wet-to-damp dressing changes, mechanical flushing of necrotic and infective exudate, application of prescribed enzyme preparations that dissolve necrotic tissue, or surgical dissection. If eschar (dry scab) covers the pressure injury, it is removed surgically to ensure the wound is clean and vitalized. Exudate may be absorbed by dressings or special hydrophilic powders, beads, or gels. Cultures of infected pressure injuries are obtained to guide the selection of antibiotic therapy.

After the pressure injury is clean, a topical treatment is prescribed to promote granulation. New granulation tissue must be protected from reinfection, drying, and damage, and care should be taken to prevent pressure and further trauma to the area. Dressings, solutions, and ointments should not disrupt the healing process. For chronic, noninfected injuries that are healing by secondary intention (healing of an open wound from the base upward by laying down new tissue), vacuum-assisted closure (VAC) or hyperbaric oxygen treatment may be used. VAC involves the use of a negative-pressure sponge dressing in the wound to increase blood flow, increasing formation of granulation tissue and nutrient uptake and decreasing bacterial load. Hyperbaric oxygen therapy involves either applying topical oxygen at increased pressure directly to the wound or placing the patient into a hyperbaric oxygen chamber. Both methods of hyperbaric oxygen therapy promote wound healing by stimulating new vascular growth and aiding in the preservation of damaged tissue. In a randomized control study comparing standard wound care with standard wound care and hyperbaric oxygen therapy for patients with diabetic foot ulcerations, Chen, Wu, Hsu, and colleagues (2017) reported improved wound healing and decreased risk of amputation among study participants who received hyperbaric oxygen therapy.

Multiple agents and protocols are used to treat pressure injuries; however, consistency is an important key to success. Objective evaluation of the pressure injury (e.g., measurement of the size and depth of the pressure injury, inspection for granulation tissue) for response to the treatment protocol must be made every 4 to 6 days. Taking photographs at weekly intervals is a reliable strategy for monitoring the healing process, which may take weeks to months.

Surgical intervention is necessary when the injury is extensive, when complications (e.g., fistula) exist, and when the pressure injury does not respond to treatment. Surgical procedures include débridement, incision and drainage, bone resection, and skin grafting. Osteomyelitis is a

common complication of wounds of stage 4 depth. (See Chapter 36 for more information on osteomyelitis.)

PREVENTING RECURRENT

It may take more than a year for healing tissue to regain the strength of preinjury skin; thus, care must be taken to prevent recurrence of pressure injuries. However, recurrence of pressure injuries should be anticipated; therefore, active, preventive intervention and frequent continuing assessments are essential. Patients with spinal cord injuries are particularly susceptible to pressure injuries and recurrence of pressure injuries; results from one meta-analysis suggest that globally, 23% of patients with spinal cord injuries will have a pressure injury during their lifetime (Chen, Cai, Du, et al., 2020).

The patient's tolerance for sitting or lying on the healed pressure area is increased gradually by increasing the time that pressure is allowed on the area in 5- to 15-minute increments. The patient is instructed to increase mobility and to follow a regimen of turning, weight shifting, and repositioning. The patient education plan includes strategies to reduce the risk for pressure injuries and methods to detect, inspect, and minimize pressure areas. Early recognition and intervention are keys to long-term management of potential impaired skin integrity.

Evaluation

Expected patient outcomes may include:

1. Maintains intact skin
 - a. Exhibits no areas of nonblanchable erythema at bony prominences
 - b. Avoids massage of bony prominences
 - c. Exhibits no breaks in skin
2. Limits pressure on bony prominences
 - a. Changes position every 1 to 2 hours
 - b. Uses bridging techniques to reduce pressure
 - c. Uses special equipment as appropriate
 - d. Raises self from the seat of wheelchair every 15 minutes
3. Increases mobility
 - a. Performs range-of-motion exercises
 - b. Adheres to turning schedule
 - c. Advances sitting time as tolerated
4. Has improved sensory and cognitive ability
 - a. Demonstrates improved level of consciousness

- Remembers to inspect potential pressure injury areas every
 - b. morning and evening
- 5. Demonstrates improved tissue perfusion
 - a. Exercises to increase circulation
 - b. Elevates body parts susceptible to edema
- 6. Attains and maintains adequate nutritional status
 - a. Verbalizes the importance of protein and vitamin C in diet
 - b. Eats diet high in protein and vitamin C
 - c. Exhibits acceptable levels of hemoglobin, electrolyte, prealbumin, transferrin, and creatinine
- 7. Avoids friction and shear
 - Avoids semireclining position
 - Uses heel protectors when appropriate
 - Lifts body instead of sliding across surfaces
- 8. Maintains clean, dry skin
 - a. Avoids prolonged contact with wet or soiled surfaces
 - b. Keeps skin clean and dry
 - c. Uses lotion to keep skin lubricated

PRURITUS

Pruritus (itching) is the most common symptom of patients with dermatologic disorders (Song, Xian, Yang, et al., 2018). Pruritus may be general (over all body skin surfaces) or confined to specific regions.

Chart 56-3

Systemic Disorders Associated with Generalized Pruritus

- Chronic kidney disease
- Endocrine disease (thyrotoxicosis, hypothyroidism, diabetes)
- Folliculitis (bacterial, candidiasis, dermatophyte)
- Hematologic disorders (iron deficiency anemia)
- Infestations (scabies, lice, other insects)
- Malignancies (polycythemia vera, Hodgkin lymphoma, lymphoma, leukemia, multiple myeloma, mycosis fungoides, and cancers of the lung, breast, central nervous system, and gastrointestinal tract)
- Neurologic disorders (multiple sclerosis, brain abscess, brain tumor)
- Obstructive biliary disease (primary biliary cirrhosis, extrahepatic biliary obstruction, drug-induced cholestasis)
- Pruritus of pregnancy (pruritic urticarial papules of pregnancy, cholestasis of pregnancy, pemphigoid of pregnancy)
- Psychiatric disorders (emotional stress, anxiety, neurosis, phobias)
- Skin conditions (seborrheic dermatitis, folliculitis, atopic dermatitis)

Adapted from Song, J., Xian, D., Yang, L., et al. (2018). Pruritus: Progress toward pathogenesis and treatment. *BioMed Research International*, 2018, 9625936.

General Pruritus

Itch receptors are unmyelinated, penicillate (brushlike) nerve endings that are found exclusively in the skin, mucous membranes, and cornea. Although pruritus is usually caused by primary skin disease with resultant rash or lesions, it may occur without a rash or lesion. This is referred to as essential pruritus, which generally has a rapid onset, may be severe, and interferes with normal daily activities.

Pruritus may be the first indication of a systemic internal disease such as diabetes, blood disorders, or cancer (occult malignancy of the breast or colon, lymphoma). It may also accompany kidney, hepatic, and thyroid diseases (Chart 56-3). Some common oral medications such as aspirin, antibiotics, hormones (e.g., estrogens, testosterone, or oral contraceptives), and opioids (e.g., morphine) may cause pruritus directly or by increasing sensitivity to ultraviolet (UV) light. Certain soaps and chemicals, radiation therapy, miliaria (prickly heat), and contact with woolen garments are associated with pruritus as well. Pruritus may also be caused by

psychological factors, such as excessive stress in family or work situations, and is called *psychogenic pruritus* (Song et al., 2018).



Gerontologic Considerations

Pruritus occurs frequently in older adults as a result of dry skin. Older adults are also more likely to have a systemic illness that triggers pruritus, are at higher risk for occult malignancy, and are more likely to be taking multiple medications than younger people. All of these factors increase the incidence of pruritus in older adults (Eliopoulos, 2018).

Pathophysiology

Scratching the pruritic area causes the inflamed cells and nerve endings to release histamine, which produces more pruritus, generating a vicious itch-scratch cycle. If the patient responds to an itch by scratching, the integrity of the skin may be altered, and excoriation, redness, wheals (raised areas), infection, or changes in pigmentation may result. Pruritus usually is more severe at night and is less frequently reported during waking hours, probably because the person is distracted by daily activities. At night, when there are fewer distractions, the slightest pruritus cannot be easily ignored. Severe itching can be debilitating (Bolier, Elferink, & Beuers, 2016).

Medical Management

A thorough history and physical examination usually provide clues to the underlying cause of the pruritus, such as hay fever, allergy, recent administration of a new medication, or a change of cosmetics or soaps. After the cause has been identified, treatment of the condition should relieve the pruritus. Signs of infection and environmental clues, such as warm, dry air or irritating bed linens, should be identified. In general, washing with soap and hot water is avoided. Bath oils containing a surfactant that allows the oil to mix with bathwater (e.g., Lubath™, Alpha Keri™) may be sufficient for cleaning. However, an older adult patient or a patient with unsteady balance should avoid adding oil because it increases the danger of slipping in the bathtub. A warm bath with a mild soap followed by application of a bland emollient to moist skin can control xerosis. Tepid baths, or applying cool compresses or cool agents that contain menthol and camphor (which constrict blood vessels) may also help relieve pruritus (Cornish, 2019).

Pharmacologic Therapy

Topical antipruritic agents (e.g., lidocaine, prilocaine) or capsaicin cream may be useful in providing relief from localized pruritus. Topical corticosteroids are effective when used to diminish pruritus that occurs secondary to inflammatory conditions because of their anti-inflammatory effects. Oral antihistamines are frequently prescribed and may be effective when the pruritus is nocturnal, particularly agents such as diphenhydramine or hydroxyzine, which also cause somnolence, resulting in a restful and comfortable sleep. Other nonsedating antihistamines are not beneficial in relieving pruritus. Selective serotonin reuptake inhibitors (e.g., fluoxetine, sertraline) may be effective, particularly in patients with pruritus that is secondary to cholestasis or the uremia of chronic kidney disease (Bolier et al., 2016; Song et al., 2018).

Nursing Management

The nurse reinforces the reasons for the prescribed therapeutic regimen and educates the patient about specific points of care. The effectiveness of therapy may be gauged by asking the patient to rate the extent of itching pre- and posttherapy (Bolier et al., 2016). If baths have been prescribed, the patient is reminded to use tepid (not hot) water and to shake off the excess water and blot between intertriginous areas (body folds) with a towel. Rubbing vigorously with the towel is avoided because this overstimulates the skin and causes more itching. It also removes water from the stratum corneum. Immediately after bathing, the skin should be lubricated with an emollient to trap moisture.

The patient is instructed to avoid situations that cause vasodilation. Examples include exposure to an overly warm environment and ingestion of alcohol or hot foods and liquids, all of which can induce or intensify pruritus. Using a humidifier is helpful if environmental air is dry. Activities that result in perspiration should be limited because perspiration may irritate and promote pruritus. If itching interferes with sleep, the nurse can advise the patient to wear cotton clothing next to the skin rather than synthetic materials. The room should be kept cool and humidified. Vigorous scratching should be avoided and nails kept trimmed to prevent skin damage and infection. When the underlying cause of pruritus is unknown and further testing is required, the nurse explains each test and its expected outcome.

Perineal and Perianal Pruritus

Pruritus of the genital and anal regions may be caused by small particles of fecal material lodged in the perianal crevices or attached to anal hairs. Alternatively, it may result from perianal skin damage caused by scratching, moisture, and decreased skin resistance as a result of corticosteroid or antibiotic therapy. Other possible causes of perianal itching include local lesions such as hemorrhoids, fungal or yeast infections, and pinworm infestation. Conditions reviewed in [Chart 56-3](#) may also result in pruritus. Occasionally, no cause can be identified.

Management

The patient is instructed to follow proper hygiene measures and to discontinue home and OTC remedies. The perineal or anal area should be rinsed with lukewarm water and blotted dry with cotton balls. Premoistened tissues may be used after defecation (Breen & Bleday, 2020).

As part of health education, the nurse instructs the patient to avoid bathing in water that is too hot and to avoid using bubble baths, sodium bicarbonate, and detergent soaps, all of which aggravate dryness. To keep the perineal or perianal skin as dry as possible, patients should avoid wearing underwear made of synthetic fabrics. The patient should also avoid vasodilating agents (e.g., alcohol), stimulants (e.g., caffeine), and mechanical irritants (e.g., rough or woolen clothing). A diet that includes adequate fiber may help maintain soft stools and prevent minor trauma to the anal mucosa (Breen & Bleday, 2020).

SECRETORY DISORDERS

The main secretory function of the skin is performed by the sweat glands, which help regulate body temperature. These glands excrete perspiration that evaporates, thereby cooling the body. The sweat glands are located in various parts of the body and respond to different stimuli. Those on the trunk generally respond to thermal stimulation; those on the palms and soles respond to nervous stimulation; and those in the axillae and on the forehead respond to both kinds of stimulation. Normal perspiration has no odor. Body odor is produced by the increase in bacteria on the skin and the interaction of bacterial waste products with the chemicals of perspiration (Norris, 2019). As a rule, moist skin is warm, and dry skin is cool, but this is not always true. It is not unusual to observe warm, dry skin in patients who are dehydrated and very hot, dry skin in patients with some febrile states.

Normally, sweat can be controlled with the use of antiperspirants and deodorants. Most antiperspirants are aluminum salts that block the opening to the sweat duct. Pure deodorants inhibit bacterial growth and block the metabolism of sweat; they have no antiperspirant effect. Fragrance-free deodorants are available for those with sensitive skin.

Hidradenitis Suppurativa

Hidradenitis suppurativa is a chronic suppurative folliculitis of the perianal, axillary, and genital areas or under the breasts. It can produce abscesses or sinuses with scarring. It develops after puberty and diminishes in incidence after 50 years of age. Black Americans are at greater risk for hidradenitis suppurativa, as are patients who smoke and who have obesity. In addition, men are at greater risk for anogenital hidradenitis suppurativa, whereas women are at greater risk for axillary hidradenitis suppurativa. The cause is unknown, but it appears to have a genetic basis (Tchero, Herlin, Bekara, et al., 2019).

Pathophysiology

It had been assumed for many years that hidradenitis suppurativa was caused by the blockage and infection of the sweat glands. However, recent evidence suggests that it is a primary disorder of follicular occlusion, often resulting in infection, that causes eventual hypertrophic formation of scar tissue in the area of the sweat glands (Doughty & McNichol, 2016).

Clinical Manifestations

Hidradenitis suppurativa occurs more frequently in the axillae but also appears in inguinal folds, on the mons pubis, around the buttocks, areolae of the breasts, submammary fold, nape of the neck, and shoulders. The patient may present with a firm, pea-sized nodule that causes discomfort, or with a history of this type of nodule that then ruptures and discharges purulent drainage. The nodule then propagates, and multiple similar nodules will form adjacent to the initial nodule. The nodules become deep seated and, as they rupture, form scars. The nodules may coalesce or form “bridges,” become infected, and result in abscesses. As they coalesce, the patient will present with complaints of persistent pain (Doughty & McNichol, 2016).

Management

The patient is educated to use warm compresses and wear loose-fitting clothes over the nodules or lesions. Oral antibiotic agents such as erythromycin, tetracycline, minocycline, and doxycycline are frequently prescribed. Nonsteroidal anti-inflammatory drugs (NSAIDs) may be indicated to relieve the pain. Silver-impregnated alginate dressings may be useful with some lesions. Incision and drainage of large suppurating areas with gauze packs inserted to facilitate drainage are often necessary. Rarely, the entire area is excised, removing the scar tissue and any infection. This surgery is drastic in that it may require the use of skin grafts (see [Chapter 57](#)) and is performed only as a last resort. Carbon dioxide laser surgery (see later discussion) may be more effective than this type of excisional surgery (Tchero et al., 2019).

Seborrheic Dermatitis

Seborrhea is excessive production of sebum (secretion of sebaceous glands), which typically occurs in areas where sebaceous glands are normally found in large numbers, such as the face, scalp, eyebrows, eyelids, sides of the nose and upper lip, malar regions (cheeks), ears, axillae, under the breasts, groin, and gluteal crease of the buttocks. *Dermatosis* refers to a skin disorder; thus, the seborrheic dermatoses are skin disorders caused by an excessive production of sebum. *Dermatitis* refers to an inflammatory skin disorder. Seborrheic dermatitis is a chronic inflammatory disease of the skin with a predilection for areas that are well supplied with sebaceous glands or lie between skin folds, where the bacterial count is high (Doughty & McNichol, 2016).

Clinical Manifestations

Two forms of seborrheic dermatitis can occur: an oily form and a dry form. Either form may start in childhood and continue throughout life. The oily form appears moist or greasy. There may be patches of sallow, greasy skin, with or without scaling, and slight erythema, predominantly on the forehead, nasolabial fold, beard area, scalp, and between adjacent skin surfaces in the regions of the axillae, groin, and breasts. Small pustules or papulopustules resembling acne may appear on the trunk. The dry form, consisting of flaky desquamation of the scalp with a profuse amount of fine, powdery scales, is commonly called *dandruff*. The mild forms of the disease are asymptomatic. When scaling occurs, it is often accompanied by pruritus, which may lead to scratching and secondary infections and excoriation.

Seborrheic dermatitis has a genetic predisposition. Hormones, nutritional status, infection, and emotional stress influence its course. The remissions and exacerbations of this condition should be explained to the patient. If a person has not previously been diagnosed with this condition and suddenly appears with a severe outbreak, a complete history and physical examination should be conducted. Infrequently, it may be a manifestation of a serious disorder, such as Parkinson's disease or human immune deficiency virus (HIV) infection (Sasseville, 2020).

Medical Management

Because there is no known cure for seborrhea, the objectives of therapy are to control the disorder and allow the skin to repair itself. Seborrheic dermatitis of the body and face may respond to a topically applied corticosteroid cream, which allays the secondary inflammatory response. However, this medication should be used with caution near the eyelids because it can lead to glaucoma and cataracts. As an alternative treatment, patients can wash the eyelids using baby shampoo and cotton swabs (Handler, 2019).

Patients with seborrheic dermatitis may develop a secondary candidal (yeast) infection in body creases or folds. To avoid this, patients should be advised to ensure maximum aeration of the skin and to clean carefully areas where there are creases or folds in the skin (Doughty & McNichol, 2016). Patients with persistent candidiasis should be evaluated for diabetes.

The mainstay of dandruff treatment is proper, frequent shampooing (at least three times weekly) with medicated shampoos. Two or three different types of shampoo should be used in rotation to prevent the seborrhea from becoming resistant to a particular shampoo. The shampoo is left on at least 5 to 10 minutes. As the condition of the scalp improves, the treatment can be less frequent. Antiseborrheic shampoos include those containing selenium sulfide suspension, zinc pyrithione, salicylic acid, or sulfur compounds, and tar shampoo that contains sulfur or salicylic acid (Handler, 2019; Sasseville, 2020).

Nursing Management

The patient is educated that seborrheic dermatitis is a chronic condition that tends to reappear. The goal is to keep it under control through adherence to the treatment program (Handler, 2019; Sasseville, 2020). The patient is advised to avoid external irritants, excessive heat, and perspiration; rubbing

and scratching prolong the disorder. To avoid secondary infection, the patient should air the skin and keep skin folds clean and dry.

Instructions for using medicated shampoos are reinforced for people with dandruff who require treatment. Frequent shampooing is contrary to some cultural practices; the nurse should be sensitive to these differences when educating the patient.

Acne Vulgaris

Acne vulgaris is a common disorder affecting susceptible pilosebaceous units (hair follicles and sebaceous glands), most commonly on the face, neck, torso, and upper arms (Dlugasch & Story, 2021; Thiboutot & Zaenglein, 2019). It is a chronic dermatosis characterized by **comedones** (primary acne lesions), both closed (whiteheads) and open (blackheads), and by papules, pustules, nodules, and cysts (Zaenglein, Pathy, Schlosser, et al., 2016) (see [Chapter 55, Table 55-2](#)).

Acne is the most commonly encountered skin condition that affects up to 80% of Americans at some time during their lives. Acne is most prevalent during adolescence among males but is more prevalent in adulthood among females. Acne is traditionally considered a skin disorder of adolescence; however, by age 45 years, up to 5% of adults report having acne (Rao & Chen, 2020). Acne appears to stem from an interplay of genetic, hormonal, and bacterial factors (Dlugasch & Story, 2021; Thiboutot & Zaenglein, 2019).

Pathophysiology

During puberty, androgens stimulate the sebaceous glands, causing them to enlarge and secrete sebum (a naturally occurring endogenous oil) that rises to the top of the hair follicle and flows out onto the skin surface. In adolescents who develop acne, androgenic stimulation produces a heightened response in the sebaceous glands, with increased sebum production and hyperkeratinization, causing sebum plug formation within the pilosebaceous ducts. Sebaceous plugging then causes a localized inflammatory response (Dlugasch & Story, 2021; Thiboutot & Zaenglein, 2019).

Clinical Manifestations

The main lesions of acne are comedones. Closed comedones form from impacted lipids or oils and keratin that plug the dilated follicle. Closed

comedones may evolve into open comedones, in which the contents of the ducts are in open communication with the external environment. The color of open comedones results from an accumulation of lipid, bacterial, and epithelial debris. Some closed comedones may rupture, resulting in an inflammatory reaction caused by leakage of follicular contents (e.g., sebum, keratin, bacteria) into the dermis. The resultant inflammation is seen clinically as erythematous papules, inflammatory pustules, and inflammatory cysts. Mild papules and cysts drain and heal without treatment. Deeper papules and cysts cause scarring of the skin (Thiboutot & Zaenglein, 2019).

Assessment and Diagnostic Findings

The diagnosis of acne is based on the history and physical examination, evidence of lesions characteristic of acne, and age. Women may report a history of flare-ups a few days before menses. The presence of the typical comedones along with oily skin is characteristic (Rao & Chen, 2020). Oiliness is more prominent in the midfacial area; other parts of the face may appear dry.

Acne vulgaris can be classified as mild, moderate, or severe based upon the number and type of acne lesions, severity location and scarring. However, currently there is no consensus on the exact number of lesions that constitute mild, moderate, and severe acne (Zaenglein et al., 2016). Generally speaking, mild acne is characterized by the presence of comedones and a few papulopustules; moderate acne is characterized by a greater number of papulopustules and comedones along with the presence of inflammatory pustules; and, severe acne is characterized by the presence of cysts (also called nodules or nodulocysts) that are greater than 5 mm in diameter (Rao & Chen, 2020).

Medical Management

The goals of management are to reduce bacterial colonies, decrease sebaceous gland activity, prevent the follicles from becoming plugged, reduce inflammation, combat secondary infection, minimize scarring, and eliminate factors that predispose the person to acne. The therapeutic regimen depends on the type of lesion (e.g., comedones, papule, pustule, cyst). The duration of treatment depends on the extent and severity of the acne. In severe cases, treatment may extend over years.

Nutrition and Hygiene Therapy

The association between diet and acne is not established. In particular, the association between acne and milk products, chocolate, and fried foods is not well defined. However, there does appear to be a correlation between foods high in refined sugars and acne; therefore, these foods should be avoided (Zaenglein et al., 2016). In general, maintenance of good nutrition equips the immune system for effective action against bacteria and infection.

For mild cases of acne, washing twice a day with a cleansing soap and use of OTC products that contain benzoyl peroxide or salicylic acid (see later discussion) may be all that is required (Dlugasch & Story, 2021; Zaenglein et al., 2016). Oil-free cosmetics and creams should be chosen. These products are usually designated as useful for acne-prone skin.

TABLE 56-5

Medications Indicated for Treatment of Acne

Vulgaris

Classification	Recommended Medications
Mild acne	Benzoyl peroxide -or- Topical retinoid -or- Combination ^a topical antibiotic and benzoyl peroxide -or- Combination ^a topical retinoid and benzoyl peroxide -or- Combination ^a topical retinoid and benzoyl peroxide and topical antibiotic
Moderate acne	Combination ^a topical antibiotic and benzoyl peroxide -or- Combination ^a topical retinoid and benzoyl peroxide -or- Combination ^a topical retinoid and benzoyl peroxide and topical antibiotic -or- Oral antibiotic and combination ^a topical retinoid and benzoyl peroxide -or- Oral antibiotic and combination ^a topical retinoid and benzoyl peroxide and topical antibiotic
Severe acne	Oral antibiotic and combination ^a topical retinoid and benzoyl peroxide -or- Oral antibiotic and combination ^a topical antibiotic and benzoyl peroxide -or- Oral antibiotic and combination ^a topical retinoid and benzoyl peroxide and topical antibiotic -or- Oral antibiotic and oral isotretinoin

^aMay be prescribed as combination products or as singular products.

Adapted from Zaenglein, A. L., Pathy, A. L., Schlosser, B. J., et al. (2016). Guidelines of care for the management of acne vulgaris. *Journal of the American Academy of Dermatology*, 74(5), 945–973.

Pharmacologic Therapy

Pharmacologic treatments for acne are based upon the severity of the acne (Zaenglein et al., 2016). Table 56-5 summarizes medications recommended to manage acne vulgaris based upon severity.

Topical Therapy

Recommended OTC acne medications contain benzoyl peroxide, which is very effective at removing the sebaceous follicular plugs. Benzoyl peroxide preparations produce a rapid and sustained reduction of inflammatory lesions. They depress sebum production and promote breakdown of comedo plugs and have an antibacterial effect (Zaenglein et al., 2016). Initially, benzoyl peroxide causes redness and scaling, but the skin usually adjusts quickly to its use. However, the skin of some people can be overly sensitive to these products, which can cause irritation or excessive dryness, especially when used with some prescribed topical medications. The patient should be instructed to discontinue use of the product if severe irritation occurs. Typically, the patient applies a gel of benzoyl peroxide once daily. In many instances, this is the only treatment needed (Comerford & Durkin, 2020).

OTC salicylic acid preparations are also available for use by patients with mild acne. The effects of these agents are similar to those of benzoyl peroxide products. Although salicylic acid products have long been used by patients with acne, their efficacy has not been demonstrated in clinical trials (Zaenglein et al., 2016). Prescription topical agents used for years that have also not demonstrated efficacy in clinical trials include zinc, sulfur, and resorcinol; and are therefore not recommended for treatment (Zaenglein et al., 2016).

Synthetic vitamin A acids, also called retinoids (e.g., tretinoin, adapalene, tazarotene), are applied topically to clear the keratin plugs from the pilosebaceous ducts. The patient should be informed that symptoms may worsen during early weeks of therapy because inflammation, erythema, and peeling may occur. The patient is cautioned against sun exposure while using this topical medication because it may cause sunburn. Package insert directions should be followed carefully. Improvement may take 8 to 12 weeks. Some patients may benefit from being treated with both a retinoid and benzoyl peroxide and may be prescribed a combination topical gel (e.g., adapalene–benzoyl peroxide) (Zaenglein et al., 2016).

Topical antibiotic treatment for acne is common. Topical antibiotic agents suppress bacterial growth; reduce superficial free fatty acid levels; decrease comedones, papules, and pustules; and produce no systemic side effects (Comerford & Durkin, 2020). Commonly prescribed agents include clindamycin and erythromycin. Topical combination gels that include both benzoyl peroxide and an antibiotic (e.g., benzoyl erythromycin) are commonly prescribed and can be very effective treatment (Zaenglein et al., 2016).

Other less commonly prescribed topical agents that may be effective in treating acne vulgaris include azelaic acid and dapsone gel. Azelaic acid has

comedolytic, antibacterial, and anti-inflammatory effects. It may also have a lightening effect on skin that can be hyperpigmented as a consequence of acne (Zaenglein et al., 2016). Dapsone reduces inflammatory lesions and for reasons poorly understood, seems to work better in female adult patients than in adolescent or male patients (Zaenglein et al., 2016).

Systemic Therapy

Oral antibiotic agents given in small doses over a long period are very effective in treating moderate and severe acne, especially when the acne is inflammatory and results in pustules, abscesses, and scarring. Therapy may continue for months to years. Antibiotics most commonly selected are of the tetracycline class (e.g., tetracycline, doxycycline, minocycline) (Zaenglein et al., 2016). The tetracycline family of antibiotics is contraindicated in pregnant women. Side effects of tetracyclines include photosensitivity (sensitivity to the sun), nausea, diarrhea, cutaneous infection, and vaginitis in women (Comerford & Durkin, 2020). Alternative antibiotics that may be selected include erythromycin, azithromycin, and trimethoprim-sulfamethoxazole (Zaenglein et al., 2016).

Oral retinoids (e.g., isotretinoin) are used with dramatic results in patients with nodular cystic acne unresponsive to conventional therapy. This may prevent scarring that can result from cyst formation. Retinoids reduce sebaceous gland size and inhibit sebum production. They also cause epidermal desquamation (shedding of the epidermis), thereby unseating and expelling existing comedones. The most common side effect is **cheilitis** (inflammation of the lips). Dry and chafed skin and mucous membranes are also frequent side effects. These changes are reversible with the withdrawal of the medication. Retinoids are teratogenic, meaning that they may cause fetal defects. Effective contraceptive measures for women of childbearing age are mandatory during treatment and for about 4 to 8 weeks thereafter (Dlugasch & Story, 2021). To avoid additive toxic effects, patients are cautioned not to take vitamin A supplements while taking retinoids (Comerford & Durkin, 2020).

Estrogen therapy (including progesterone-estrogen preparations) suppresses sebum production and reduces skin oiliness. It is usually reserved for young women when the acne begins somewhat later than usual and tends to flare up at certain times in the menstrual cycle. Estrogen-dominant oral contraceptive compounds may be given on a prescribed cyclic regimen (Rao & Chen, 2020). Estrogen is not given to male patients because of the undesirable side effects such as enlargement of the breasts and decrease in body hair.

Phototherapy

The use of antibiotic therapy runs the risk of developing antibiotic resistance; therefore, phototherapy has been proposed as a potentially viable alternative treatment. The use of light-emitting diode (LED) phototherapy using blue light (i.e., directing wavelengths of 407 to 420 nm to targeted skin) has shown preliminary promise for the treatment of mild to moderate acne. The blue light is believed to cause photoactivation of naturally occurring porphyrins, resulting in free radical formation, which causes cell membrane destruction of *Propionibacterium acne*, the common culprit in inciting comedo formation (Ablon, 2018; Scott, Stehlik, Clark, et al., 2019). To date, there have been no reported adverse effects associated with blue light phototherapy. Patients must commit time to these treatments, which may be self-administered at home twice daily for 30 to 60 minutes for 5 weeks (Scott et al., 2019). At present, the efficacy of phototherapy remains under investigation.

Surgical Management

Treatment includes comedo extraction; injections of corticosteroids into the inflamed lesions; and incision and drainage of large, fluctuant (moving in palpable waves), nodular cystic lesions. Patients with deep scars may be treated with dermabrasion (deep abrasive therapy), in which the epidermis and some superficial dermis are removed down to the level of the scars (Rao & Chen, 2020).

Comedones may be removed with a comedo extractor. The site is first cleaned with alcohol. The opening of the extractor is then placed over the lesion, and direct pressure is applied to cause extrusion of the plug through the extractor. Removal of comedones leads to erythema, which may take several weeks to subside. Recurrence of comedones after extraction is common (Rao & Chen, 2020).

Nursing Management

Nursing care of patients with acne includes monitoring and managing potential complications of skin treatments. Major nursing activities include providing patient education, particularly in proper skin care techniques, and managing potential problems related to the skin disorder or therapy. Providing positive reassurance, listening attentively, and being sensitive to the feelings of the patient with acne are essential to the patient's psychological well-being and understanding of the disease and treatment plan. Having acne, particularly if it persists into adulthood, can lead to anxiety and depression (Zaenglein et al., 2016).

Preventing Scarring

Prevention of scarring is the ultimate goal of therapy. The chance of scarring increases with the severity of the grade of acne. Severe acne usually requires longer-term therapy with systemic antibiotic agents and other treatments that may include combination topical agents or isotretinoin (see Table 56-5). Patients should be warned that discontinuing these medications may lead to more flare-ups and increase the chance of deep scarring. Furthermore, manipulation of the comedones, papules, and pustules increases the potential for scarring.

When acne surgery is prescribed to extract deep-seated comedones or inflamed lesions or to incise and drain cystic lesions, the intervention itself may result in further scarring. Dermabrasion, which levels existing scar tissue, can also increase scar formation. Hyper- or hypopigmentation also may affect the tissue involved. The patient should be informed of these potential outcomes before choosing surgical intervention for acne.

Promoting Home, Community-Based, and Transitional Care



Educating Patients About Self-Care

In addition to providing instructions for taking prescribed medications, the nurse advises patients to wash the face and other affected areas with mild soap and water twice a day to remove surface oils and prevent obstruction of the oil glands. Mild abrasive soaps and drying agents are prescribed to eliminate the oily feeling that troubles many patients. At the same time, patients are cautioned to avoid excessive abrasion, because it makes acne worse.

All forms of friction and trauma are avoided, including propping the hands against the face, rubbing the face, and wearing tight collars, helmets, and face masks. Patients are instructed to avoid manipulation of pimples or blackheads. Squeezing merely worsens the problem, because a portion of the blackhead is pushed down into the skin, which may cause the follicle to rupture. Because cosmetics, shaving creams, and lotions can aggravate acne, these should be avoided.

INFECTIOUS DERMATOSES

Various dermatoses can be caused by bacterial, viral, fungal, or parasitic infections.

Bacterial Skin Infections

Also called **pyodermas**, pus-forming bacterial infections of the skin may be primary or secondary. Primary skin infections originate in previously normal-appearing skin and are usually caused by a single organism. Secondary skin infections arise from a preexisting skin disorder or from disruption of the skin integrity from injury or surgery. In either case, several microorganisms may be implicated (e.g., *Staphylococcus aureus*, group A streptococci). Common primary bacterial skin infections are impetigo and folliculitis. Folliculitis may lead to furuncles or carbuncles.

Impetigo

Impetigo is a superficial infection of the skin caused by staphylococci, streptococci, or multiple bacteria. Bullous impetigo, a more deep-seated infection of the skin caused by *S. aureus*, is characterized by the formation of **bullae** (i.e., large, fluid-filled blisters) from original vesicles. The bullae rupture, leaving raw, red areas. Nonbullous impetigo accounts for approximately 70% of the cases. This type of impetigo tends to affect skin that has already been disrupted by cuts, abrasions, bites, or other types of trauma. *S. aureus* is also commonly implicated, including methicillin-resistant *S. aureus* (MRSA) and gentamycin-resistant *S. aureus*, as well as *Streptococcus pyogenes* (Lewis, 2019).

The exposed areas of the body, face, hands, neck, and extremities are most frequently involved. Impetigo is contagious and may spread to other parts of the patient's skin or to other members of the family who touch the patient or use towels or combs that are soiled with the exudate of the lesions (Lewis, 2019).

Impetigo is seen in people of all races and ages. It is particularly common in children living in poor hygienic conditions. Chronic health problems, poor hygiene, and malnutrition may predispose an adult to impetigo. It is more prevalent in warm, humid climates and is therefore more commonly seen in the southeastern United States than in northern climates (Lewis, 2019).

Clinical Manifestations

The lesions of impetigo are most commonly seen on the face or extremities. They begin as small, red macules, which quickly become discrete, thin-walled vesicles that rupture and become covered with a loosely adherent honey-yellow crust ([Fig. 56-4](#)). These crusts are easily removed to reveal

smooth, red, moist surfaces on which new crusts soon develop (Lewis, 2019).

Medical Management

Topical antibacterial therapy (e.g., mupirocin, retapamulin) is typically prescribed when the disease is limited to a small area. The medication must be applied to the lesions several times daily for 5 to 7 days. Lesions are first soaked or washed with soap solution to remove the central site of bacterial growth, giving the topical antibiotic an opportunity to reach the infected site. After the crusts are removed, the prescribed topical antibiotic cream is applied. Gloves are worn when providing patient care (Lewis, 2019).

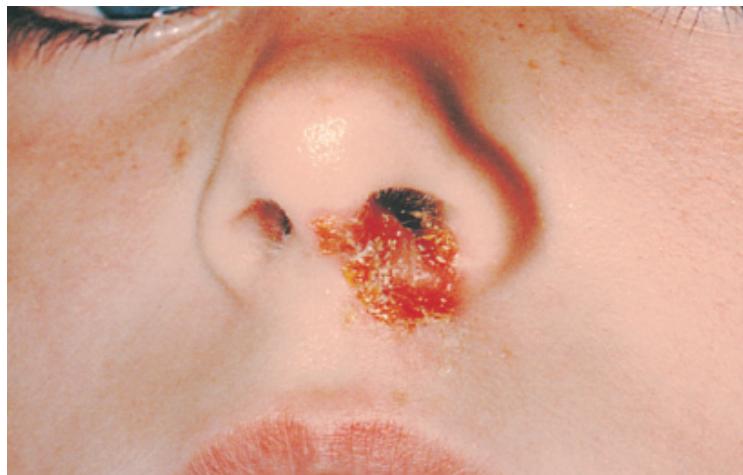


Figure 56-4 • Impetigo of the nostril.

Systemic antibiotic agents may be prescribed to treat infections that are widespread or in cases where there are systemic manifestations (e.g., fever is present). These antibiotics are effective in reducing contagious spread, treating deep infections, and preventing acute glomerulonephritis (kidney infection), which may occur as a consequence of streptococcal skin diseases. Amoxicillin-clavulanate, cloxacillin, or dicloxacillin may be prescribed. In cases where MRSA is present, antibiotics prescribed may include clindamycin, trimethoprim-sulfamethoxazole, levofloxacin, or ciprofloxacin (Lewis, 2019).

Nursing Management

The nurse educates the patient and family members to bathe at least once daily with bactericidal soap. Cleanliness and good hygiene practices help to

prevent the spread of the lesions from one skin area to another and from one person to another. In particular, patients and family members must be educated to practice hand hygiene every time after a lesion is touched. Each person should have a separate towel and washcloth. Because impetigo is a contagious disorder, people who are infected should avoid contact with other people until the lesions heal (Lewis, 2019).

Folliculitis, Furuncles, and Carbuncles

Infectious folliculitis is an inflammatory condition of the cells within the wall and ostia of the hair follicles that may be caused by a bacterial, viral, fungal, or parasitic infection. Lesions may be superficial or deep. Single or multiple papules or pustules appear close to the hair follicles. Folliculitis can affect any hairy part of the body, most commonly the beard area of men who shave, as well as women's legs, if they shave. Other commonly affected areas include the axillae, trunk, and buttocks (Bryant & Nix, 2016).

Pseudofolliculitis barbae (shaving bumps) occur predominantly on the faces of Black men as a result of shaving. The sharp ingrowing hairs have a curved root that grows at a more acute angle and pierces the skin, provoking an irritative reaction. The only entirely effective treatment is to avoid shaving. Other treatments include using special lotions or antibiotics or using a hand brush to dislodge the hairs mechanically. If the patient must remove facial hair, a depilatory cream or electric razor may be used.

A **furuncle** (boil) is an acute inflammation arising deep in one or more hair follicles and spreading into the surrounding dermis (Fig. 56-5). This inflammation is a deep form of folliculitis. Furunculosis refers to multiple or recurrent lesions. Furuncles may occur anywhere on the body but are more prevalent in areas subjected to irritation, pressure, friction, and excessive perspiration, such as the back of the neck, the axillae, and the buttocks.

A furuncle may start as a small, red, raised, painful pimple. Frequently, the infection progresses and involves the skin and subcutaneous fatty tissue, causing tenderness, pain, and cellulitis. The area of redness and induration represents an effort of the body to keep the infection localized. The bacteria (usually staphylococci) produce necrosis of the invaded tissue (Motswaledi, 2018). The characteristic pointing of a boil follows in a few days. When this occurs, the center becomes yellow or black, and the boil is said to have "come to a head."



Figure 56-5 • Painful furuncle on the thigh. Reprinted with permission from Goodheart, H. P. (2003). *Goodheart's photoguide of common skin disorders* (2nd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

A **carbuncle** is an abscess of the skin and subcutaneous tissue that represents an extension of a furuncle that has invaded several follicles and is large and deep seated. It is usually caused by a staphylococcal infection. Carbuncles appear most commonly in areas where the skin is thick and inelastic; the back of the neck and the back are common sites (Ahmad & Siddiqui, 2017). The extensive inflammation frequently prevents a complete walling off of the infection; purulent material may be absorbed, resulting in high fever, pain, leukocytosis, and sepsis.

Furuncles and carbuncles are more likely to occur in older adult patients with underlying systemic diseases, such as diabetes or hematologic malignancies, and in those receiving immunosuppressive therapy for other diseases. Both are more prevalent in hot climates, especially on skin beneath occlusive clothing (Ahmad & Siddiqui, 2017).

Medical Management

In treating staphylococcal infections, it is important not to rupture or destroy the protective wall of induration that localizes the infection. The boil or pimple should never be squeezed. Systemic antibiotic therapy, selected by culture and sensitivity study, is generally indicated. Oral dicloxacillin and cephalosporins are first-line medications. If MRSA is suspected, antibiotic agents selected may include clindamycin,

trimethoprim-sulfamethoxazole, doxycycline, or minocycline (Harris, 2019).

When the pus has localized and is fluctuant, a small incision with a scalpel can speed resolution by relieving the tension and ensuring direct evacuation of the pus and debris. The patient is instructed to keep the draining lesion covered with a dressing.

Nursing Management

Intravenous (IV) fluids, fever reduction, and other supportive treatments are indicated for patients who are acutely ill from infection. Warm, moist compresses hasten resolution of the furuncle or carbuncle. The surrounding skin may be cleansed gently with antibacterial soap, and an antibacterial ointment may be applied. Soiled dressings are handled according to standard precautions. Nursing personnel should carefully follow standard precautions to avoid becoming carriers of staphylococci.



Quality and Safety Nursing Alert

Nurses must take special precautions in caring for boils on the patient's face because the skin area drains directly into the cranial venous sinuses. Sinus thrombosis can develop after manipulating a boil in this location. The infection can travel through the sinus tract and penetrate the brain cavity, causing a brain abscess.

Promoting Home, Community-Based, and Transitional Care



Educating Patients About Self-Care

To prevent and control staphylococcal skin infections such as boils and carbuncles, the staphylococcal pathogen must be eliminated from the skin and environment. Efforts must be made to provide a hygienic environment. If lesions are actively draining, the mattress and pillow should be covered with plastic material and wiped with disinfectant daily; the bed linens, towels, and clothing should be laundered after each use; and the patient should use an antibacterial soap and shampoo for an indefinite period, often several months.

Viral Skin Infections

Cutaneous manifestations may ensue because of viral infections. Viruses implicated in causing dermatologic disorders include the varicella-zoster virus (VZV), the herpes simplex viruses, and the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Herpes Zoster

Herpes zoster, also called *shingles*, is an infection caused by VZV. The disease is characterized by painful vesicular eruptions along the areas of distribution of dermatomes (sensory nerves) from one or more posterior ganglia. After a case of primary varicella (chickenpox) runs its course, the VZV lies dormant inside nerve cells near the brain and spinal cord. Later, when the latent virus becomes reactivated because of declining cellular immunity, it travels by way of the peripheral nerves to the skin, where it replicates and creates a red rash of small, fluid-filled blisters.

It is thought that during the aging process, natural immunity to the varicella virus wanes, facilitating viral reactivation. Herpes zoster develops naturally over the lifetime of about 10% to 20% of all adults who had chickenpox earlier in life, usually after 50 years of age. The rates of occurrence tend to be the same in both men and women but are slightly lower in Black adults than White adults. There is an increased frequency of herpes zoster infections in patients with weakened immune systems, including those with HIV infection and in those with cancer. In these patients, the infection can become widespread and cause significant complications (Janniger, Eastern, Hespenthal, et al., 2020).

Clinical Manifestations

Manifestations typically occur in three phases, including the preeruptive, acute eruptive, and postherpetic neuralgia phases. During the preeruptive phase, the previously dormant VZV becomes reactivated within the dorsal root ganglia of the spinal cord. Manifestations that follow, therefore, tend to follow the dermatomes that correspond with the ganglia that are affected. The patient will typically complain of pain, or sometimes pruritus or paresthesias, over the sensory region that follows affected dermatomes. This phase lasts from 1 to 10 days, with 48 hours being typical (Janniger et al., 2020).

The acute eruptive phase is heralded by the appearance of unilateral patchy erythematous areas in the dermatomal area that is affected. Vesicles

develop that appear initially clear, then become cloudy, and eventually rupture and crust (Fig. 56-6). The pain that accompanies this stage is typically described as severe and unrelenting. This phase typically lasts between 10 and 15 days (Janniger et al., 2020).

The last phase—postherpetic neuralgia—is variable in terms of both duration and manifestations. The pain is typically localized to the dermatomal area that was affected. Approximately 50% of adults older than 60 years with herpes zoster experience postherpetic neuralgia pain for longer than 60 days (Janniger et al., 2020).

Herpes zoster ophthalmicus is a rare subtype of herpes zoster that causes severe consequences. Typically in herpes zoster ophthalmicus, a branch of the trigeminal nerve is affected that innervates the ocular and periocular structures. This may cause significant pain and morbid ocular complications, including blindness (Janniger et al., 2020).

Medical Management

The effects of herpes zoster can be diminished if oral antiviral agents such as acyclovir, valacyclovir, or famciclovir are given within 72 hours of the onset of symptoms; the prescribed antiviral agent then must continue to be taken for 7 to 10 days in patients who are immune competent. IV acyclovir may be indicated in patients who are immune compromised; length of therapy may continue for up to 21 days (Janniger et al., 2020).



Figure 56-6 • Herpes zoster (shingles).

The goals of herpes zoster management are to relieve the pain and to reduce or avoid complications, which include infection, scarring, and postherpetic neuralgia and eye complications. Pain is controlled with analgesic agents because adequate pain control during the acute phase helps prevent persistent pain patterns. Analgesic agents may include NSAIDs or acetaminophen for mild pain, or opioids such as oxycodone for moderate to severe pain (Beuscher, Reeves, & Harrell, 2017). Systemic corticosteroids have traditionally been prescribed; however, their routine use is currently controversial as benefits have not been seen in research studies (Janniger et al., 2020). Patients with postherpetic neuralgia may be prescribed pregabalin or gabapentin to mitigate its unpleasant effects. Alternative agents that might be prescribed to treat postherpetic neuralgia include tricyclic antidepressants (e.g., amitriptyline, nortriptyline) (Beuscher et al., 2017). Patients with herpes zoster ophthalmicus require emergent treatment by an ophthalmologist (Janniger et al., 2020).

Since 1995, the widespread vaccination of children with the VZV vaccine has led to a marked reduction in the incidence of primary varicella, which presumably will result in marked decrease in rates of herpes zoster in

the future. A zoster vaccine live (ZVL) was introduced to boost VZV cellular immunity in adults 60 years of age and older in 2006. Since that time, consensus guidelines have lowered the age for vaccination to 50 years, and include those with a history of herpes zoster, because it may recur (Janniger et al., 2020). A nonlive, recombinant zoster vaccine (RZV) was approved by the U.S. Food and Drug Administration (FDA) in 2017. In response, the Centers for Disease Control and Prevention (CDC) revised its herpes zoster vaccination guidelines to recommend that adults 50 years of age and older should receive 2 doses of RZV 2 to 6 months apart, regardless of whether or not they have previously received the ZVL vaccine. For those adults who have received the ZVL vaccine, they should not receive a first dose of the RZV vaccine until at least 2 months have elapsed from receipt of the ZVL vaccine (Dooling, Guo, Patel, et al., 2018).

Nursing Management

The patient and family members are instructed about the importance of taking antiviral agents as prescribed and in keeping follow-up appointments with the primary provider. The nurse assesses the patient's discomfort and response to medication and collaborates with the primary provider to make necessary adjustments to the treatment regimen. Vesicles and rashes may be soothed by applying OTC calamine lotion or 5% aluminum acetate (Burow's solution) wet dressings for 30 to 60 minutes four to six times daily (Janniger et al., 2020). The patient is educated about how to follow proper hand hygiene techniques to avoid spreading the virus.

Diversionary activities and relaxation techniques are encouraged to ensure restful sleep and to alleviate discomfort. A caregiver may be required to assist with dressings, particularly if the patient is an older adult and unable to apply them. Food preparation for patients who cannot care for themselves or prepare nourishing meals must be arranged.

Herpes Simplex

Herpes simplex is a common skin infection. There are two types of the causative virus, which are identified by viral typing. In general, herpes simplex type 1 occurs on the skin of the lips, mouth, gums, or tongue (or on the skin around the mouth) and type 2 occurs in the genital area, but both viral types can be found in both locations. See [Chapters 18](#) and [51](#) for discussion of herpes simplex type 1 and type 2, respectively.



COVID-19 Considerations

SARS-CoV-2, the virion implicated in causing the global pandemic of coronavirus disease 2019 (COVID-19), primarily manifests with respiratory ailments in patients who are infected (e.g., pneumonia, acute respiratory distress syndrome, acute respiratory failure), as its name implies. However, there have been notable dermatologic manifestations of COVID-19; these have been tracked by an international registry of patients with cutaneous manifestations of COVID-19, sponsored by the American Academy of Dermatology (AAD) and the International League of Dermatologic Societies (ILDS). At the time of this writing, the registry has reported dermatologic manifestations of COVID-19 among 716 patients from 31 countries (Freeman, McMahon, Lipoff, et al., 2020b). Although many diverse cutaneous manifestations of COVID-19 have been reported, one that is of particular note involves perniolike acral (fingers, toes) skin lesions (Freeman, McMahon, Lipoff, et al., 2020a; Freeman et al., 2020b).

Pernio (chilblains) is a dermatologic inflammatory manifestation of the superficial vasculature that occurs in response to cold. It exhibits as edema and erythema, sometimes with plaque formation, of affected fingers or toes; ulcerations are sometimes present. The unique perniolike acral manifestations of COVID-19, sometimes called *COVID toes*, are not related to cold/ambient temperature and are not believed to be caused by a vascular response. At the present time, researchers posit that its underlying cause may be idiopathic (unknown), or related to a simple inflammatory response, or related to a prothrombotic coagulopathy incited by the infection (Freeman et al., 2020a). Irrespective of the pathophysiologic mechanisms responsible for this phenomenon, the perniolike acral skin lesions apparently have a predilection for children and young adults rather than middle-aged or older adults with COVID-19. It more commonly affects the toes than the fingers, and in some instances, is the sole manifestation of SARS-CoV-2 infection (Freeman et al., 2020a; Freeman et al., 2020b). Furthermore, the infection tends to be mild and generally may be managed on an outpatient basis (see [Chapter 19](#) for discussion of management of mild COVID-19). Based upon these observations, it is recommended that patients who are otherwise apparently healthy but who present with perniolike acral skin lesions should be tested for COVID-19, regardless of their history of COVID-19 exposure or the presence or absence of other symptoms suggestive of COVID-19 (Feldman & Freeman, 2020).

Fungal (Mycotic) Skin Infections

Fungi are eukaryotic microorganisms that belong to neither the plant nor the animal kingdoms. They are culprits in causing various common skin infections. In some cases, they affect only the skin and its appendages (hair and nails). In other cases, internal organs are involved, and the diseases may be life-threatening. However, superficial infections rarely cause even temporary disability and respond readily to treatment. Secondary infection with bacteria, *Candida*, or both organisms may occur.

The most common fungal skin infection is **tinea**, which is also called *ringworm* because of its characteristic appearance of a ring or rounded tunnel under the skin. Tinea infections affect the head, body, groin, feet, and nails (Sahoo & Mahajan, 2016). **Table 56-6** summarizes the tinea infections and treatments.

To obtain a specimen for diagnosis, the lesion is cleaned and a scalpel or glass slide is used to remove scales from the margin of the lesion. The scales are dropped onto a slide to which potassium hydroxide has been added. The diagnosis is made by examination of the infected scales microscopically for spores and hyphae or by isolating the organism in culture. Under Wood's light, a specimen of infected hair appears fluorescent; this may be helpful in diagnosing some cases of tinea capitis (Sahoo & Mahajan, 2016).

Parasitic Skin Infestations

Parasitic skin infestations include those of the skin by lice (pediculosis) and the itch mite (scabies).

Pediculosis: Lice Infestation

Lice infestation affects people of all ages. Three varieties of lice infest humans: *Pediculus humanus capitis* (head louse), *Pediculus humanus corporis* (body louse), and *Phthirus pubis* (pubic louse or "crab"). Lice are called *ectoparasites* because they live on the outside of the host's body. They depend on the host for their nourishment, feeding on human blood several times a day. They inject their digestive juices and excrement into the skin, which causes severe itching (CDC, 2017).

Pediculosis Capitis

Pediculosis capitis is an infestation of the scalp by the head louse. The female louse lays her eggs (nits) close to the scalp. The nits become firmly attached to the hair shafts with a tenacious substance. The young lice hatch in about 6 to 9 days and reach maturity in 7 days. Head lice may be transmitted directly by physical contact or indirectly by infested combs, brushes, wigs, hats, helmets, and bedding (CDC, 2017).

Pediculosis Corporis and Pthiriasis Pubis

Pediculosis corporis is an infestation of the body by the body louse. This is a disease of those who live in close quarters. Pthiriasis pubis is extremely common. The infestation is generally localized in the genital region and is transmitted chiefly by sexual contact (Guenther & Maguiness, 2020).

Clinical Manifestations

Head lice are found most commonly along the back of the head and behind the ears. To the naked eye, the eggs look like silvery, glistening oval bodies. The bite of the insect causes intense pruritus, and the resultant scratching often leads to secondary bacterial infection, such as impetigo or furunculosis. The infestation is more common in children and people with long hair (CDC, 2017).

TABLE 56-6

Tinea (Ringworm) Infections

Type and Location	Clinical Manifestations	Treatment
Tinea barbae (fungal infection of beard or moustache of men)	<ul style="list-style-type: none"> Red, inflamed abscesslike lesions, pustules, or crusting May develop secondary infection 	<ul style="list-style-type: none"> Griseofulvin for 4–6 wks or terbinafine for 2–4 wks Shampoo beard or moustache twice weekly with selenium sulfide shampoo for 2 wks
Tinea capitis (scalp or eyebrows; contagious fungal infection of the hair shaft)	<ul style="list-style-type: none"> Oval, scaling, erythematous patches Small papules or pustules on the scalp or eyebrows Brittle hair that breaks easily; patchy alopecia 	<ul style="list-style-type: none"> Griseofulvin for 4–6 wks or terbinafine for 2–4 wks Shampoo hair or eyebrows twice weekly with selenium sulfide shampoo for 2 wks
Tinea corporis (body)	<ul style="list-style-type: none"> Begins with red macule, which spreads to a ring of papules or vesicles with central clearing Lesions found in clusters; many spread to the hair, scalp, or nails Pruritis is a common complaint 	<ul style="list-style-type: none"> Local infections—topical antifungal creams once or twice daily (e.g., clotrimazole, econazole, ketoconazole) Extensive infections or concomitant tinea capitis or immunosuppressive conditions (e.g., active neoplasms)—oral antifungal medications (e.g., fluconazole for 2–4 wks, itraconazole for 1 wk, terbinafine for 2 wks)

Tinea cruris (groin area; “jock itch”)	<ul style="list-style-type: none"> Begins with small, red scaling patches, which spread to form circular elevated plaques Very pruritic Clusters of pustules may be seen around borders 	<ul style="list-style-type: none"> Local infections—see treatment for tinea corporis Extensive infections or concomitant tinea pedis or immunosuppressive conditions (e.g., active neoplasms)— see treatment for tinea corporis Educate patients to avoid wearing clothing that is tight over the groin; patients should pat dry skin folds thoroughly (avoid rubbing) after bathing and use separate towels for groin and other body parts
Tinea pedis (foot; “athlete’s foot”)	<ul style="list-style-type: none"> Soles of one or both feet have scaling and mild redness with maceration in the toe webs More acute infections may have clusters of clear vesicles on dusky base 	<ul style="list-style-type: none"> Local infections—see treatment for tinea corporis Extensive infections or concomitant tinea pedis or immunosuppressive conditions (e.g., active neoplasms)— see treatment for tinea corporis Educate patients: <ul style="list-style-type: none"> to put on socks before underwear to avoid cross-contamination to groin to either dispose of old shoes or treat them with antifungal powder to prevent reinfection to wear protective footwear at communal pools and tubs
Tinea unguium (toenails; onychomycosis)	<ul style="list-style-type: none"> Nails thicken, crumble easily, and lack luster Whole nail may be destroyed If untreated, can result in pain, loss of balance, and candida infection 	<ul style="list-style-type: none"> Oral antifungal medications for 12 wks (e.g., itraconazole, terbinafine) with or without concomitant topical ciclopirox olamine nail lacquer Nail avulsion may be indicated, either surgically or chemically using a 40–50% urea compound

Adapted from Handler, M. Z., Stephany, M. P., & Schwartz, R. A. (2020). Tinea capititis. *Medscape*. Retrieved on 10/12/2020 at: emedicine.medscape.com/article/1091351-overview; Robbins, C. M., & Elewski, B. E. (2020). Tinea pedis. *Medscape*. Retrieved on 10/12/2020 at: emedicine.medscape.com/article/1091684-overview; Schwartz, R. A., & Szepietowski, J. C. (2020). Tinea barbae. *Medscape*. Retrieved on 10/12/2020 at: emedicine.medscape.com/article/1091252-overview; Shukla, S., & Khachemoune, A. (2020). Tinea corporis. *Medscape*. Retrieved on 10/12/2020 at: emedicine.medscape.com/article/1091473-overview; Tosti, A. (2020). Onychomycosis. *Medscape*. Retrieved on 10/12/2020 at: emedicine.medscape.com/article/1105828-overview; Weiderkehr, M., & Schwartz, R. A. (2020). Tinea cruris. *Medscape*. Retrieved on 10/12/2020 at: emedicine.medscape.com/article/1091806-overview.

With body lice, the areas of the skin that come in closest contact with the underclothing (i.e., neck, trunk, and thighs) are chiefly involved. The body louse lives primarily in the seams of underwear and clothing, to which it clings as it pierces the skin with its proboscis. Its bites cause characteristic minute hemorrhagic points. Widespread excoriation may appear as a result of intense pruritus and scratching, especially on the trunk and neck. Among the secondary lesions produced are parallel linear scratches and a slight degree of eczema. In long-standing cases, the skin may become thick, dry, and scaly, with dark pigmented areas (Dlugasch & Story, 2021).

Pruritus, particularly at night, is the most common symptom of lice infestation. Reddish-brown dust (i.e., excretions of the insects) may be found in the patient's underclothing. The pubic area should be examined with a magnifying glass for lice crawling down a hair shaft or nits cemented to the hair or at the junction with the skin. Infestation by pubic lice may coexist with sexually transmitted infections (STIs) such as gonorrhea, herpes, or syphilis. There may also be infestation of the hairs of the chest, axillae, beard, and eyelashes. Gray-blue macules may sometimes be seen on the trunk, thighs, and axillae as a result of either the reaction of the insects' saliva with bilirubin (converting it to biliverdin) or an excretion produced by the salivary glands of the louse (Guenther & Maguiness, 2020).

Medical Management

Treatment of head and pubic lice involves washing the hair with a shampoo containing pyrethrin compounds with piperonyl butoxide or rinsing with permethrin (CDC, 2019). The patient is instructed to shampoo the scalp and hair according to the product directions. After the hair is rinsed thoroughly, it is combed with a fine-toothed comb dipped in vinegar to remove any remaining nits or nit shells freed from the hair shafts. They are extremely difficult to remove and may have to be picked off one by one (CDC, 2019).

The patient with body lice is instructed to bathe with soap and water. Typically, no medications are indicated because the lice live on the patient's clothing. Topical medications used to treat head and pubic lice may be applied to the clothing, however, particularly in the seams of garments (see following discussion about general hygiene measures). If the eyelashes are involved, petrolatum may be thickly applied twice daily for 8 days, followed by mechanical removal of any remaining nits (CDC, 2019).

All articles of clothing, towels, and bedding that may have lice or nits should be washed in hot water—at least 54°C (130°F)—or dry-cleaned to prevent reinfestation. Upholstered furniture, rugs, and floors should be vacuumed frequently. Combs, brushes, and helmets are disinfected or discarded. All family members and close contacts are treated (CDC, 2019).

Complications, such as severe pruritus, pyoderma, and dermatitis, are treated with antipruritics, systemic antibiotics, and topical corticosteroids. Body lice can transmit epidemic rickettsial disease (e.g., epidemic typhus, relapsing fever, and trench fever) to humans. The causative organism may be in the gastrointestinal tract of the insect and may be excreted on the skin surface of the infested person (CDC, 2019).

Nursing Management

The nurse informs the patient that head lice may infest anyone and are not a sign of uncleanliness. Because the condition spreads rapidly, treatment must be started immediately. Epidemics among those living in close quarters (e.g., dormitories, military barracks, camps) may be managed by having everyone shampoo their hair on the same night. Cohabitants and family members should be warned not to share combs, brushes, and hats; they should be inspected for head lice daily for at least 2 weeks.

Treatment is necessary for all family members and sexual contacts of patients with body or pubic lice. The nurse educates them about personal hygiene and methods to prevent or control infestation. The patient and partner must also be scheduled for a diagnostic workup for coexisting STIs.

Scabies

Scabies is an infestation of the skin by the itch mite *Sarcoptes scabiei*. The disease is most commonly found in people living in substandard hygienic conditions and in people who are sexually active. People at increased risk include children, older adults, and those who are immune compromised. The mites frequently involve the fingers, and hand contact may produce infection (Cheng, Mzahim, Koenig, et al., 2020).

Clinical Manifestations

It takes approximately 4 weeks from the time of contact for the patient's symptoms to appear. The patient complains of severe itching caused by a delayed type of immunologic reaction to the mite or its fecal pellets. During examination, the patient is asked where the pruritus is most severe. A magnifying glass and a penlight are held at an oblique angle to the skin while a search is made for the small, raised burrows created by the mites. The burrows may be multiple, straight or wavy, brown or black, threadlike lesions, most commonly observed between the fingers and on the wrists. Other sites are the extensor surfaces of the elbows, the knees, the edges of the feet, the points of the elbows, around the nipples, in the axillary folds, under pendulous breasts, and in or near the groin or gluteal fold, penis, or scrotum. Red, pruritic eruptions usually appear between adjacent skin areas. However, the burrow is not always visible (Cheng et al., 2020).

One classic sign of scabies is the increased itching that occurs during the evening hours, perhaps because the increased warmth of the skin has a stimulating effect on the parasite. Hypersensitivity to the organism and its products of excretion also may contribute to the pruritus. If the infection has spread, other members of the family and close friends also complain of pruritus about 1 month later (Cheng et al., 2020).

Secondary lesions are quite common and include vesicles, papules, excoriations, and crusts. Bacterial superinfection may result from persistent excoriation of the burrows and papules (Cheng et al., 2020).



Gerontologic Considerations

Older adult patients living in long-term care facilities are susceptible to outbreaks of scabies because of close living quarters, poor hygiene due to limited physical ability, and the potential for incidental spread of the organisms by staff members. The vivid inflammatory reaction seen in younger people seldom occurs; rather, the older adult may have peripheral sensory deficits and be less prone to scratch or may be physically unable to scratch. Scratching is an effective mechanism that partially eradicates mite infestation; thus, this results in a more severe subtype. The lesions crust over (causing "crusted scabies") and, in time, may become hyperkeratotic (Cheng et al., 2020).

Health care personnel in extended-care facilities should wear gloves when providing hands-on care to a patient suspected of having scabies until the diagnosis is confirmed and treatment is completed. It is advisable to treat all residents, staff, and families of patients at the same time to prevent

reinfection. The scales that are present with crusted scabies must be removed so that the antiscabicidal medication may be effective. Crusts may be removed with warm water soaks followed by application of 5% salicylic acid in petrolatum cream (Cheng et al., 2020).

Assessment and Diagnostic Findings

The diagnosis is confirmed by recovering *S. scabiei* or the mites' byproducts from the skin. A sample of superficial epidermis is scraped from the top of the burrows or papules with a small scalpel blade. The scrapings are placed on a microscope slide and examined through a microscope at low power to demonstrate evidence of the mite (Cheng et al., 2020).

Medical Management

The patient is instructed to take a warm, soapy bath or shower to remove the scaling debris from the crusts and then to pat the skin dry thoroughly and allow it to cool. A prescription scabicide, 5% permethrin, is considered the medication of choice. It is applied thinly to the entire skin from the neck down, sparing only the face and scalp (which are not affected in scabies). The medication is left on for 12 to 24 hours, after which the patient is instructed to wash thoroughly. One application may be curative, but it is advisable to repeat the treatment for 1 week (Cheng et al., 2020).

Nursing Management

The patient should wear clean clothing and sleep between freshly laundered bed linens. All bedding and clothing should be washed in hot water and dried on the hot dryer cycle. If bed linens or clothing cannot be washed in hot water, dry cleaning is advised.

After treatment is completed, the patient may apply an ointment, such as a topical corticosteroid, to skin lesions because the scabicide may irritate the skin. The patient's hypersensitivity does not cease on destruction of the mites. Pruritus may continue for several weeks as a manifestation of hypersensitivity, particularly in people who are atopic (allergic). This is not a sign that the treatment has failed. The patient is instructed not to apply more scabicide, because it will cause more irritation and increased itching, and not to take frequent hot showers, because they can dry the skin and produce pruritus. Oral antihistamines such as diphenhydramine or hydroxyzine can help control the pruritus. If a secondary infection is

present, treatment with oral antibiotic agents may be indicated (Cheng et al., 2020).

All family members and close contacts should be treated simultaneously to eliminate the mites. Some scabicides are approved for use in infants and pregnant women. If scabies is sexually transmitted, the patient may require treatment for coexisting STI. Scabies may also coexist with pediculosis.

NONINFECTIOUS INFLAMMATORY DERMATOSES

Noninfectious inflammatory dermatoses include dermatologic disorders such as irritant contact dermatitis, psoriasis, and generalized exfoliative dermatitis (also called *erythroderma*).

Irritant Contact Dermatitis

Contact dermatitis (also called *eczema*) is an inflammatory reaction of the skin to physical, chemical, or biologic agents. The epidermis is damaged by repeated physical and chemical irritations. Contact dermatitis may be of the primary irritant type, in which a nonallergic reaction results from exposure to an irritating substance, or it may be an allergic reaction resulting from exposure of sensitized people to contact allergens (see [Chapter 33](#)).

Common causes of irritant contact dermatitis are soaps, detergents, scouring compounds, and industrial chemicals. Predisposing factors include extremes of heat and cold, frequent contact with soap and water, and a preexisting skin disease. Persons at risk include those whose occupations require repeated handwashing (e.g., nurses) or repeated exposure to food or other irritants (e.g., food preparation workers, cleaners, hairdressers). Women tend to be affected more commonly than men (Goldner & Fransway, 2018).

Clinical Manifestations

The eruptions begin when the causative agent contacts the skin. The first reactions include pruritus, burning, and erythema, followed closely by edema, papules, vesicles, and oozing or weeping. In the subacute phase, these vesicular changes are less marked, and they occur alternatively with crusting, drying, fissuring, and peeling. If repeated reactions occur or if the patient continually scratches the skin, lichenification and pigmentation

occur. Secondary bacterial invasion may follow (Goldner & Fransway, 2018).

Management

The objectives of management are to soothe and heal the involved skin and protect it from further damage. The distribution pattern of the reaction is identified to differentiate between allergic and irritant contact dermatitis. A detailed history is obtained. If possible, the offending irritant is removed. Local irritation should be avoided, and soap is not generally used until healing occurs.

Many preparations are advocated for relieving dermatitis. In general, a barrier cream that contains ceramide or dimethicone is used for small patches of erythema. A thin layer of cream or ointment containing a corticosteroid is commonly used, although the efficacy of corticosteroids has not been demonstrated in research (Goldner & Fransway, 2018). The patient is educated about how to treat and prevent future bouts of irritant contact dermatitis ([Chart 56-4](#)).



COVID-19 Considerations

The first known outbreak of COVID-19 began in Wuhan, China, in late 2019 and quickly spread through the province of Hubei. Working for long hours caring for patients with COVID-19, Hubei health care workers (HCWs), including nurses and physicians, wore PPE, such as N95 respirators, goggles, face shields, double gloves, and gowns, for extended hours (see [Chapter 66](#) for discussion on PPE). In addition, HCWs spent more time than typical engaging in hand hygiene protocols. As a consequence of these practices that were aimed at protecting themselves and others from SARS-CoV-2 infection, many HCWs on the frontlines of the pandemic in Hubei reported high rates of irritant contact dermatitis. One study of 700 frontline HCWs reported an overall prevalence of irritant contact dermatitis of 97%, with 83.1% of HCWs reporting nasal bridge irritation, presumably from prolonged usage of N95 respirators and goggles (Lan, Song, Miao, et al., 2020). Another group of researchers found that among 61 frontline HCWs, 68.9% reported nasal bridge scarring. These same researchers reported that the incidence of adverse skin reactions to N95 respirators was 95.1%, to gloves 88.5%, and to other PPE 60.7% (Hu, Fan, Li, et al., 2020). In response to these reports, the AAD promulgated a white paper of guidelines that HCWs could adopt to avoid occupationally

induced skin disorders during the COVID-19 pandemic. Key recommendations include the following (AAD, 2020):

Chart 56-4



PATIENT EDUCATION

Strategies for Avoiding Irritant Contact Dermatitis

The precautions listed below may help prevent repeated cases of irritant contact dermatitis and should be followed for at least 4 months after skin appears to be completely healed.

The nurse instructs the patient to:

- Study the pattern and location of your dermatitis and think about which things have touched your skin and which things may have caused the problem; try to avoid contact with these materials.
- Avoid heat, soap, and rubbing, all of which are external irritants.
- Choose bath soaps, laundry detergents, and cosmetics that do not contain fragrance.
- Avoid using a fabric softener dryer sheet. Fabric softeners that are added to the washer may be used.
- Avoid topical medications, lotions, or ointments, except those specifically prescribed for your condition.
- Wash your skin thoroughly immediately after exposure to possible irritants.
- Ensure that when wearing gloves (such as for washing dishes or general cleaning), they are cotton lined. Do not wear them more than 15 or 20 minutes at a time.

Adapted from Goldner, R., & Fransway, A. F. (2018). Irritant contact dermatitis in adults. *UpToDate*. Retrieved on 10/12/2020 at: www.uptodate.com/contents/irritant-contact-dermatitis-in-adults

- HCWs should use a moisturizer after engaging in hand hygiene. Continued hand moisturization when off work is also recommended in order to better protect the skin. Moisturizers that contain at least 5% petrolatum are most effective.
- If an HCW uses an N95 respirator that is irritating, the HCW should notify their respective safety officer and request an alternative N95 respirator that might be less irritating. If that is not possible, then a liquid skin sealant/protectant should be applied to the irritated area and

dried before the mask is donned. Petrolatum should *not* be used as a protectant, however, as it can interfere with the seal of the mask.

- All HCWs who utilize PPE should keep their skin clean, dry, and well-moisturized. In particular, the face should be well-moisturized when off work. Cosmetics that include foundations and concealers should not be used. If skin moisturizers are applied, they should be applied at least one hour prior to donning PPE. Irritated areas, particularly the forehead, cheeks, and bridge of the nose, may be treated with petrolatum when off work.
- If masks must be reused, they should be thoroughly dry before they are donned a second time.

Psoriasis

Psoriasis is a chronic inflammatory multisystem disorder of the skin that affects approximately 3.2% of Americans (Nicpon, 2017). Although the primary manifestation of this noncommunicable disease tends to involve the skin, psoriasis may involve the oral cavity, eyes (including the lids, conjunctivae, and corneas), and joints. Psoriasis is typically characterized by the appearance of silvery plaques that most commonly appear on the skin over the elbows, knees, scalp, lower back, and buttocks (Habashy & Robles, 2019). Onset may occur at any age, with a median onset at 28 years. It is more prevalent among women and White Americans. It is thought that most patients with psoriasis have a genetic predisposition to develop the disease. Psoriasis is characterized by periods of remission and exacerbation throughout life (Habashy & Robles, 2019).

Pathophysiology

Current evidence supports an autoimmune basis for psoriasis. Periods of emotional stress and anxiety aggravate the condition, and trauma, infections, and seasonal and hormonal changes may also serve as triggers (Habashy & Robles, 2019).

In this disease, the epidermis becomes infiltrated by activated T cells and cytokines, resulting in both vascular engorgement and proliferation of keratinocytes. Epidermal hyperplasia results. These epidermal cells tend to improperly retain their nuclei, crippling their ability to release lipids that encourage cellular adhesion. This results in rapid turnover of poorly matured cells that do not adhere well to each other, resulting in the classic presentation of plaque-like lesions that have a silvery, scaly, and flaky appearance (Habashy & Robles, 2019).

Clinical Manifestations

Psoriasis may range in severity from a cosmetic source of annoyance to a physically disabling and disfiguring disorder. Lesions appear as red, raised patches of skin covered with silvery scales. The scaly patches are formed by the buildup of living and dead skin (Fig. 56-7). If the scales are scraped away, the dark red base of the lesion is exposed, producing multiple bleeding points. The patches are not moist and may be pruritic. In many cases, the nails are also involved, with pitting, discoloration, crumbling beneath the free edges, and separation of the nail plate (Habashy & Robles, 2019). Psoriasis is classified as mild if the plaques involve less than 5% body surface area (BSA), moderate if they involve between 5% and 10% of BSA, and severe if more than 10% BSA is affected by plaque formation (Nicpon, 2017).

Complications

Asymmetric rheumatoid factor—negative arthritis of multiple joints occurs in up to 42% of people with psoriasis, most typically after the skin lesions appear (Nicpon, 2017). The most typical joints affected include those in the hands or feet, although sometimes larger joints such as the elbows, knees, or hips may be affected (Habashy & Robles, 2019). A rheumatologist should be consulted to assist in the diagnosis and long-term treatment of this disorder. See Chapter 34 for further discussion of spondyloarthropathies, including psoriatic arthritis. Generalized exfoliative dermatitis may also result from psoriasis (see discussion later in this chapter).



Figure 56-7 • Psoriasis.

Assessment and Diagnostic Findings

The presence of the classic plaque-type lesions generally confirms the diagnosis of psoriasis. If in doubt, the health care provider should assess for signs of nail and scalp involvement and for a positive family history. Biopsy of the skin is of little diagnostic value. The presence and extent of plaque should be assessed carefully, to calculate BSA involvement.

Medical Management

The goals of management are to slow the rapid turnover of epidermis, to promote resolution of the psoriatic lesions, and to control the natural cycles of the disease. There is no known cure.

The therapeutic approach should be one that the patient understands; it should be cosmetically acceptable and minimally disruptive of lifestyle. Treatment involves the commitment of time and effort by the patient and possibly the family. Any precipitating or aggravating factors are addressed. An assessment is made of lifestyle because psoriasis is significantly affected by stress. Management of emotional factors should be addressed as part of the overall treatment of psoriasis. The patient is informed that treatment of severe psoriasis can be time-consuming, expensive, and aesthetically unappealing at times. Many patients report difficulty adhering

to treatment plans, either for time reasons or lack of response to the treatment (Feldman, 2020).

Gentle removal of scales is an important principle of psoriasis treatment. This can be accomplished by taking baths with added oils (e.g., olive oil, mineral oil), colloidal oatmeal preparations, or coal tar preparations. A soft brush may be used to gently scrub the psoriatic plaques. After bathing, the application of emollient creams containing alpha-hydroxy acids or salicylic acid can soften thick scales. The patient and family should be encouraged to establish a regular skin care routine that can be maintained even when the psoriasis is not in an acute stage (Feldman, 2020).

Pharmacologic Therapy

Three types of therapy are commonly indicated: topical, phototherapy, and systemic. Topical agents, possibly in tandem with phototherapy, are recommended for mild disease. Patients with moderate or severe disease should receive topical agents, phototherapy, and systemic treatment (Nicpon, 2017).

Topical Agents

Topically applied agents are used to slow the overactive epidermis. Topical corticosteroids may be applied for their anti-inflammatory effects (see [Table 56-3](#)). Choosing the correct strength of corticosteroid for the involved site and choosing the most effective vehicle base are important aspects of topical treatment. In general, high-potency topical corticosteroids should not be used on the face and intertriginous areas, and their use on other areas should be limited to a 4-week course of twice-daily applications. A 4-week break should be taken before repeating treatment with the high-potency corticosteroids. For long-term therapy, moderate-potency corticosteroids are used. On the face and intertriginous areas, only low-potency corticosteroids are appropriate for long-term use (Doughty & McNichol, 2016).

Occlusive dressings may be applied to increase the effectiveness of the corticosteroid. Large plastic bags may be used—one for the upper body with openings cut for the head and arms and one for the lower body with openings for the legs. Large rolls of tubular plastic can be used to cover the arms and legs. Another option is a vinyl jogging suit. The medication is applied, and the suit is put on over it. The hands can be wrapped in gloves, the feet in plastic bags, and the head in a shower cap. Occlusive dressings should not remain in place longer than 8 hours. The skin should be inspected carefully for the appearance of atrophy, hypopigmentation, striae, and telangiectasias—all of which are side effects of corticosteroids.

When psoriasis involves large areas of the body, topical corticosteroid treatment can be expensive and involve some systemic risk. The more potent corticosteroids, when applied to large areas of the body, have the potential to cause adrenal suppression through percutaneous absorption of the medication. In this event, other treatment modalities (e.g., nonsteroidal topical medications, UV light) may be used instead or in combination to decrease the need for corticosteroids (Doughty & McNichol, 2016).

Treatment with topical nonsteroidal agents, such as calcipotriene and tazarotene, can suppress **epidermopoiesis** (i.e., development of epidermal cells) and cause sloughing of the rapidly growing epidermal cells. Calcipotriene 0.05% is a derivative of vitamin D₂. It works by decreasing the mitotic turnover of the psoriatic plaques. Its most common side effect is local irritation. The intertriginous areas and face should be avoided when using this medication. The patient should be monitored for symptoms of hypercalcemia. Calcipotriene is available as a cream for use on the body and a solution for the scalp. It is not recommended for use by older adult patients because of their more fragile skin or by pregnant or lactating women (Feldman, 2020).

Tazarotene, a retinoid, causes sloughing of the scales covering psoriatic plaques. As with other retinoids, it causes increased sensitivity to sunlight by loss of the outermost layer of skin, so the patient should be cautioned to use an effective sunscreen and avoid other photosensitizers (e.g., tetracycline, antihistamines). Tazarotene is teratogenic, and the risk of use in pregnant women clearly outweighs any possible benefits. A negative result on a pregnancy test should be obtained before initiating this medication in women of childbearing age, and an effective contraceptive should be continued during treatment. Side effects include burning, erythema, or irritation at the site of application, and worsening of psoriasis (Feldman, 2020).

Intralesional injections of the corticosteroid triamcinolone can be given directly into highly visible or isolated patches of psoriasis that are resistant to other forms of therapy. Care must be taken to ensure that the medication is not injected into normal skin (Habashy & Robles, 2019).

Phototherapy

For patients who do not respond well to topical treatments, phototherapy using narrow-band ultraviolet-B (UVB) therapy may be effective as a single-therapy modality. However, phototherapy is generally more effective when it is given as ultraviolet-A (UVA) in conjunction with a photosensitizing oral medication (a combination referred to as PUVA). Here, the patient takes a photosensitizing medication (i.e., psoralen) in a

standard dose and is subsequently exposed to long-wave UV light as the medication plasma levels peak. It is thought that when psoralen-treated skin is exposed to UVA light, the psoralen binds with DNA and decreases epidermal cellular proliferation. PUVA has been associated with long-term risks of skin cancer, cataracts, and premature aging of the skin (Habashy & Robles, 2019).

The patient is usually treated two or three times each week until the psoriasis clears. An interim period of 48 hours between treatments is necessary to allow any burns resulting from PUVA therapy to become evident. After the psoriasis clears, the patient begins a maintenance program. Once little or no disease is active, less potent therapies are used to keep minor flare-ups under control (Habashy & Robles, 2019).

Systemic Agents

Although systemic corticosteroids may cause rapid improvement of psoriasis, the usual risks and the possibility of triggering a severe flare-up on withdrawal limit their use; therefore, they are not indicated for treatment of psoriasis.

Methotrexate, a systemic cytotoxic agent, is the first-line drug for treating moderate to severe psoriasis (Nicpon, 2017). Methotrexate appears to inhibit DNA synthesis in epidermal cells, thereby reducing the turnover time of the psoriatic epidermis. However, the medication can be toxic, especially to the liver, kidneys, and bone marrow. Laboratory studies must be monitored to ensure that the hepatic, hematopoietic, and renal systems are functioning adequately. The patient should avoid drinking alcohol while taking methotrexate because alcohol ingestion increases the possibility of liver damage. The medication is teratogenic and thus should not be given to pregnant women.

Cyclosporine, a cyclic peptide immunosuppressive agent, may be considered in treatment of severe, therapy-resistant cases of psoriasis. However, its use is limited by side effects such as hypertension and nephrotoxicity and is only indicated for short-term use, generally no longer than 3 to 6 months (Habashy & Robles, 2019).

Another line of treatments for psoriasis includes a group called *biologic agents* because of their derivation from immunomodulators and bioengineered proteins (such as antibodies or recombinant cytokines) and their targeted action directly on the T cells. These agents act by inhibiting activation and migration, eliminating the T cells completely, slowing postsecretory cytokines or inducing immune deviation.

Infliximab is a monoclonal antibody that binds to tumor necrosis factor-alpha (TNF- α) and can only be given by IV infusion. Ustekinumab is also a

monoclonal antibody that specifically interferes with the effect of interleukins (ILs), particularly IL-12 and IL-23. Etanercept is a fusion protein that binds with soluble TNF- α and blocks its interaction with the cell surface receptors. Alefacept is a fusion protein that inhibits T-cell proliferation. Adalimumab is a recombinant human immunoglobulin G1 (IgG1) monoclonal antibody against TNF- α . Secukinumab is a human IgG1 monoclonal antibody and ixekizumab is a humanized monoclonal IgG4 antibody; both of these agents neutralize the effects of the proinflammatory cytokine IL-17A and are administered subcutaneously. All of these biologic agents have significant side effects, making close monitoring essential (Habashy & Robles, 2019).

Nursing Management

Psoriasis may cause despair and frustration for the patient; observers may stare, comment, ask embarrassing questions, or even avoid the person. The disease can eventually exhaust the patient's resources, interfere with their job, and negatively affect many aspects of life.

The nurse assesses the impact of the disease on the patient and the coping strategies used for conducting normal activities and interactions with family and friends. Many patients need reassurance that the condition is not infectious, not a reflection of poor personal hygiene, and not skin cancer. The nurse can create an environment in which the patient feels comfortable discussing important quality of life issues related to their psychosocial and physical response to this chronic illness.

The nurse explains with sensitivity that although there is no cure for psoriasis and lifetime management is necessary, the condition can usually be controlled. The pathophysiology of psoriasis is reviewed, as are the factors that provoke it—irritation or injury to the skin (e.g., cut, abrasion, sunburn), current illness (e.g., pharyngeal streptococcal infection), and emotional stress. It is emphasized that repeated trauma to the skin and an unfavorable environment (e.g., cold) may exacerbate psoriasis. The patient is cautioned about taking any nonprescription medications because some may aggravate mild psoriasis. As well, the patient is advised to seek treatment from the same primary provider for any acute illnesses or chronic conditions to minimize chances of receiving prescriptions that may interfere with each other (Nicpon, 2017).

Reviewing and explaining the treatment regimen are essential to ensure adherence to the therapeutic regimen. For example, if the patient has a mild condition confined to localized areas, such as the elbows or knees, application of an emollient to maintain softness and minimize scaling may

be all that is required. Most patients need a comprehensive plan of care that ranges from using topical medications and shampoos to more complex and lengthy treatment with systemic medications and photochemotherapy, such as PUVA therapy. Patient education materials that include a description of the therapy and specific guidelines are helpful but cannot replace face-to-face discussions (either in-person or online) of the treatment plan.

To avoid injuring the skin, the patient is advised not to pick at or scratch the affected areas. Measures to prevent dry skin are encouraged because dry skin worsens psoriasis. Too-frequent washing produces more soreness and scaling. Water should be warm, not hot, and the skin should be dried by patting with a towel rather than by rubbing. Emollients have a moisturizing effect, providing an occlusive film on the skin surface so that normal water loss through the skin is halted and allowing the trapped water to hydrate the stratum corneum. A bath oil or emollient cleansing agent can comfort sore and scaling skin. Softening the skin can prevent fissures.

A therapeutic relationship between health care professionals and the patient with psoriasis includes education and support. Introducing the patient to successful coping strategies used by others with psoriasis and making suggestions for reducing or coping with stressful situations at home, school, and work can facilitate a more positive outlook and acceptance of the chronicity of the disease.

Promoting Home, Community-Based, and Transitional Care



Educating Patients About Self-Care

Printed patient education materials may be provided to reinforce face-to-face discussions about treatment guidelines and other considerations. Patients using topical corticosteroid preparations repeatedly on the face and around the eyes should be aware that cataract development is possible. Strict guidelines for applying these medications should be emphasized, because overuse can result in skin atrophy, striae, and medication resistance.

PUVA, which is reserved for moderate to severe psoriasis, produces photosensitization. If exposure to the sun is unavoidable, the skin must be protected with sunscreen and clothing. Gray- or green-tinted wraparound sunglasses should be worn to protect the eyes during and after treatment, and ophthalmologic examinations should be performed on a regular basis (Nicpon, 2017).

If indicated, referral may be made to a mental health professional who can help to ease emotional strain and give support. Belonging to a support

group may also help patients recognize that they are not alone in experiencing life adjustments in response to a visible, chronic disease. The National Psoriasis Foundation publishes periodic bulletins and reports about new and relevant developments in this condition (see Resources section).

Generalized Exfoliative Dermatitis

Generalized exfoliative dermatitis, also called *erythroderma*, is characterized by a scaling erythematous dermatitis that may involve more than 90% of the skin (César, Cruz, Mota, et al., 2016). Generalized exfoliative dermatitis has a variety of causes. It may occur as a result of a reactive process (e.g., drug allergy) or may be secondary to an underlying skin disease (e.g., psoriasis, contact dermatitis, atopic dermatitis) or a systemic disease (e.g., lymphoma, leukemia). The cause is idiopathic (i.e., unknown) in approximately 16% of cases (Kellen & Berlin, 2016; Umar & Kelly, 2019). Although generalized exfoliative dermatitis may occur at any age, it more commonly appears in those between the ages of 41 and 61 years. It occurs two to four times more commonly in men than in women (Kellen & Berlin, 2016).

Clinical Manifestations

This condition starts as a patchy or generalized erythematous eruption accompanied by fever, malaise, and chills. The skin color changes from pink to dark red. Afterward, the characteristic exfoliation (i.e., scaling) begins, usually in the form of thin flakes that leave the underlying skin smooth and red, with new scales forming as the older ones come off. It may be associated with chills, fever, prostration, and severe pruritus. There is a profound loss of stratum corneum (i.e., outermost layer of the skin), which causes capillary leakage, hypoalbuminemia, and negative nitrogen balance. Because of widespread dilation of cutaneous vessels, large amounts of body heat can be lost. Hair loss may accompany this disorder. The progression of these clinical manifestations varies, depending on the underlying cause. For instance, the progression from fever and scaling may be acute and progress over hours or a couple of days when generalized exfoliative dermatitis results from a drug reaction, or may be insidious and progress over weeks when it is secondary to a skin disease, such as psoriasis (Umar & Kelly, 2019).

Assessment and Diagnostic Findings

The presence of scaling erythematous dermatitis, particularly when it occurs in tandem with a known skin disease or a new prescription medication, increases the suspicion that generalized exfoliative dermatitis may be diagnosed. The patient frequently also presents with hypoalbuminemia and a negative nitrogen balance, as described previously, as well as an increased erythrocyte sedimentation rate that is consistent with an underlying acute inflammatory process. A skin biopsy is indicated, because it may confirm the underlying cause and diagnosis (Umar & Kelly, 2019).

Medical Management

The objectives of management are to discern and treat any underlying disorder, to maintain fluid and electrolyte balance, and to prevent infection. The treatment is individualized and supportive and should be initiated as soon as the condition is diagnosed.

The patient may be hospitalized. All medications that may be implicated are discontinued. A comfortable room temperature should be maintained because the patient does not have normal thermoregulatory control as a result of temperature fluctuations caused by vasodilation and evaporative water loss. Fluid and electrolyte balance must be maintained because there is considerable water and protein loss from the skin surface. Patients in a negative nitrogen balance may be prescribed enteral or parenteral therapy (Umar & Kelly, 2019) (see [Chapters 39](#) and [41](#)).

Nursing Management

Continual nursing assessment is carried out to prevent sepsis. The disrupted, erythematous, moist skin is susceptible to infection and becomes colonized with pathogenic organisms, which produce more inflammation. Antibiotic agents, which are prescribed if infection is present, are selected on the basis of culture and sensitivity.

Hypothermia may occur because of the increased blood flow in the skin, coupled with increased water loss through the skin, leads to heat loss by radiation, conduction, and evaporation. Changes in vital signs are closely monitored and reported. Intake and output are also closely monitored and reported if there is variance.

Topical therapy is used to provide symptomatic relief. Soothing baths, compresses, and lubrication with emollients are used to treat the extensive dermatitis. Topical corticosteroids are the mainstay of treatment (see [Table 56-3](#)). The patient is likely to be extremely irritable because of the severe

pruritus; sedating antihistamines (e.g., hydroxyzine) administered before bedtime may be prescribed to relieve the itching and promote sleep (Umar & Kelly, 2019).

The use of oral or parenteral corticosteroids may be prescribed; however, their use is controversial. They are contraindicated when the cause of the condition is either not known or is suspected to be secondary to an underlying skin disease, such as psoriasis. When generalized exfoliative dermatitis occurs as a complication of psoriasis, systemic corticosteroids can exacerbate the condition (Umar & Kelly, 2019). When a specific cause is known, more specific therapy may be used. The patient is advised to avoid all irritants in the future, particularly medications that are known to cause the condition (Kellen & Berlin, 2016).

BLISTERING DISEASES

Blisters of the skin have many origins, including bacterial, fungal, or viral infections; allergic contact reactions; burns; metabolic disorders; and immunologically mediated (i.e., autoimmune) reactions. Some of these have been discussed previously (e.g., herpes simplex and zoster infections, contact dermatitis).

Immunoglobulin-mediated blistering skin diseases are referred to as *pemphigus* disorders. Of these, there are five subtypes. Three of these are immunoglobulin G (IgG)-mediated disorders, including pemphigus vulgaris, pemphigus foliaceus, and paraneoplastic pemphigus; the remaining two are immunoglobulin A (IgA)-mediated, and include subcorneal pustular dermatosis and intraepidermal neutrophilic dermatosis. Of these five pemphigus disorders, pemphigus vulgaris is the most common; the other four are relatively rare (Estupiñan & Sandhu, 2017; Hertl & Sitaru, 2020). Bullous pemphigoid, another type of IgG-mediated blistering disorder, has distinct characteristics that make this disease different from the pemphigus disorders. Dermatitis herpetiformis is another nonpemphigus IgA-mediated blistering skin disorder that occurs as a consequence of gluten sensitivity. The diagnosis for all of these types of blistering skin disorders is made by immunofluorescent and histologic examination of a biopsy specimen (Hertl & Sitaru, 2020).

Pemphigus Vulgaris

Pemphigus vulgaris is characterized by the appearance of bullae of various sizes on apparently normal skin and mucous membranes. Pemphigus vulgaris is an autoimmune disease in which the IgG antibody is directed against a specific cell surface antigen in epidermal cells causing separation between the epidermis and dermis with subsequent blister formation (Doughty & McNichol, 2016). The blisters form from the antigen–antibody reaction. The level of serum antibody is predictive of disease severity. Genetic factors may also have a role in its development, with the highest incidence in people of Jewish or Mediterranean descent. This disorder usually occurs in men and women in middle and late adulthood (Hertl & Sitaru, 2020).

Assessment and Diagnostic Findings

Most patients present with oral lesions appearing as irregularly shaped erosions that are painful, bleed easily, and heal slowly. The skin bullae enlarge, rupture, and leave large, painful eroded areas that are accompanied by crusting and oozing. A characteristic odor emanates from the bullae and the exuding serum. There is blistering or sloughing of uninvolved skin when minimal pressure is applied (Nikolsky sign). The eroded skin heals slowly, and large areas of the body eventually are involved.

Specimens from the blister and surrounding skin demonstrate **acantholysis** (separation of epidermal cells from each other because of damage to or an abnormality of the intracellular substance), and immunofluorescent studies show intraepidermal presence of IgG (Doughty & McNichol, 2016).

The most common complications arise when the disease process is widespread. Skin bacteria have relatively easy access to the bullae as they ooze, rupture, and leave denuded areas exposed to the environment. Fluid and electrolyte imbalance results from fluid and protein loss as the bullae rupture.

Management

The goals of therapy are to bring the disease under control as rapidly as possible, to prevent loss of serum and the development of secondary infection, and to promote reepithelialization (i.e., renewal of epithelial tissue).

Corticosteroids are given to control the disease and keep the skin free of blisters. The dosage level is maintained until remission is apparent. Immunosuppressive agents (e.g., azathioprine, mycophenolate mofetil) are prescribed early in the course of the disease to help control the disease and

reduce the corticosteroid dose. The monoclonal antibody rituximab may be chosen as an alternative agent, as well as intravenous immunoglobulin (IVIG). The immunosuppressant agent cyclophosphamide may be tried when other medications fail to induce remission (Hertl & Geller, 2020; Kridin, 2018).



For the procedural guidelines for managing immunoglobulin therapy, go to thepoint.lww.com/Brunner15e.

Bullous Pemphigoid

Bullous pemphigoid is a chronic disease that is characterized by periodic flare-up and remission. If untreated, it may be fatal. It is most commonly seen in older adults, with a peak incidence at about 65 years of age. There is no gender or racial predilection, and the disease can be found throughout the world (Chan, 2018).

Assessment and Diagnostic Findings

Bullous pemphigoid is characterized most commonly by the general appearance of tense bullae that have a particular tendency to appear on the flexor surfaces of the arms. When the blisters break, the skin has shallow erosions that heal fairly quickly. Pruritus can be intense, even before the appearance of the blisters (Chan, 2018).

Immunofluorescent studies of skin biopsy specimens from patients with bullous pemphigoid reveal depositions of IgG and complement C3 at the junction of the dermis and epidermis (Chan, 2018).

Management

Medical treatment includes topical corticosteroids for localized eruptions and systemic anti-inflammatory or immunosuppressant medications for widespread involvement. Systemic corticosteroids (e.g., prednisone) may be continued for months, in alternative-day doses. The patient needs to understand the implications of long-term corticosteroid therapy (see

[Chapter 45](#)). Tetracycline may be prescribed, although not for its antimicrobial effectiveness but because its anti-inflammatory properties are believed to be particularly efficacious in treating this disorder. Alternative medications may include immunosuppressive agents (e.g., azathioprine) or monoclonal antibodies (e.g., rituximab). Most patients will achieve remission, although this may require from 6 to 60 months of treatment (Chan, 2018).

Dermatitis Herpetiformis

Dermatitis herpetiformis is an intensely pruritic, chronic disease that manifests with small, tense blisters that are distributed over the extensor surfaces of the elbows and knees, as well as the buttocks and back. It most commonly occurs between 20 and 40 years of age but can appear at any age. It is more common in people of northern European heritage and is slightly more common in men. Patients with dermatitis herpetiformis have a defect in gluten metabolism; many have a concomitant diagnosis of celiac disease (Miller & Zaman, 2020).

Assessment and Diagnostic Findings

Patients typically present with erythematous papules with small, clustered (i.e., herpetiform) vesicles that tend to have a symmetrical distribution on affected extensor surfaces of the skin. Erosions and crusts may also be present, which may result from excoriation and scratching as a reaction to the intense pruritus (Miller & Zaman, 2020).

Immunofluorescent studies of skin biopsy specimens from patients with dermatitis herpetiformis reveal granular patterns of IgA deposits in the papillary dermis (Miller & Zaman, 2020).

Management

Most patients respond to dapsone and to a gluten-free diet. All patients should be screened for glucose-6-phosphate dehydrogenase deficiency because dapsone can induce severe hemolysis in those with this deficiency. Patients benefit from dietary counseling because the dietary restrictions are lifelong, and a gluten-free diet is often difficult to follow (see [Chapter 41](#) for further discussion of gluten-free diets) (Miller & Zaman, 2020). Patients need emotional support as they deal with the process of learning new habits and accepting major changes in their lives.

NURSING PROCESS

Care of the Patient with a Blistering Disease

Assessment

Patients with blistering disorders may experience significant disability. There is constant itching and possible pain in the denuded areas of skin. There may be drainage from the denuded areas, which may be malodorous. Effective assessment and nursing management become a challenge.

Disease activity is monitored clinically by examining the skin for the appearance of new blisters. Particular attention is given to assessing for signs and symptoms of infection. Hyperpigmentation may be seen in areas of resolving blisters.

Diagnosis

NURSING DIAGNOSES

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

- Acute pain of skin and oral cavity associated with blistering and erosions
- Impaired skin integrity associated with ruptured bullae and denuded areas of the skin
- Disturbed body image associated with the appearance of the skin
- Risk for infection associated with loss of protective barrier of skin and mucous membranes
- Hypovolemia associated with loss of tissue fluids

Planning and Goals

The major goals for the patient may include relief of discomfort from lesions, skin healing, improved body image, absence of infection, and achievement of fluid and electrolyte balance.

Nursing Interventions

RELIEVING ORAL DISCOMFORT

Depending on the skin disorder, the patient's entire oral cavity may be affected with erosions and denuded surfaces. Necrotic tissue may develop over these areas, adding to the patient's discomfort and interfering with eating. Weight loss and hypoproteinemia may result. Meticulous oral hygiene is important to keep the oral mucosa clean and allow the epithelium to regenerate. Frequent rinsing of the mouth with

chlorhexidine solution is prescribed to rid the mouth of debris and to soothe ulcerated areas. Commercial mouthwashes are avoided. The lips are kept moist with petrolatum. Cool mist therapy helps humidify environmental air.

ENHANCING SKIN INTEGRITY AND RELIEVING DISCOMFORT

The patient with painful and extensive lesions should be premedicated with analgesic agents before skin care is initiated. Patients with large areas of blistering have a characteristic odor that decreases when secondary infection is controlled. After the patient's skin is bathed, it is dried carefully. Tape should never be used because it may produce more blisters. Hypothermia is common, and measures to keep the patient warm and comfortable are priority nursing activities. The nursing management of patients with bullous skin conditions can be similar to that for patients with extensive burns (see [Chapter 57](#)).

PROMOTING A POSITIVE BODY IMAGE

Attention to the psychological needs of the patient requires listening to the patient, being available, providing expert nursing care, and educating the patient and the family. The patient is encouraged to express anxieties, discomfort, and feelings of hopelessness. Arranging for a family member or a close friend to spend more time with the patient, either live or via distance technology, can be supportive. When patients receive information about the disease and its treatment, uncertainty and anxiety often decrease, and the patient's capacity to act on their own behalf is enhanced. Psychological counseling may assist the patient in dealing with fears, anxiety, and promote positive self-esteem.

PREVENTING INFECTION

The patient is susceptible to infection because the barrier function of the skin is compromised. Bullae are also susceptible to infection, and sepsis may follow (see [Chapter 11](#)). The skin is cleaned to remove debris and dead skin and to prevent infection.

Secondary infection may be accompanied by an unpleasant odor from skin or oral lesions. *Candida albicans* of the mouth (i.e., thrush) commonly affects patients receiving corticosteroid therapy. The oral cavity is inspected daily, and any changes are reported. Oral lesions are slow to heal.



Quality and Safety Nursing Alert

Because infection is the leading cause of death in patients with blistering diseases, meticulous assessment for signs and symptoms of local and systemic infection is required. Seemingly trivial complaints or minimal changes are investigated because corticosteroids can mask or alter typical signs and symptoms of infection.

The patient's vital signs are monitored, and temperature fluctuations are documented. The patient is observed for chills, and all secretions and excretions are monitored for changes suggesting infection. Results of culture and sensitivity tests are monitored. Antimicrobial agents are given as prescribed, and response to treatment is assessed. Health care personnel must perform effective hand hygiene and wear gloves.

In patients who are hospitalized, environmental contamination is reduced as much as possible. Isolation measures, standard precautions, and the use of appropriate PPE are warranted. See [Chapter 32](#), [Chart 32-5](#) for a description of standard precautions.

PROMOTING FLUID BALANCE

Extensive denudation of the skin leads to fluid and electrolyte imbalance because of significant loss of fluids and sodium chloride from the skin. This sodium chloride loss is responsible for many of the systemic symptoms associated with the disease and is treated by IV administration of saline solution.

A large amount of protein and blood is also lost from the denuded skin areas. Blood component therapy may be prescribed to maintain the blood volume, hemoglobin level, and plasma protein concentration. Serum albumin, protein, hemoglobin, and hematocrit values are monitored.

The patient is encouraged to maintain adequate oral fluid intake. Cool, nonirritating fluids are encouraged to maintain hydration. Small, frequent meals or snacks of high-protein, high-calorie foods (e.g., oral nutritional supplements, eggnog, milk shakes) help maintain nutritional status. Parenteral nutrition is considered if the patient cannot eat an adequate diet.

Evaluation

Expected patient outcomes may include:

1. Reports relief from pain of oral lesions
 - a. Identifies therapies that reduce pain

- b. Uses mouthwashes and anesthetic or antiseptic aerosol mouth spray
 - c. Drinks chilled fluids at 2-hour intervals
- 2. Achieves skin healing
 - a. States purpose of therapeutic regimen
 - b. Adheres to soaks and bath regimen
- 3. Reports body image has improved
 - a. Verbalizes concerns about condition, self, and relationships with others
 - b. Participates in self-care
- 4. Remains free of infections and sepsis
 - a. Has cultures from bullae, skin, and orifices that are negative for pathogenic organisms
 - b. Has no purulent drainage
 - c. Shows signs that skin is clearing
 - d. Has normal body temperature
- 5. Maintains fluid and electrolyte balance
 - a. Keeps intake record to ensure adequate fluid intake and normal fluid and electrolyte balance
 - b. Verbalizes the rationale for IV infusion therapy
 - c. Has urine output that is greater than 400 mL daily
 - d. Has serum chemistry and hemoglobin and hematocrit values within normal limits



Toxic Epidermal Necrolysis and Stevens–Johnson Syndrome

Toxic epidermal necrolysis and Stevens–Johnson syndrome are potentially fatal acute skin disorders characterized by widespread erythema and macule formation with blistering, resulting in epidermal detachment or sloughing and erosion formation. These diseases are believed to be one and the same but manifest along a spectrum of reactions, with toxic epidermal necrolysis being the most severe. The mortality rate from toxic epidermal necrolysis is estimated to be 25% to 35% and from Stevens–Johnson syndrome is 1% to 5% (Kellen & Berlin, 2016). Up to 75% of cases of toxic epidermal necrolysis and Stevens–Johnson syndrome are triggered by a reaction to medications, with antibiotics (especially sulfonamides), anticonvulsants, NSAIDs, allopurinol, and oxicam NSAIDs (e.g., meloxicam) frequently implicated (Kellen & Berlin, 2016).

Toxic epidermal necrolysis and Stevens–Johnson syndrome occur in all ages and have a slight predilection for women. The mean age for patients with toxic epidermal necrolysis and Stevens–Johnson syndrome is reported to be between 46 and 63 years. However, older adults who take multiple medications may be at greater risk. There appears to be a genetic component to developing toxic epidermal necrolysis and Stevens–Johnson syndrome. The mechanism leading to toxic epidermal necrolysis and Stevens–Johnson syndrome seems to be a cell-mediated cytotoxic reaction (Cohen, Jellinek, & Schwartz, 2018).

Clinical Manifestations

Toxic epidermal necrolysis and Stevens–Johnson syndrome are characterized initially by conjunctival burning or itching, cutaneous tenderness, fever, cough, sore throat, headache, extreme malaise, and myalgias (i.e., aches and pains). These signs are followed by a rapid onset of erythema involving much of the skin surface and mucous membranes, including the oral mucosa, conjunctiva, and genitalia. In severe cases of mucosal involvement, there may be danger of damage to the larynx, bronchi, and esophagus from ulcerations. Large, flaccid bullae develop in some areas; in other areas, large sheets of epidermis are shed, exposing the underlying dermis. Fingernails, toenails, eyebrows, and eyelashes may be shed along with the surrounding epidermis. The skin is excruciatingly tender, and the loss of skin leaves a weeping surface similar to that of a total-body, partial-thickness burn (Cohen et al., 2018; Kellen & Berlin, 2016).

Complications

Keratoconjunctivitis, sepsis, and multiple organ dysfunction syndrome (MODS) are potential complications of toxic epidermal necrolysis and Stevens–Johnson syndrome. Keratoconjunctivitis can impair vision and result in conjunctival retraction, scarring, and corneal lesions. Sepsis and MODS can be life-threatening (Cohen et al., 2018; Kellen & Berlin, 2016) (see [Chapter 11](#)).

Assessment and Diagnostic Findings

Histologic studies of frozen skin cells from a fresh lesion and cytodiagnosis of collections of cellular material from a freshly denuded area are conducted. A history of the use of medications known to precipitate toxic epidermal necrolysis or Stevens–Johnson syndrome may confirm medication reaction as the underlying cause, especially if the medications were prescribed within 4 weeks prior to the onset of illness (Cohen et al., 2018).

Results from a complete blood count (CBC) may show leukopenia and a normochromic normocytic anemia. Skin biopsy results confirm the diagnosis, showing necrotic keratinocytes with full-thickness epithelial necrosis and detachment (Cohen et al., 2018).

Medical Management

The goals of treatment include control of fluid and electrolyte balance, prevention of sepsis, and prevention of ophthalmic complications. Supportive care is the mainstay of treatment.

Any medications that may be implicated as precipitating toxic epidermal necrolysis or Stevens–Johnson syndrome are discontinued immediately. The patient is treated in a regional burn center because aggressive treatment similar to that for severe burns is required. Tissue samples from the nasopharynx, eyes, ears, blood, urine, skin, and unruptured blisters are obtained for culture to identify pathogenic organisms. IV crystalloid fluids are prescribed to maintain fluid and electrolyte balance, using parameters similar to those used to guide care of patients with burns. Similarly, thermoregulation, wound care, and pain management guidelines used to treat patients with burns are also implemented (Cohen et al., 2018) (see [Chapter 57](#)). Patients frequently require nutritional and metabolic support with total parenteral nutrition (see [Chapter 41](#)).

Initial treatment with systemic corticosteroids (e.g., methylprednisolone), although frequently tried, remains controversial. In many cases, the risk of infection, fluid and electrolyte imbalance, delayed healing, and difficulty in initiating oral corticosteroids early in the course of the disease outweigh its

benefits. Administration of IVIG may provide rapid improvement and skin healing at dosages of 1 g/kg/day for 4 days. Other medications that may be effective include the immunosuppressive agents cyclosporine or cyclophosphamide (Cohen et al., 2018; Kellen & Berlin, 2016).



For the procedural guidelines for managing immunoglobulin therapy, go to thepoint.lww.com/Brunner15e.

Protecting the skin with topical agents is crucial. Various topical antibacterial and anesthetic agents are used to prevent wound sepsis and to assist with pain management. Temporary biologic dressings (e.g., pigskin, amniotic membrane) or plastic semipermeable dressings (e.g., Vigilon™) may be used to reduce pain, decrease evaporation, and prevent secondary infection until the epithelium regenerates. Meticulous oropharyngeal and eye care is essential when there is involvement of the mucous membranes and the eyes.

NURSING PROCESS

Care of the Patient with Toxic Epidermal Necrolysis or Stevens-Johnson Syndrome

Assessment

A careful inspection of the skin is made, including its appearance and the extent of involvement. The normal skin is closely observed to determine if new areas of blisters are developing. Drainage from blisters is monitored for amount, color, and odor. The oral cavity is inspected daily for blistering and erosive lesions; the patient is assessed daily for itching, burning, and dryness of the eyes. The patient's ability to swallow and drink fluids, as well as speak normally, is determined.

The patient's vital signs are monitored, and special attention is given to the presence and character of fever and the respiratory rate, depth, rhythm, and cough. The characteristics and amount of respiratory secretions are observed. Assessment for high fever, tachycardia, and extreme weakness and fatigue is essential because these factors indicate the process of epidermal necrosis, increased metabolic needs, and possible gastrointestinal and respiratory mucosal sloughing. Urine volume, specific gravity, and color are monitored. The insertion sites of IV lines are inspected for signs of local infection. Body weight is recorded daily.

The patient is asked to describe fatigue and pain levels. An attempt is made to evaluate the patient's level of anxiety. The patient's basic coping mechanisms are assessed, and effective coping strategies are identified.

Diagnosis

NURSING DIAGNOSES

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

- Impaired tissue integrity (i.e., oral, eye, and skin) associated with epidermal shedding
- Hypovolemia associated with loss of fluids from denuded skin
- Risk for hypothermia associated with heat loss secondary to skin loss
- Acute pain associated with denuded skin and oral lesions
- Anxiety associated with the physical appearance of the skin and prognosis

COLLABORATIVE PROBLEMS/POTENTIAL COMPLICATIONS

Potential complications may include the following:

- Sepsis
- Conjunctival retraction, scars, and corneal lesions

Planning and Goals

The major goals for the patient may include skin and oral tissue healing, fluid balance, prevention of heat loss, relief of pain, reduced anxiety, and absence of complications.

Nursing Interventions

MAINTAINING SKIN AND MUCOUS MEMBRANE INTEGRITY

The local care of the skin is an important area of nursing management. The skin denudes easily, especially when the patient is lifted and turned. The nursing staff must take special care to avoid friction involving the skin when moving the patient in bed. The skin should be checked after each position change to ensure that no new denuded areas have appeared. The nurse applies the prescribed topical agents to reduce the bacterial population of the wound surface. Warm compresses, if prescribed, should be applied gently to denuded areas. The topical antibacterial agent may be used in conjunction with hydrotherapy in a tank, bathtub, or shower. The nurse monitors the patient's condition during the treatment and encourages the patient to exercise the extremities during hydrotherapy.

The painful oral lesions make oral hygiene difficult. Careful oral hygiene is performed to keep the oral mucosa clean. Prescribed chlorhexidine mouthwashes, anesthetics, or coating agents are used frequently to rid the mouth of debris, soothe ulcerative areas, and control foul mouth odor. The oral cavity is inspected several times each day, and any changes are documented and reported. Petrolatum or a prescribed ointment is applied to the lips.

ATTAINING FLUID BALANCE

The patient's vital signs, urine output, and mental status are assessed for indications of hypovolemia. Mental changes from fluid and electrolyte imbalance, sensory overload, or sensory deprivation may occur. Laboratory test results are evaluated, and abnormal results are reported. The patient is weighed daily.

Oral lesions may result in dysphagia, making tube feeding or parenteral nutrition necessary until oral ingestion can be tolerated. A daily calorie count and accurate recording of all intake and output are essential.

PREVENTING HYPOTHERMIA

The patient with toxic epidermal necrolysis is prone to chilling. Dehydration may be made worse by exposing the denuded skin to a continuous current of warm air. The patient is usually sensitive to changes in room temperature. Measures similar to those implemented for a patient with burns, such as cotton blankets, ceiling-mounted heat lamps, and heat shields, are useful in maintaining body temperature. To minimize shivering and heat loss, the nurse should work rapidly and efficiently when large

wounds are exposed for wound care. The patient's temperature is monitored frequently.

RELIEVING PAIN

The nurse assesses the patient's pain, its characteristics, factors that influence the pain, and the patient's behavioral responses. Prescribed analgesic agents are given on a regular schedule, and the nurse documents pain relief and any side effects. Analgesics are given before painful treatments are performed. Providing thorough explanations and speaking calmly to the patient during treatments can allay the anxiety that may intensify pain. Offering emotional support and reassurance and implementing measures that promote rest and sleep are basic in achieving pain control. As the pain diminishes and the patient has more physical and emotional energy, the nurse may educate the patient in self-management techniques for pain relief, such as progressive muscle relaxation and imagery (see [Chapter 9](#)).

REDUCING ANXIETY

Because the lifestyle of the patient with toxic epidermal necrolysis or Stevens–Johnson syndrome has been abruptly changed to one of complete dependence, an assessment of their emotional state may reveal anxiety, depression, and fear of dying. The patient can be reassured that these reactions are normal. The patient also needs nursing support, honest communication, and hope that the situation can improve. The patient is encouraged to express their feelings. Listening to the patient's concerns and being readily available with skillful and compassionate care are important anxiety-relieving interventions. Emotional support by a psychiatric nurse, spiritual advisor, psychologist, or psychiatrist may be helpful to promote coping during the long recovery period.

MONITORING AND MANAGING POTENTIAL COMPLICATIONS

Sepsis. The major cause of death from toxic epidermal necrolysis is from sepsis. Monitoring vital signs closely and noticing changes in respiratory, kidney, and gastrointestinal function may quickly detect the beginning of an infection. Strict asepsis is always maintained during routine skin care measures. Hand hygiene and wearing sterile gloves when carrying out procedures are essential. Visitors should wear protective garments and wash their hands before and after coming into contact with the patient. People with any infections or infectious disease should not visit the patient until they are no longer a danger to the patient. The nurse is critical in identifying early signs and symptoms of infection and notifying the primary provider. Antibiotic agents are not generally begun until there are signs and symptoms of an infection (Cohen et al., 2018).

Conjunctival Retraction, Scars, and Corneal Lesions. The eyes are inspected daily for signs of pruritus, burning, and dryness, which may

indicate progression to keratoconjunctivitis—the principal eye complication. Applying a cool, damp cloth over the eyes may relieve burning sensations. The eyes are kept clean and observed for signs of discharge or discomfort, and the progression of symptoms is documented and reported. Administering an eye lubricant, when prescribed, may alleviate dryness and prevent corneal abrasion. Using eye patches or reminding the patient to blink periodically may also counteract dryness. The patient is instructed to avoid rubbing the eyes or putting any medication into the eyes that has not been prescribed or recommended by the primary provider.

PROMOTING HOME, COMMUNITY-BASED, AND TRANSITIONAL CARE



Educating Patients About Self-Care.

Patients with toxic epidermal necrolysis or Stevens–Johnson syndrome with involvement of large areas of the skin require care that is similar to that of patients with thermal burns. As the patient completes the acute inpatient stage of illness, the focus is directed toward rehabilitation and outpatient care or care in a rehabilitation center. The patient and family members are involved throughout this care and are instructed in the procedures, such as wound care and dressing changes, that will continue at home. The patient and family members are assisted in acquiring dressing supplies that will be needed at home.

The patient and family members are also provided with education about pain management; nutrition; measures to increase mobility; and prevention of complications, including prevention of infection. They are educated about the signs and symptoms of complications and instructed when to notify the health care provider. Written instructions are provided to the patient and family so that they can refer to this information when necessary (Trommel, Hofland, van Komen, et al., 2019).

Continuing and Transitional Care. Interdisciplinary follow-up care is imperative to ensure that the patient's progress continues. Some patients will require care in a rehabilitation center before returning home. Others will require outpatient physical and occupational therapy for an extended period. When the patient returns home, the home health nurse coordinates the care provided by the various members of the health care team (e.g., physician, physical therapist, occupational therapist, dietician). The nurse also monitors the patient's progress, provides ongoing assessment to identify complications, and monitors the patient's adherence to the plan of care. The patient's adaptation to the home care environment and the patient's and family's needs for support and assistance are also assessed. Referrals to community agencies are made as appropriate (Trommel et al., 2019).

Evaluation

Expected patient outcomes may include:

1. Achieves increasing skin and oral tissue healing
 - a. Demonstrates areas of healing skin
 - b. Swallows fluids and speaks clearly
2. Attains fluid balance
 - a. Demonstrates laboratory values within normal ranges
 - b. Maintains urine volume and specific gravity within acceptable range
 - c. Shows stable vital signs
 - d. Increases intake of oral fluids without discomfort
 - e. Maintains weight or gains weight, if appropriate
3. Attains thermoregulation
 - a. Registers body temperature within normal range
 - b. Reports no chills
4. Achieves pain relief
 - a. Uses analgesic agents as prescribed
 - b. Applies self-management techniques for relief of pain
5. Reports less anxiety
 - a. Discusses concerns freely
 - b. Sleeps for progressively longer periods
6. Absence of complications, such as sepsis and impaired vision
 - a. Has body temperature within normal range
 - b. Demonstrates laboratory values within normal ranges
 - c. Has no abnormal discharges or signs of infection
 - d. Continues to see objects at baseline acuity level
 - e. Shows no signs of keratoconjunctivitis

SKIN TUMORS

Tumors of the skin are common and occur along a spectrum from those that are benign to those that are highly malignant.

Benign Skin Tumors

Cysts

Cysts of the skin are epithelium-lined cavities that contain fluid or solid material. Epidermal cysts (epidermoid cysts) occur frequently and may be described as slow-growing, firm, elevated tumors found most frequently on the face, neck, upper chest, and back. Surgical removal with biopsy of the cyst is typically performed (Docik, Johnson, & Rizk, 2019).

Trichilemmal or pilar cysts are most frequently found on the scalp. They originate from the middle portion of the hair follicle and from the cells of the outer hair root sheath. Treatment is surgical removal (Al Aboud, Yarrarapu, & Patel, 2020).

Seborrheic and Actinic Keratoses

Seborrheic keratoses are benign, wartlike lesions of various sizes and colors, ranging from light tan to black. They are usually located on the face, shoulders, chest, and back and are the most common skin tumors seen in middle-aged and older adults. Although these lesions are benign, they should be assessed periodically for changes in appearance that may suggest malignant transformation (see later discussion) (Norris, 2019). They may be cosmetically unacceptable to the patient. Treatment is removal of the tumor tissue by excision, electrodesiccation (destruction of the skin lesions by monopolar high-frequency electric current) and curettage, or application of carbon dioxide or liquid nitrogen.

Actinic keratoses are premalignant skin lesions that develop in chronically sun-exposed areas of the body. They appear as rough, scaly patches with underlying erythema. These lesions may gradually transform into squamous cell carcinoma (see later discussion); they are usually removed by cryotherapy, electrodesiccation, or lasers, or they may be treated with topical chemotherapeutic creams (e.g., 5-fluorouracil cream) (Doughty & McNichol, 2016).

Verrucae: Warts

Warts are common, benign skin tumors caused by infection with the human papillomavirus, which belongs to the DNA virus group. People of all ages may be affected, but the warts occur most frequently between the ages of 12 and 16 years. There are many types of warts.

As a rule, warts are asymptomatic, except when they occur on weight-bearing areas, such as the soles of the feet. They may be treated with locally applied laser therapy, liquid nitrogen, salicylic acid plasters, or electrodesiccation (Dlugasch & Story, 2021).

Warts occurring on the genitalia and perianal areas are known as condylomata acuminata. They may be transmitted sexually and are treated with liquid nitrogen, cryosurgery, electrosurgery, topically applied

trichloroacetic acid, and curettage. Condylomata that affect the uterine cervix predispose the patient to cervical cancer (see [Chapter 51](#)).

Angiomas

Angiomas are benign vascular tumors that involve the skin and the subcutaneous tissues. They are present at birth and may occur as flat, violet-red patches (port-wine angiomas) or as raised, bright red, nodular lesions (i.e., hemangiomas of infancy, formerly known as strawberry angiomas). The latter tend to involute spontaneously within the first few years of life, but port-wine angiomas usually persist indefinitely. Most patients use masking cosmetics to camouflage the lesions. Cherry angiomas are small, smooth deep red papules found on the trunk of most adults older than 30 years of age that are benign and generally not considered cosmetically problematic (Norris, 2019).

Pigmented Nevi: Moles

Moles are common skin tumors of various sizes and shades, ranging from yellowish brown to black. They may be flat, macular lesions or elevated papules or nodules that occasionally contain hair. Most pigmented nevi are harmless lesions. However, in rare cases, malignant changes occur, and a melanoma develops at the site of the nevus. Nevi that show a change in color or size, become symptomatic (e.g., itch), or develop irregular borders should be removed to determine if malignant changes have occurred. Moles that occur in unusual places should be examined carefully for any irregularity and for notching of the border and variation in color. Nevi larger than 6 mm should be examined carefully. Excised nevi should be examined histologically (Hunt, Schaffer, & Bolognia, 2020).

Keloids

Keloids are benign overgrowths of fibrous tissue at the site of a scar or trauma. They are more common among people with dark skin. Keloids are asymptomatic but may cause disfigurement and cosmetic concerns. Treatment may consist of surgical excision, intralesional corticosteroid therapy or chemotherapy, laser therapy, or radiation (Doughty & McNichol, 2016).

Dermatofibroma

A dermatofibroma is a common, benign tumor of connective tissue that occurs predominantly on the lower extremities. It is a firm, dome-shaped nodule that may be of the same color as the patient's skin, or may present in a variety of colors, most commonly pink or brown. Treatment is not typically indicated,

unless the patient finds it cosmetically unappealing. The tumor may be removed surgically, although scarring can occur. If the tumor is prominently raised, liquid nitrogen application may be a better option for treatment (Goldstein & Goldstein, 2020).

Neurofibromatosis: Von Recklinghausen Disease

Neurofibromatosis is an autosomal dominant genetic disorder manifested by *café-au-lait* macules (pigmented patches), axillary and inguinal freckling, cutaneous neurofibromas (soft, fleshy, benign skin tumors), and peripheral neurofibromas (benign peripheral nerve sheath tumors) that vary in size. Patients with neurofibromatosis are at risk for developing other benign and malignant tumors (e.g., sarcomas, astrocytomas) (Korf, Lobbous, & Metrock, 2020).

Malignant Skin Tumors

Skin cancer is the most common cancer in the United States. Each year, more people are diagnosed with skin cancer than all other cancers combined. It is estimated that at least one in five Americans will have skin cancer by age 70. The cost of treating Americans with skin cancers is estimated at \$8.1 billion annually (Skin Cancer Foundation, 2020a). Because the skin is easily inspected, skin cancer is readily seen and detected and is therefore believed to be amenable to early intervention.

Exposure to UV radiation, including the sun and artificial UV rays (e.g., tanning booths) is the leading preventable cause of skin cancer; incidence is related to the total amount of exposure to UV radiation. Damage is cumulative, and harmful effects may be severe by 18 years of age (Skin Cancer Foundation, 2020a). Skin cancers in adults tend to manifest after a 20- to 50-year latency period post-UV radiation exposure (Bader, 2020) ([Chart 56-5](#)). Over 99% of all skin cancers include melanoma and the two most common types of nonmelanoma skin cancers, basal cell carcinoma and squamous cell carcinoma (American Cancer Society [ACS], 2020a).

Basal Cell Carcinoma and Squamous Cell Carcinoma

Basal cell carcinoma is the most prevalent skin cancer in the United States, responsible for 80% of all skin cancers in both men and women. It is rarely associated with any morbidity and rarely causes death. It is twice as common in men than women (Bader, 2020). Although less common than basal cell carcinoma, squamous cell carcinoma is the second most prevalent skin cancer in the United States. It is two to three times more common in men than women

(Najjar, 2020). Although less aggressive than melanoma, squamous cell carcinoma is believed to be responsible for at least 15,000 deaths annually (Skin Cancer Foundation, 2020a).

Chart 56-5



RISK FACTORS

Skin Cancer

- Adults <30 years^a and >50 years of age; risk increases with age
- Family history of skin cancer
- Having a large number of nevi (i.e., moles) or having dysplastic nevi (i.e., atypical, large moles)
- History of heavy ultraviolet light exposure (e.g., sun exposure, tanning beds, sun lamps)
- History of sunburns
- Immune suppression (e.g., acquired immune deficiency syndrome)^a
- Males
- People who have blond or red hair
- People who have blue or green eyes
- People who are light skinned, particularly with skin that burns, freckles, or reddens easily
- Personal prior history of skin cancer

^aThese are risks specific to melanoma.

Adapted from American Cancer Society (ACS). (2019b). Melanoma skin cancer causes, risk factors, and prevention. Retrieved on 10/19/2020 at:

www.cancer.org/content/dam/CRC/PDF/Public/8824.00.pdf;

Centers for Disease Control and Prevention (CDC). (2020). What are the risk factors for skin cancer? Retrieved on 10/19/2020 at: www.cdc.gov/cancer/skin/basic_info/risk_factors.htm

Clinical Manifestations

Basal cell carcinoma generally appears on sun-exposed areas of the body, such as the face, neck, hands, and scalp. Basal cell carcinoma usually begins as a small, waxy nodule with rolled, translucent, pearly borders; telangiectatic vessels may be present. As it grows, it undergoes central ulceration and

sometimes crusting (Fig. 56-8A). The tumors appear most frequently on the face. Basal cell carcinoma is characterized by invasion and erosion of contiguous (adjoining) tissues. It rarely metastasizes, but recurrence is common. However, a neglected lesion can result in the loss of a nose, an ear, or a lip. Other variants of basal cell carcinoma may appear as shiny, flat, gray, or yellowish plaques (Bader, 2020).

Squamous cell carcinoma is a malignant proliferation arising from the epidermis. Its precursor is typically actinic keratosis (see previous discussion). Although it usually appears on sun-damaged skin, it may arise from normal skin or from preexisting skin lesions. It is of greater concern than basal cell carcinoma because it is an invasive carcinoma, metastasizing in 4% to 8% of cases by the blood or lymphatic system (Najjar, 2020).

Squamous cell carcinoma appears as a rough, thickened, scaly tumor that may be asymptomatic or may bleed (Fig. 56-8B). The border of a squamous cell carcinoma lesion may be wider, more infiltrated, and more inflammatory than that of a basal cell carcinoma lesion. Secondary infection can occur. Exposed areas, especially of the upper extremities and of the face, lower lip, ears, nose, and forehead, are common sites (Najjar, 2020). The prognosis for squamous cell carcinoma depends on the incidence of metastases, which is related to the histologic type and the level or depth of invasion. Regional lymph nodes should be evaluated for metastases (Najjar, 2020).

Medical Management

The goal of treatment is to eradicate the tumor. The treatment method depends on the tumor location; the cell type, location, and depth; the cosmetic desires of the patient; the history of previous treatment; whether the tumor is invasive; and whether metastatic nodes are present. Management of basal cell carcinoma and squamous cell carcinoma includes surgical excision, which may include Mohs micrographic surgery, electrosurgery, or cryosurgery. In patients who are not surgical candidates, alternatives such as radiation therapy, photodynamic therapy, or topical chemotherapeutic creams may be viable options (Bader, 2020).

Surgical Management

The main goal is to remove the tumor entirely. The best way to maintain cosmetic appearance is to place the incision properly along natural skin tension lines and natural anatomic body lines. In this way, scars are less noticeable. The size of the incision depends on the tumor size and location but usually involves a length-to-width ratio of 3:1.

The adequacy of the surgical excision is verified by microscopic evaluation of sections of the specimen. When the tumor is large, reconstructive surgery with the use of a skin flap or skin grafting may be required. The incision is

closed in layers to enhance cosmetic effect. A pressure dressing applied over the wound provides support. Infection after a simple excision is uncommon if proper surgical asepsis is maintained.

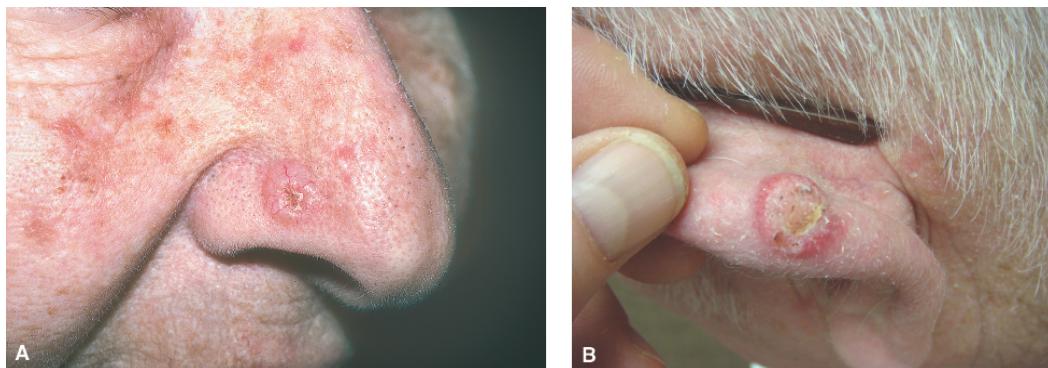


Figure 56-8 • Basal cell carcinoma (**A**) and squamous cell carcinoma (**B**). Reprinted with permission from Goodheart, H. P. (2011). *Goodheart's same-site differential diagnosis: A rapid method of diagnosing and treating common skin disorders*. Philadelphia, PA: Lippincott Williams & Wilkins.

Mohs Micrographic Surgery

This technique is the most accurate surgical technique and best conserves normal tissue. The procedure removes the tumor layer by layer. The first layer excised includes all evident tumor and a small margin of normal-appearing tissue. The specimen is frozen and analyzed by section to determine if all of the tumor has been removed. If not, additional layers of tissue are shaved and examined until all tissue margins are tumor free. In this manner, only the tumor and a safe, normal tissue margin are removed. Mohs surgery is the recommended tissue-sparing procedure, with extremely high cure rates for basal cell carcinoma and squamous cell carcinoma. It is the treatment of choice and the most effective for tumors around the eyes, nose, upper lip, and auricular and periauricular areas (Najjar, 2020).

Electrosurgery

Electrosurgery is the destruction or removal of tissue by electrical energy. The current is converted to heat, which then passes to the tissue from a cold electrode. Electrosurgery may be preceded by curettage (excising the skin tumor by scraping its surface with a curette). Electrodesiccation is then implemented to achieve hemostasis and to destroy any viable malignant cells at the base of the wound or along its edges. Electrodesiccation and curettage is useful for lesions smaller than 1 to 2 cm (0.4 to 0.8 inch) in diameter.

This method takes advantage of the fact that the tumor is softer than the surrounding skin and therefore can be outlined by a curette, which “feels” the

extent of the tumor. The tumor is removed and the base cauterized. The process is repeated twice. Usually, healing occurs within 1 month (Bader, 2020).

Cryosurgery

Cryosurgery destroys the tumor by deep-freezing the tissue. A thermocouple needle apparatus is inserted into the skin, and liquid nitrogen is directed to the center of the tumor until the tumor base is -40° to -60°C (-40° to -76°F). Liquid nitrogen has the lowest boiling point of all cryogens, is inexpensive, and is easy to obtain. The tumor tissue is frozen, allowed to thaw, and then refrozen. The site thaws naturally and then becomes gelatinous and heals spontaneously. Swelling and edema follow the freezing. The appearance of the lesion varies. Normal healing, which may take 4 to 6 weeks, occurs faster in areas with a good blood supply (Bader, 2020).

Nonsurgical Alternative Therapies

Some older adult patients may defer surgical treatment options. Furthermore, in some cases, lesions may be extensive or are located on sites where wide surgical excision is not practical to achieve (e.g., cancer of the eyelid, tip of the nose). In these cases, local radiation therapy (see [Chapter 12](#)) or photodynamic therapy may prove reasonable alternatives. Photodynamic therapy involves application of 5-aminolevulinic acid to the lesion, which is then followed by photoactivation with directed blue light for approximately 1 hour. This has the effect of locally destroying the neoplastic cells, with good cosmetic results. Topical application of 5-fluorouracil cream (a chemotherapeutic agent) may be tried as another alternative to managing superficial basal cell carcinoma (Bader, 2020).

The patient should be informed that the skin may become red and blistered after any of these therapies. A bland skin ointment prescribed by the primary provider may be applied to relieve discomfort. The patient should also be cautioned to avoid exposure to the sun.

Nursing Management

Because many skin cancers are removed by excision, patients are usually treated in outpatient surgical units. The role of the nurse is to educate the patient about prevention of skin cancer ([Chart 56-6](#)) and self-care after treatment.

Promoting Home, Community-Based, and Transitional Care



Educating Patients About Self-Care

The wound is usually covered with a dressing to protect the site from physical trauma, external irritants, and contaminants. The patient is advised when to report for a dressing change or is given written and verbal information on how to change dressings, including the type of dressing to purchase, how to remove dressings and apply fresh ones, and the importance of hand hygiene before and after the procedure.

Chart 56-6



HEALTH PROMOTION

Preventing Skin Cancer

Minimize sun exposure:

- To the extent possible, avoid sun between the hours of 10 AM and 4 PM.
- Wear protective clothing (e.g., long-sleeved clothing, broad-brimmed hats).
- Seek shady areas when outdoors.
- Wear sunglasses when outdoors to protect the sensitive skin around the eyes.
- Use caution around snow and water because of reflective sun rays.

Use sunscreen:

- Use a sunscreen with a sun protection factor (SPF) of 15 or higher that protects against both ultraviolet-A (UVA) and ultraviolet-B (UVB) rays.
- Apply generously 20 minutes prior to sun exposure (e.g., going outdoors).
- Reapply every 2 hours, or immediately after swimming.
- Use lip balm with SPF of 15 or higher.

Do not use artificial ultraviolet sources (e.g., tanning beds and booths).

Check your skin regularly:

- Perform self-examination monthly.
- Schedule an examination by primary provider yearly, if over the age of 50 years.

Strengthen your immune system:

- Do not smoke/quit smoking.

Adapted from American Cancer Society (ACS). (2019a). Can basal and squamous cell skin cancers be prevented? Retrieved on 4/5/2020 at: www.cancer.org/cancer/basal-and-squamous-cell-skin-cancer/causes-risks-prevention/prevention.html

The patient is advised to watch for excessive bleeding and tight dressings that compromise circulation. If the lesion is in the perioral area, the patient is instructed to drink liquids through a straw and limit talking and facial movement. Dental work should be avoided until the area is completely healed.

After the sutures are removed, an emollient cream may be used to help reduce dryness. Applying a sunscreen over the wound is advised to prevent postoperative hyperpigmentation if the patient spends time outdoors.

Follow-up examinations should be at regular intervals, usually every 3 months for a year, and should include palpation of the adjacent lymph nodes. The patient should also be instructed to seek treatment for any moles that are subject to repeated friction and irritation and to watch for indications of potential malignancy in moles as described previously. The importance of lifelong follow-up evaluations is emphasized.

Melanoma

A melanoma is a cancerous neoplasm characterized by neoplastic melanocytes present in the epidermis and the dermis (and sometimes the subcutaneous cells). Although melanoma only accounts for 1% of all skin cancers, it is responsible for approximately 6,850 deaths annually (Siegel, Miller, & Jemal, 2020). White Americans are 20 times more at risk for melanoma than Black Americans. It may strike adults of any age; however, the average age at diagnosis is 65 years. It is more prevalent among women than men younger than 50 years of age; by 65 years of age, it is twice as common among men than women and, by 80 years of age, is three times as common among men than women (Tan, 2020). Risk factors for melanoma are noted in [Chart 56-5](#).

Clinical Manifestations

Melanoma may manifest as a change in a nevus or a new growth on the skin, arising from cutaneous epidermal melanocytes. A malignant melanoma is typically dark, red or blue colored, or a mix of any of these, and irregular in shape. It may be associated with itching, rapid growth, ulceration, or bleeding. This type of malignancy is found more frequently in the lower extremities in women, and in the trunk, neck, or head in men (National Cancer Institute [NCI], 2020). Rarely, melanomas may develop in the uveal tract of the eye or the mucosal lining of the gastrointestinal or genitourinary tract (Tan, 2020).

Melanoma can occur in one of the several forms: superficial spreading, lentigo maligna, nodular, acral lentiginous, mucosal lentiginous, desmoplastic, and verrucous melanoma (the last three are rarely seen) ([Fig. 56-9](#)). Each of these types have specific histologic features; however, the histologic features do not dictate treatment options and are not associated with differential prognoses (NCI, 2020).

Melanomas spread in two growth phases: radial and vertical. During the first growth phase—the radial phase—the tumor tends to spread radially within the epidermis. It is during this earlier phase of radial growth that the tumor is

most amenable to treatment. The second growth phase—the vertical phase—is characterized by vertical tumor growth into the dermal layer and eventual metastasis. Melanomas that progress more rapidly from the radial to the vertical growth phase are considered more aggressive types and have a poorer prognosis (Tan, 2020).



Figure 56-9 • Two forms of melanoma: superficial spreading (**left**) and nodular (**right**).

Assessment and Diagnostic Findings

Biopsy results confirm the diagnosis of melanoma. An excisional biopsy specimen provides information on the type, level of invasion, and thickness of the lesion. A specimen that includes a 1- to 2-cm margin of normal tissue and a portion of underlying subcutaneous fatty tissue is sufficient for staging a melanoma *in situ* or an early, noninvasive melanoma. Incisional biopsy should be performed when the suspicious lesion is too large to be removed safely without extensive scarring. Biopsy specimens obtained by shaving, curettage, or needle aspiration are not considered reliable histologic proof of disease (Tan, 2020).

A thorough history and physical examination should include a meticulous skin examination and palpation of regional lymph nodes that may drain the area surrounding the tumor. Because melanoma occurs in families, a positive family history of melanoma is investigated so that first-degree relatives, who may be at high risk for melanoma, can be evaluated for atypical lesions. After the diagnosis of melanoma has been confirmed, a chest x-ray, CBC, complete chemistry panel with creatinine, liver function tests, and lactate dehydrogenase (LDH) are usually performed. The LDH may be elevated in the presence of metastatic disease. Depending on the results of these tests, magnetic resonance imaging of the brain, computed tomography scans of the chest, abdomen, or pelvis, and positron emission tomography scans of the lymphatics may be indicated to further stage the extent of disease (Tan, 2020).

Staging of the tumor follows the TNM (tumor, nodes, metastasis) classification system (see [Chapter 12](#)) and is used to determine appropriate treatment (NCI, 2020):

- Stage 0: tumor in situ with only epidermal lesion
- Stage 1: tumor 2 mm thick or less without lymph node involvement or distant metastasis
- Stage 2: tumor more than 2 mm thick without lymph node involvement or distant metastasis
- Stage 3: tumor of any thickness with involvement of at least one lymph node but no distant metastasis
- Stage 4: tumor of any thickness, with or without lymph node involvement, and with distant metastasis

Patients with either stage 0 or stage 1 disease have a better than 99% likelihood of survival 5 years post diagnosis (ACS, 2019c). Early detection and treatment are thus key to ensuring good outcomes over the long term.

Medical Management

Treatment depends on the stage of the tumor and the tumor type. Surgical excision is the treatment of choice for small, superficial lesions. Deeper lesions require wide local excision, after which skin grafting may be necessary. Sentinel lymph node biopsy is commonly performed to examine the nodes nearest the tumor and to spare the patient the long-term sequelae of extensive removal of lymph nodes if the sampled nodes are negative. If these are positive, lymph node dissection may be indicated (Tan, 2020).

Patients with tumor cells present in multiple lymph nodes may benefit from radiation therapy to that chain of lymph nodes post dissection. It is thought that radiation therapy not only thwarts the recurrence of tumor cells within the lymphatics, but also improves the overall efficacy of checkpoint inhibitor therapy, a clear benefit for patients for whom that treatment is indicated (i.e., patients who are *BRAF* negative) (see following discussion) (NCI, 2020).

Patients with stage 2 tumors considered at risk for relapse were traditionally prescribed interferon alfa-2 therapy; however, long-term data did not support its therapeutic benefit. These patients tend to be managed with surgical excision only and then close ongoing monitoring for recurrence or metastasis (ACS, 2019c; NCI, 2020; Tan, 2020).

Patients with stage 3 and stage 4 tumors may be managed with intravenous checkpoint inhibitors, such as pembrolizumab, nivolumab, or ipilimumab. Checkpoint inhibitors enhance the action of T cells by inhibiting a specific “off” switch on their cellular surfaces, making them more effective in targeting and attacking cancer cells (ACS, 2019c; NCI, 2020; Tan, 2020). At least half of all patients with melanoma have a *BRAF* genetic mutation (NIC, 2020; Tan, 2020). These patients may be prescribed a *BRAF* inhibitor, to turn off the

function of the *BRAF* mutation responsible for tumor growth. This therapy is typically prescribed along with an *MEK* inhibitor, as the *MEK* gene works in tandem with the *BRAF* mutation. This type of therapeutic regimen, called *targeted therapy*, may be prescribed in lieu of checkpoint inhibitors. Both *BRAF* inhibitors (dabrafenib, encorafenib, and vemurafenib) and *MEK* inhibitors (trametinib, cobimetinib, and binimetinib) may be administered orally. *BRAF* inhibitors are associated with an increased incidence of squamous cell carcinomas of the skin, however (NCI, 2020).

Patients who are diagnosed with melanoma are at high risk for a second melanoma or a recurrence of their primary tumor. Intralesional injection of an immunotherapeutic vaccine, talimogene laherparepvec, may be indicated in patients with recurrence of tumor that is considered nonresectable. Talimogene laherparepvec is a genetically modified oncolytic agent that is derived from herpes simplex-1 virus. Its use is associated with decreased tumor mass, although there is not an overall improvement in long-term survival (NCI, 2020).

Nursing Management

The best hope for decreasing the incidence of advanced melanoma lies in educating patients to recognize its early signs, when it is amenable to treatment and cure. The nurse educates patients at risk to examine their skin and scalp monthly in a systematic manner and to seek prompt medical attention if changes are detected. This is especially true for patients with a prior history of melanoma, as the likelihood of a second melanoma is higher than in patients without a personal history of having had melanoma (Tan, 2020). The AAD provides multimedia resources on performing skin self-examination (see the Resources section at the end of this chapter).

An important risk factor in the development of melanoma is exposure to UV radiation (e.g., sunlight). Irrespective of the presence or absence of other risks, all patients should be educated about the risks of UV radiation exposure and methods to mitigate that risk (e.g., sunscreen, shade). A group particularly at risk is young adult athletes, especially women (McGuffin, Jordan, Langford, et al., 2019; Orsimarsi, 2019). See the Nursing Research Profile in [Chart 56-7](#).

The presence of nevi, particularly multiple nevi, is another risk factor for melanoma that should be addressed. The nurse educates patients with nevi how to self-assess for signs that may suggest malignant transformation, referred to as the *ABCDEs of Moles* ([Chart 56-8](#)). Evidence of these types of changes should be promptly reported to the patient's primary provider for further evaluation. Patients should also be on the alert for formation of the proverbial *Ugly Duckling* nevus, which may appear different from other nevi. In addition, reportable symptoms that may be consistent with a melanotic malignancy

include pruritus, tenderness, and pain at the site of a nevus (Skin Care Foundation, 2020b).

The patient with a new diagnosis of advanced melanoma must be prepared for wide surgical excision. A melanoma may present on any skin surface, although they tend to appear on surfaces exposed to sun (e.g., extremities, head). Surgical removal of melanoma in different locations presents different challenges, taking into consideration the removal of the primary melanoma, and whether or not multiple sentinel lymph nodes evidence cancerous spread, necessitating lymph node dissection. A split- or full-thickness skin graft may be necessary when large defects are created by surgical removal of a melanoma (see [Chapter 57](#) for further discussion of skin grafts). Nursing interventions after surgery for melanoma center on promoting comfort, including anticipating the need for and administration of appropriate analgesic medications (see [Chapter 9](#)).

Psychological support is essential when surgery that might be disfiguring is performed ([Chart 56-9](#)). Support includes encouraging the patient to express anxieties and feelings about the seriousness of the neoplasm and conveying understanding of these feelings. During the diagnostic workup and staging of the depth, type, and extent of the tumor, the nurse answers questions, provides information, and helps clarify misconceptions. Learning that they have a melanoma can cause the patient considerable fear and anguish. Pointing out the patient's resources, past effective coping mechanisms, and social support systems helps the patient cope with the diagnosis and need for treatment and continuing follow-up. Family members should be included in all discussions to enable them to clarify information, ask questions that the patient might be reluctant to ask, and provide emotional support to the patient.

Chart 56-7



NURSING RESEARCH PROFILE

Sun Safety in Female College Athletes

McGuffin, K. S., Jordan, K., Langford, D., et al. (2019). Assessing knowledge, attitudes, and behaviors regarding sun safety in female collegiate athletes. *Journal of the Dermatology Nurses' Association*, 11(1), 20–33.

Purpose

Melanoma is a common type of cancer among young adults, and its incidence has been rising for the past 30 years. Young adult athletes who compete in outdoor sports are at high risk for melanoma because they spend long hours exposed to ultraviolet (UV) radiation (i.e., sunlight) during games, matches, and practices. Young women are at greater risk for melanoma than young men, and frequently develop melanotic lesions in their extremities. Thus, women college athletes who compete in outdoor sports are especially at risk for melanoma, since their extremities are subjected to long-UV-radiation exposure. The purpose of this research study was to find if an education intervention would improve knowledge, attitudes, and behaviors on sun protection practices among female college athletes.

Design

The setting for this study was a public university in North Carolina. All varsity women athletes who competed in track, soccer, softball, tennis, and cross country were eligible and invited to participate, and all consented ($N = 81$). The researchers designed a brief 15-minute education intervention with PowerPoint™ images on sun safety practices, and delivered the intervention in a classroom setting in the university athletic offices. Participants took a pretest immediately prior to the intervention, which was a modified version of the Melanoma Risk Behavior Survey. The same survey was taken as the posttest immediately after the intervention was completed, and again 3 months after the intervention was completed. A paired t -test was done between the pretest and the posttests to determine whether or not there were improvements in knowledge, attitudes, and behaviors on sun safety practices among participants.

Findings

Participants' knowledge of sun safety significantly improved from pretest to the first posttest ($t = 15.232$, $p \leq 0.001$). This improvement was sustained from pretest to the second posttest 3 months post intervention ($t = 14.366$, $p \leq 0.001$). Moreover, 3 months postintervention, 79.1% of participants self-reported that they applied sunscreen more often than they had preintervention and experienced fewer sunburns post intervention; 91.6% affirmed that they would continue to engage in sun safety in the future.

Nursing Implications

On an anecdotal level, the researchers noted that many participants were surprised to learn of their melanoma risks. In particular, women athletes with

dark skin did not see the need to use sunscreen and practice sun safety. While individuals with darker skin are at lesser risk of skin cancer than those with lighter skin, anyone afflicted with a sunburn has a higher risk of melanoma. This education intervention was concise and yet focused and ultimately, effective in its aim. It can be readily replicated in other college and high school settings. Future interventions could be delivered not only to the athletes, but also to their trainers and coaches, who could continue to encourage sun safety among young adult athletes.

Promoting Home, Community-Based, and Transitional Care

The patient with advanced melanoma will be prescribed either targeted therapy or a checkpoint inhibitor, depending upon the patient's *BRAF* status (see previous discussion). Because the agents that comprise targeted therapy for the patient who is *BRAF* positive may be administered orally, the patient can self-administer them at home, a key advantage. These agents have few side effects, most of which tend to be cutaneous (e.g., rashes, photosensitivity). In addition, patients taking these agents are at greater risk for developing squamous cell carcinomas (ACS, 2019d). Patients on these regimens should be educated to self-assess their skin and promptly report any signs to their primary provider for definitive follow-up. The importance of engaging in sun safety protocols including seeking shade whenever feasible when outdoors, and applying sunscreen, cannot be overemphasized.

The patient who is *BRAF* negative likely will be prescribed a checkpoint inhibitor. These agents must be administered IV; therefore, the patient must anticipate receiving treatments in an infusion center. Treatments are typically administered every 2 to 3 weeks for up to a year. However, the checkpoint inhibitors may be administered via a peripheral vein, and so the patient need not have an IV port placed. Furthermore, these agents tend to be tolerated better than most chemotherapeutic agents. The most commonly noted side effects include fatigue, rash, and diarrhea or constipation (ACS, 2020b). Patients receiving these agents should be educated to monitor for and promptly report side effects and to engage in sun safety protocols.

Chart 56-8



ASSESSMENT

Assessing the ABCDEs of Moles

Melanomas may be distinguished from benign nevi, using the following characteristics:

A for Asymmetry

- The lesion does not appear balanced on both sides. If an imaginary line was drawn down the middle, the two halves would not look alike.
- The lesion has an irregular surface with irregular topography (uneven elevations) either palpable or visible. A change in the surface may be noted from smooth to scaly.

B for Irregular Border

- Angular indentations or multiple notches appear in the border.
- The border is fuzzy or indistinct, as if rubbed with an eraser.

C for Variegated Color

- Benign moles are usually a uniform light to medium brown. Darker coloration indicates that the melanocytes have penetrated to a deeper layer of the dermis.
- Colors that may indicate malignancy if found together within a single lesion are shades of red, white, and blue; shades of blue are ominous.
- White areas within a pigmented lesion are suspicious.
- Some melanomas, however, are not variegated but are uniformly colored (bluish-black, bluish-gray, bluish-red).

D for Diameter

- A diameter >6 mm (about the size of a pencil eraser) is considered more suspicious, although this finding without other signs is not significant. Many benign skin growths are larger than 6 mm, whereas some early melanomas may be smaller.

E for Evolving

- Benign moles appear the same over time; when a mole starts to change in appearance, in size, shape, color, or elevation, it may suggest malignancy.

Adapted from Skin Cancer Foundation. (2020b). Warning signs: The ABCDEs of melanoma. Retrieved on 10/23/2020 at: www.skincancer.org/skin-cancer-information/melanoma/melanoma-warning-signs-and-images/#abcde

Chart 56-9



ETHICAL DILEMMA

Should Crowdfunding for Nonevidence-Based Therapies Be Permitted?

Case Scenario

You work as a nurse navigator in a surgical oncology clinic. O.G. is a 29-year-old woman who was referred to the clinic by her dermatologist for evaluation of a melanoma on her right upper arm. The surgical oncologist that examined O.G. wishes to perform a wide excision of her tumor with graft placement. You have an appointment set up with O.G. to coordinate her care between the surgical oncologist, a plastic surgeon (for the anticipated skin graft that will be performed after the tumor is excised), and a medical oncologist (for coordination of postoperative treatments). During your visit, O.G. states that she is reluctant to have the surgery since she believes it will be disfiguring. She tells you that her older sister was diagnosed with a melanoma 2 years ago that was successfully treated using black salve prescribed by a homeopathic physician in Mumbai, India. Although O.G. cannot afford to travel to India to pursue these treatments, her sister has offered to manage a GoFundMe™ site for her so that she might be able to pursue this option, which she finds more palatable than the treatment plan proposed by the surgical oncologist.

Discussion

Using social media to engage in crowdfunding, or online solicitation for donations, has become very popular over the past several years. Crowdfunding to solicit donations for medical procedures, therapies, or travel and other expenses related to pursuing medical treatment, is particularly commonplace. Bioethicists have criticized the use of medical crowdfunding for several reasons. Arguably, donors to crowdfunding platforms tend to favor people who seem more appealing or relatable, which can result in further widening of disparities in access to health care resources (causing a *distributive justice* dilemma). For instance, few people seeking donor support for obesity-related medical services are successful in raising funds on these sites, as persons with obesity may seem less appealing to some donors. Likewise, fewer people from ethnic minority groups tend to be successful in fundraising efforts than people who appear to be White and middle-class. Furthermore, not all people for whom funds are ostensibly raised may fully understand or consent to the setup of their fundraising platforms. These individuals may be coerced to do so by others, or lack the ability to fully comprehend what is being done on their behalf, or may be deceived by their fundraisers and not receive the funds raised for their relief.

Many patients with cancer use complementary and alternative medicine to assist them in managing the myriad of symptoms associated with cancer. Most patients use complementary and alternative therapies to complement mainstream medical treatments (i.e., allopathic medicine). However, some patients may elect to singularly pursue complementary and alternative therapy in lieu of evidence-based allopathic medical treatment. Crowdfunding can be used to try to finance these treatments, which are not covered by

health insurance policies. Crowdfunding platforms have been criticized for not blocking the setup of these types of solicitations from their sites.

Analysis

- Describe the ethical principles that are in conflict in this case (see [Chapter 1, Chart 1-7](#)). Do you believe that O.G. has the right to determine what treatment options are best for her, even when the treatment option she chooses is not evidence-based? How would you assure your role to do what is in O.G.'s best interests without threatening her right to self-determination and without taking on a paternalistic tone (i.e., *I know what is best for you*)?
- How might family dynamics be affecting O.G.'s decision to pursue treatment options? It is not uncommon for patients with melanoma to have first-degree relatives who also have melanoma. How might O.G.'s relationship with her older sister, and her sister's previous treatment for melanoma, affect O.G.'s decision making now?
- What resources might you use to help you advocate for O.G. and assure that resources targeted to treat her melanoma are used in a just manner? How might O.G.'s medical crowdfunding platform affect the well-being of other patients with melanoma?

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Resources

See [Chapter 1, Chart 1-10](#) for Steps of an Ethical Analysis and Ethics Resources.



Educating Patients About Self-Care

Until a few years ago, patients with metastatic disease had a grim prognosis. With the advent of targeted therapy and checkpoint inhibitors within the past decade, hope for remission and even cure is possible. Patients with metastatic disease and their family members should be given this positive news when they seek treatment. However, there are still instances where remission or cure is not possible. There is some evidence that patients with metastatic disease

who are at end-of-life are not linked into palliative care services appropriately when they are near death, as it is becoming difficult to clearly identify when treatments aimed at remission have failed (Fox, Rosenberg, Ekberg, et al., 2020). The nurse caring for a patient with metastatic melanoma who is nearing end-of-life must advocate for the patient and family so that they receive appropriate and timely palliative care services (see [Chapter 13](#)).

Metastatic Skin Tumors

The skin is an important yet uncommon site of metastatic cancer. All types of cancer may metastasize to the skin. Cancers with a predilection to metastasize to the skin include melanomas and cancers of the breast, nasal sinuses, larynx, and oral cavity. Of these, skin metastases from carcinoma of the breast are most frequently seen, accounting for 30% of all cases. The clinical appearance of metastatic skin lesions is not distinctive, except perhaps in some cases of breast cancer in which diffuse, brawny hardening of the skin of the involved breast is seen. In most instances, metastatic lesions occur as multiple cutaneous or subcutaneous nodules of various sizes that may be skin colored or different shades of red (American Osteopathic College of Dermatology, 2020).

Kaposi Sarcoma

Kaposi sarcoma is a malignancy of endothelial cells that line the small blood vessels. Kaposi sarcoma is manifested clinically by lesions of the skin, oral cavity, gastrointestinal tract, and lungs. The skin lesions consist of reddish-purple to dark blue macules, plaques, or nodules. Kaposi sarcoma is subdivided into four categories (ACS, 2018):

- *Classic Kaposi sarcoma* occurs predominantly in older adult men of Mediterranean or Jewish ancestry. Most patients have nodules or plaques on the lower extremities that rarely metastasize beyond this area. Classic Kaposi sarcoma is chronic, relatively benign, and rarely fatal.
- *Endemic (African) Kaposi sarcoma* affects people predominantly in the eastern half of Africa near the equator. Men are affected more often than women, and children can be affected as well. The disease may resemble classic Kaposi sarcoma, or it may infiltrate and progress to lymphadenopathic forms.
- *Iatrogenic/organ transplant-associated Kaposi sarcoma* occurs in transplant recipients and in patients receiving long-term immunosuppressants, such as azathioprine, cyclosporine, or corticosteroids, such as prednisone.

- *AIDS-related or epidemic Kaposi sarcoma* occurs in people with AIDS. This form of Kaposi sarcoma is characterized by local skin lesions and disseminated visceral and mucocutaneous diseases. This is a more aggressive tumor type than other forms of Kaposi sarcoma. More information on AIDS-related Kaposi sarcoma can be found in [Chapter 32](#).

PLASTIC, RECONSTRUCTIVE, AND COSMETIC PROCEDURES

The word *plastic* comes from a Greek word meaning “to form.” Plastic or reconstructive procedures are performed to reconstruct or alter congenital or acquired defects to restore or improve the body’s form and function. Often the terms *plastic* and *reconstructive* are used interchangeably. This type of surgery includes closure of wounds, removal of skin tumors, repair of soft tissue injuries or burns, correction of deformities, and repair of cosmetic defects. Plastic surgery can be used to repair many parts of the body and numerous structures, such as bone, cartilage, fat, fascia, mucous membrane, muscle, nerve, and cutaneous structures. Bone inlays and transplants for deformities and nonunion can be performed, muscle can be transferred, nerves can be reconstructed and spliced, and cartilage can be replaced. As important as any of these measures is the reconstruction of the cutaneous tissues around the neck and the face; this is usually referred to as aesthetic or cosmetic surgery.

Cosmetic procedures are generally considered to be ones that correct defects that are not life-threatening or caused by diseases. An example would be removal of a benign mole or sebaceous cyst from the face. Most health insurance plans do not cover procedures deemed to be cosmetic, and these procedures can be expensive. Procedures that are performed to correct a surgical defect, such as removal of a skin cancer or correction of a significant congenital defect such as a cleft lip are generally covered by insurance.

Wound Coverage: Grafts and Flaps

Various surgical techniques, including skin grafts and flaps, are used to cover skin wounds.

Skin Grafts

Skin grafting is a technique in which a section of skin is detached from its own blood supply and transferred as free tissue to a distant (recipient) site. Skin grafting can be used to repair almost any type of wound and is the most common form of reconstructive surgery.

Skin grafts are commonly used to repair surgical defects such as those that result from excision of skin tumors, to cover areas denuded of skin (e.g., burns), and to cover wounds in which insufficient skin is available to permit wound closure. They are also used when primary closure of the wound increases the risk of complications or when primary wound closure would interfere with function. Skin grafts may be classified as autografts, homografts, or xenografts (see [Chapter 57](#) for further discussion of skin grafts).

Flaps

Another form of wound coverage is provided by flaps. A flap is a segment of tissue that remains attached at one end (i.e., a base or pedicle) while the other end is moved to a recipient area. Its survival depends on functioning arterial and venous blood supplies and lymphatic drainage in its pedicle or base (del Rosario & Barkley, 2017). A flap differs from a graft in that a portion of the tissue is attached to its original site and retains its blood supply. An exception is the free flap, which is described later.

Flaps may consist of skin, mucosa, muscle, adipose tissue, omentum, and bone. They are used for wound coverage and provide bulk, especially when bone, tendon, blood vessels, or nerve tissue is exposed. Flaps are used to repair defects caused by congenital deformity, trauma, or tumor ablation (removal, usually by excision) in an adjacent part of the body (del Rosario & Barkley, 2017).

Flaps offer an aesthetic solution because a flap retains the color and texture of the donor area; is more likely to survive than a graft; and can be used to cover nerves, tendons, and blood vessels. However, several surgical procedures are usually required to advance a flap. The major complication is necrosis of the pedicle or base as a result of failure of the blood supply.

A free flap or free tissue transfer is completely severed from the body and transferred to another site. A free flap receives early vascular supply from microvascular anastomosis with vessels at the recipient site. The procedure usually is completed in one step, eliminating the need for a series of surgical procedures to move the flap. Microvascular surgery allows surgeons to use a variety of donor sites for tissue reconstruction (Hsieh & Bhatt, 2020).

Cosmetic Procedures

A variety of cosmetic procedures may be performed, including chemical face peels, dermabrasion, facial reconstructive surgery, and rhytidectomy (i.e., face-lift).

Chemical Face Peeling

Chemical face peeling involves application of a chemical mixture to the face for superficial destruction of the epidermis and the upper layers of the dermis to treat fine wrinkles, keratoses, and pigment problems. It is especially useful for wrinkles at the upper and lower lip, forehead, and periorbital areas. The type of chemical used depends on the planned depth of the peel. The patient who is conscious feels a burning sensation that continues for 12 to 24 hours. Frequent small doses of analgesic and tranquilizing agents are prescribed to keep the patient comfortable. The most common complications include discoloration of the skin, infection of the burned area, persistent sensory changes or itching, and occasionally permanent scarring of the skin (Fabbrocini, 2017).

Dermabrasion

Dermabrasion is a form of skin abrasion used to treat acne scarring, aging, and sun-damaged skin. A special instrument (e.g., motor-driven wire brush, diamond-impregnated disc) is used. The epidermis and some superficial dermis are removed by a sanding-type action, and enough of the dermis is preserved to allow reepithelialization of the treated areas. Results are best in the face because it is rich in intradermal epithelial elements (Bharti, Kirman, Molnar, et al., 2018).

Patients with a history of herpes simplex viral infection are typically prescribed with prophylactic antiviral medications (e.g., valacyclovir) preprocedurally so that the physiologic stress of the procedure is less likely to cause a cutaneous herpes eruption. Tretinoin cream may be prescribed with instructions to apply it 2 to 3 weeks preoperatively; this is associated with accelerating reepithelialization post dermabrasion. Patients must be educated preprocedurally about the postprocedural dressing regimen and when to return to the primary provider to have dressing changes performed (Wong, Arnold, & Boeckmann, 2016).

Facial Reconstructive Surgery

Reconstructive procedures on the face are individualized to the patient's needs and desired outcomes. They are performed to repair deformities or restore normal function. They may vary from closure of small defects to complicated procedures involving implantation of prosthetic devices to conceal a large defect or reconstruct a lost part of the face (e.g., nose, ear, jaw). Each surgical procedure is customized and involves a variety of incisions, flaps, and grafts. Multiple surgical procedures may be required.

The process of facial reconstruction is often slow and tedious. Because a person's facial appearance affects self-esteem so greatly, this type of reconstruction is often a very emotional experience for the patient.

Rhytidectomy

Rhytidectomy (i.e., face-lift) is a surgical procedure that removes soft tissue folds and minimizes cutaneous wrinkles on the face. It is performed to create a more youthful appearance. Psychological preparation requires that the patient recognize the limitations of surgery and the fact that miraculous rejuvenation will not occur. The patient is informed that the face may appear bruised and swollen after the dressings are removed and that several weeks may pass before the edema subsides. Corticosteroids (e.g., methylprednisolone) and vitamin C are prescribed postoperatively to minimize edema. Prophylactic antibiotic agents such as cephalexin may also be prescribed postoperatively (Neligan, Warren, & Van Beek, 2017).

Laser Treatment of Cutaneous Lesions

Lasers are devices that amplify or generate highly specialized light energy. They can mobilize immense heat and power when focused at close range and are valuable tools in providing dermatologic abrasion therapy. The laser modalities used for this purpose today include scanned carbon dioxide laser, pulsed carbon dioxide laser, pulsed erbium/yttrium-aluminum-garnet (Er:YAG) laser, fractional Er:YAG laser resurfacing, combination of carbon dioxide and Er:YAG lasers, and fractionated photothermolysis (Husain & Alster, 2016).

Each of these lasers is a precise surgical instrument that vaporizes and excises water-containing tissues with minimal damage. Because the beams used can seal blood and lymphatic vessels, they create a dry surgical field that makes many procedures easier and quicker. Therefore, these lasers are generally safe to use on patients with bleeding disorders or those receiving anticoagulant therapy. They are primarily used to improve the appearance of facial wrinkles, although they are also useful in removing epidermal nevi, tattoos, certain warts, skin cancer, ingrown toenails, and keloids. Incisions made with the laser beam heal and scar much like those made by a scalpel. Patients with a history of herpes simplex viral infection typically receive preprocedural antiviral prophylaxis (Husain & Alster, 2016).

TABLE 56-7

Select Nursing Considerations in Cosmetic Procedures

Nursing Consideration	Interventions and Patient Education
Maintaining airway and pulmonary function	Cosmetic surgeries involving the face and neck can cause considerable swelling; bandages can restrict breathing or eating. Check dressings frequently, and ensure that no constriction occurs as swelling develops.
Relieving pain and achieving comfort	Procedures that involve a large surface area will cause considerable pain. Cool compresses or ice packs will relieve the burning of dermabrasion or chemical peels. Oral analgesic agents should be administered regularly to control pain.
Maintaining adequate nutrition	When the face is involved, the patient may be unable to fully open the mouth, and chewing may be painful. Provide soft or liquid diet that is rich in protein to assist with healing.
Enhancing communication	Depending on the type of cosmetic procedure, a nonverbal method of communication might be necessary until pain and swelling have subsided.
Improving self-concept	Recovery time from cosmetic procedures is slow. Expected results will take weeks to become apparent. Patients with darker skin will experience increased pigmentation long after the initial wounds have healed. Helping patients to understand postoperative expectations will allow them to feel more comfortable with the healing process.
Promoting family coping	Most cosmetic procedures are performed in an outpatient facility; therefore, family members are integral to postoperative care. They should understand what to expect as the patient emerges from the procedure room: the type of dressings that will be in place, the skin care plan that is prescribed, and how to help the patient cope with pain.
Monitoring and managing potential complications	Infection is the most common complication, but excessive pain, nerve damage, and emotional distress about appearance are also common. If opioid analgesic agents are used, there may be gastrointestinal upset, mental status changes, or allergic reaction to the medication. Alert the caregiver to signs of these complications and how and when to report changes in status.

Nursing Management

The majority of dermatologic and reconstructive procedures are performed in the physician's office or in an outpatient surgical department; therefore, most care takes place in the home. Most procedures, except very extensive reconstruction, are performed under local anesthesia or moderate sedation, therefore requiring a very short recovery time. Unless there are complications, the patient does not need hospitalization. The nurse must prepare both the patient and the family for what to expect during the postoperative recovery

time. Table 56-7 lists select nursing considerations that must be reviewed in educating the patient and family.

CRITICAL THINKING EXERCISES

1 pq You work as a staff nurse in an emergency department (ED). A 46-year-old woman presents to the ED with complaints of fever, sore throat, and muscle aches for the past 48 hours. Today she began to feel markedly worse and had the sudden onset of widespread erythema, with blistering in her perineum. She has a history of epilepsy and is currently taking prescribed anticonvulsants. The ED physician tells you that the provisional diagnosis might be toxic epidermal necrolysis. What risks might the patient have for toxic epidermal necrolysis? What are your assessment priorities?

2 ipc A 25-year-old man is admitted to the medical-surgical unit where you work to manage his stage 3 sacral pressure injury. The patient had a spinal cord injury 2 years ago that resulted in paraplegia. He had extensive inpatient rehabilitation for the first several months post injury; however, for the past several months he has been living in his own apartment and able to maintain an at-home job as a data analyst. He has not had pressure injuries prior to this and is uncertain how the injuries happened and how to prevent recurrence. What resources might be available to help him effectively manage his own care so that he avoids recurrent pressure injury?

3 ebp You work in a college health office. A 21-year-old woman presents to the health office with a fever and sore throat. During your assessment, you note that she has tenderness of her shoulders and arms, with some mild erythema that is consistent with a sunburn. She plays on the varsity tennis team. You take the opportunity to talk to her about her risks for melanoma and the advisability of using sunscreen during meets and practices. She tells you that she is Latina, and does not need to worry about skin cancer. What is the strength of the evidence that this young woman is at risk for melanoma? How important is it that she engage in sun safety?

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*Asterisk indicates nursing research.

**Double asterisk indicates classic reference.

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Resources

- American Academy of Dermatology (AAD), www.aad.org
- American Cancer Society, www.cancer.org
- American Melanoma Foundation (AMF), www.melanomafoundation.org
- Dermatology Information System (DermIS), a cooperation between the Department of Clinical Social Medicine (University of Heidelberg) and the Department of Dermatology (University of Erlangen), www.dermis.net
- National Eczema Association, www.nationaleczema.org
- National Pressure Injury Advisory Panel (NPIAP), 2019 Clinical Practice Guideline, www.npiap.com/page/2019Guideline
- National Psoriasis Foundation, www.psoriasis.org
- New Zealand Dermatology Society (DermNET NZ), www.dermnetnz.org
- Skin Cancer Foundation, www.skincancer.org
- Wound, Ostomy, and Continence Nurses Society, www.wocn.org

57 Management of Patients with Burn Injury

LEARNING OUTCOMES

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

1. Identify the incidence and factors that affect severity of burn injury in the United States.
2. Describe the local and systemic effects of a major burn injury.
3. Use the nursing process as a framework for care of the patient in the emergent/resuscitative, acute/intermediate, and rehabilitative phases of a burn injury.
4. Compare priorities of care, including fluid replacement, wound management and psychosocial support, and potential complications for each phase of burn recovery.

NURSING CONCEPTS

- Fluids and Electrolytes
- Medical Emergencies
- Metabolism
- Tissue Integrity

GLOSSARY

autograft: a graft derived from one part of a patient's body and used on another part of that same patient's body

carboxyhemoglobin: a compound of carbon monoxide (CO) and hemoglobin formed in the blood with exposure to CO

collagen: a protein present in skin, tendon, bone, cartilage, and connective tissue

contracture: shrinkage of burn scar through collagen maturation

débridement: removal of foreign material and devitalized tissue until surrounding healthy tissue is exposed

donor site: the area from which skin is taken to provide a skin graft for another part of the body

eschar: devitalized tissue resulting from a burn or wound

escharotomy: a linear excision made through eschar to release constriction of underlying tissue

excision: surgical removal of tissue

fasciotomy: an incision made through the fascia to release constriction of underlying muscle

homograft: a graft transferred from one human (living or cadaveric) to another human (*synonym:* allograft)

xenograft: a graft obtained from an animal of a species other than that of the recipient (e.g., pigskin) (*synonym:* heterograft)

Burn injuries can be painful, costly, and disfiguring; they may require intensive and extensive rehabilitation therapy and are often associated with long-term disability. An extensive burn injury is associated with a complex, multisystem pathophysiology that continues to challenge health systems, despite advances that have resulted in significantly reduced comorbidities and length of stay (LOS). These advances in treatment of patients with severe burns include critical-care management, fluid resuscitation, nutrition, surgical débridement, wound coverage, and antimicrobial therapies (Jones, Williams, Cairns, et al., 2017; Weissman, Wagman, Givon, et al., 2017). The role of the nurse in the interdisciplinary treatment team includes provision of holistic evidence-based care during all phases of burn injury recovery to optimize patient outcomes.

Overview of Burn Injury

Burn injuries, which result from damage to the skin or other tissues from heat, chemicals, electricity, or radiation, most commonly occur in the home or work setting. Globally, they account for approximately 180,000 deaths and significant morbidity each year; however, many are preventable (World Health Organization [WHO], 2018).

Incidence

A burn injury can affect people of all ages, ethnicities, and socioeconomic groups. In the United States, an estimated 486,000 people are treated for burns and approximately 40,000 are hospitalized annually (American Burn Association [ABA], 2016). The largest proportion of burns, 41%, was reported as flame related, 35% were scalds, 10% were from direct source contact, 3% were electrical, 3% were chemical contact, 3% were inhalation only, and the remaining 5% were from unspecified or miscellaneous categories. Of those admitted to burn centers, the incidence of burn injuries for men was generally more than twice that for women; for both men and women, adults between 20 and 30 years of age had the highest prevalence of burn injuries. Of the reported injuries, 73% occurred in the home, 8% were industry related, 5% were recreationally related, and the remaining 14% of injuries were from other sources (American Burn Association National Burn Repository [ABA NBR], 2018).

Patients with burn injuries have particularly prolonged hospital LOS. Many require multiple surgical interventions, extensive pain control interventions, prolonged periods of immobilization and rehabilitation, and protracted intravenous (IV) medication regimens, particularly opioids and antibiotics. Historically, LOS projection was one hospital day per percent total body burn surface area (TBSA) burn. This underestimates LOS and resource utilization, most particularly in those over 40 years of age or those with an inhalation injury (Taylor, Sen, Greenhalgh, et al., 2017).



Gerontologic Considerations

Age-related changes such as diminished mobility, postural stability, strength, coordination, sensation, visual acuity, and declining memory predispose older adults to burn injury. The population of older adults continues to grow, as does the number of burn injuries among older adults. Burn Injury Registry data over a 10-year period from 212,820 hospitalized patients with burns suggest that 15% of burn injuries

requiring hospitalization occurred in patients 60 years of age and older, with fire/flame sources accounting for 56% of reported injuries (ABA NBR, 2018). Mortality associated with burns is greater in older adult patients than in younger adult patients when comparing injuries with similar severity. The overall mortality from burns in the adult over 59 years of age is approximately 13%; compared to a 2.9% overall mortality rate for all ages (ABA NBR, 2018). The lethal dose 50 describes the percentage of TBSA burn that results in 50% mortality for a population; for older adults, this remains 30% to 35% TBSA despite advances in treatment (Jeschke & Peck, 2017).

Complications associated with burn injuries are also highest in patients 60 years and older. Of all reported complications, pneumonia was the most common, followed closely by urinary tract infections. Other reported complications include respiratory failure, septicemia, cellulitis, wound infection, kidney injury, arrhythmias, and other hospital-acquired infections such as central line bloodstream infections (ABA NBR, 2018). There is evidence that frailty and high comorbidities can cause critical decompensation in even small TBSA burns for those 50 years of age and older (Maxwell, Rhee, Drake, et al., 2018; Romanowski, Curtis, Palmieri, et al., 2018). Therefore, premorbid physiology should be considered when planning care for the older adult patient with a burn injury.

The skin of the older adult is thinner and less elastic, which affects the depth of injury and its ability to heal. Pulmonary function becomes impaired with age affecting airway exchange, lung elasticity, and ventilation; these effects can be exacerbated by a history of smoking. Decreased cardiac output, presence of coronary artery disease, and decreased cardiovascular compensatory response increase the risk of complications in older adult patients with burn injuries. There may be a very fine line between adequate fluid resuscitation and fluid overload in this population. Decreased kidney and hepatic function can affect medication dosing due to altered medication clearance. Malnutrition may affect morbidity and mortality in older adults, especially those who are institutionalized. Additionally, older adult patients may have varying degrees of mental capacity on admission or throughout the course of care, rendering assessment of pain, anxiety, and delirium a challenge for the burn team.

Comorbidities are common among older adults and, when combined with treatments, result in polypharmacy (i.e., multiple medication prescriptions), which contribute to in-hospital complications and increase the need for discharge to a facility other than the patient's home after

acute recovery. Nurses need to assess the older adult patient's ability to safely perform activities of daily living (ADLs), assist older adult patients and families to modify their environment to ensure safety, and make referrals as needed. In addition, an assessment of instrumental activities of daily living (IADLs) is warranted (see [Chapter 2](#) for further discussion of IADLs). This is an assessment of the ability to carry out more complex tasks such as meal preparation, traveling to appointments, etc., and is particularly important for those returning home without a caregiver (American Psychological Association, 2020).

Prevention

Almost all burns are preventable. An important goal of nurses in community and home settings is to provide education regarding prevention of burn injuries (see [Chart 57-1](#)). The WHO recommends heightened awareness of the burden of burn injury and its risk factors as imperatives to the development of an effective burn prevention program (WHO, 2018).

Chart 57-1



HEALTH PROMOTION

Burn Prevention

- Advise that matches and lighters be kept out of the reach of children.
- Emphasize the importance of never leaving children unattended around fire or in bathroom/bathtub.
- Educate about the installation and maintenance of smoke and CO detectors on every level of the home and changing batteries annually on birthday.
- Recommend the development and practice of a home exit fire drill with all members of the household.
- Advocate setting the water heater temperature no higher than 48.9°C (120°F).
- Educate about the perils of smoking in bed, smoking while using home oxygen, or falling asleep while smoking.
- Caution against using flammable liquids to start fires and/or throwing flammable liquids onto an already burning fire.
- Warn of the danger of removing the radiator cap from a hot car engine.
- Recommend avoidance of overhead electrical wires and underground wires when working outside.
- Advise that hot irons and curling irons be kept out of the reach of children.
- Discourage running electric cords under carpets or rugs.
- Recommend storage of flammable liquids well away from a fire source, such as a pilot light.
- Educate about the importance of being aware of loose clothing when cooking over a stovetop or flame.
- Recommend having a working fire extinguisher in the home and knowing how to use it.

Outlook for Survival and Recovery

The WHO (2018) estimated 265,000 annual deaths worldwide are caused by burns, the majority occurring in middle- to low-income populations, while nonfatal burns are a leading cause of morbidity including disfigurement, disability, and social stigma. The overall mortality rate for

all TBSA burns in the United States reported to the National Burn Repository is 3% (ABA NBR, 2018). The strongest predictors for mortality in burn injuries include increased percent of TBSA burned, presence of inhalation injury, and increased age. Provision of evidenced-based, multidisciplinary, holistic care is crucial to improving both survival and recovery culminating in reintegration of the survivor into society.

Great strides in research on burn wound treatments and critical care have improved the survival rate of patients with burn injuries. Evaluation of long-term outcomes is possible because patients with very large burns are surviving their injuries. Continued research and advances in the areas of critical care, rehabilitation, and psychosocial and scar management are essential for continued progress in burn care (Bielson, Duethman, Howard, et al., 2017).

Severity

Multiple factors determine the severity of each burn injury. These factors include age of the patient; depth of the burn; amount of surface area of the body burned; the presence of inhalation injury; presence of other injuries; location of the injury in areas such as the face, the perineum, hands, or feet; and the presence of comorbid conditions. Careful assessment enables the burn team to estimate the likelihood of survival and develop an individualized plan of care for each patient (ABA, 2018).

Age

Young children and older adults have increased morbidity and mortality when compared to other age groups with similar injuries and present a challenge for the burn team. Thinner skin at both ends of the age spectrum leads to deeper burns with more complications. This is an important factor when determining the severity of injury and potential outcomes for the patient.

Burn Depth

Burns are classified according to the depth of tissue destruction as depicted in [Table 57-1](#). First-degree burns are superficial injuries that involve only the outermost layer of skin. These burns are painful and erythematous, but the epidermis is intact; if rubbed, the burned tissue does not separate from the underlying dermis. This is known as a negative Nikolsky's sign. A typical first-degree burn is a sunburn or superficial scald burn.

Second-degree (partial-thickness) burns involve the entire epidermis and varying portions of the dermis. They are painful and typically associated with blister formation. Healing time depends on the depth of dermal injury, typically ranging from 2 to 3 weeks. Hair follicles and skin appendages remain intact. The wound bed is moist due to serous leakage from the peripheral microcirculation.

TABLE 57-1



Characteristics of Burns According to Depth

Causes	Skin Involvement	Clinical Manifestations	Wound Appearance	Recoverative Course and Treatment
First Degree (Superficial)				
Sunburn Low-intensity flash Superficial scald	Epidermis	Tingling Hyperesthesia (hypersensitivity) Pain that is soothed by cooling Peeling Itching	Reddened; blanches with pressure; dry Minimal or no edema Possible blisters	Complete recovery within a few days Oral pain medications, cool compresses, skin lubricants (e.g., ointments, emollients); topical antimicrobial agents not indicated
Second Degree (Partial Thickness)				
Scalds Flash flame Contact	Epidermis, portion of dermis	Pain Hyperesthesia Sensitive to air currents	Blistered, mottled red base; disrupted epidermis; weeping surface Edema	Recovery in 2–3 wks Some scarring and depigmentation possible; may require grafting
Third Degree (Full Thickness)				
Flame Prolonged exposure to hot liquids Electric current Chemical Contact	Epidermis, dermis, and sometimes subcutaneous tissue; may involve connective tissue and muscle	Insensate Shock Myoglobinuria (red pigment in urine) and possible hemolysis (blood cell destruction) Possible contact points (entrance or exit wounds in electrical burns)	Dry; pale white, red brown, leathery, or charred Coagulated vessels may be visible. Edema	Eschar may slough Grafting necessary Scarring and loss of contour and function
Fourth Degree (Full Thickness That Includes Fat, Fascia, Muscle, and/or Bone)				
Prolonged exposure or high-voltage electrical injury	Deep tissue, muscle and bone	Shock Myoglobinuria (red pigment in urine) and possible hemolysis (blood cell destruction)	Charred	Amputations likely Grafting of no benefit given depth and severity of wound(s)

Adapted from American Burn Association. (2018). *Advanced burn life support (ABLS) course provider manual 2018*. Chicago, IL.



Figure 57-1 • Third-degree (full-thickness) burn to arm and upper back with surrounding second-degree (partial-thickness) burn. Used with permission from University of Texas Medical Branch, Galveston, TX.

Third-degree (full-thickness) burns involve total destruction of the epidermis, dermis, and, in some cases, damage of underlying tissue. Wound color ranges widely from pale white to red, brown, or charred. The deeply burned area lacks sensation because the nerve fibers are damaged. The wound appears leathery and dry due to the destruction of the microcirculation. Skin organelles such as hair follicles and sweat glands may be affected. The severity of this burn is often deceiving to patients because they have no pain in the injury area (see Fig. 57-1).

Fourth-degree burns (deep burn necrosis) are those injuries that extend into deep tissue, muscle, or bone (see Fig. 57-2) (ABA, 2018; Strauss & Gillespie, 2018).

Burn depth determines whether spontaneous reepithelialization will occur. Determining burn depth can be difficult even for the experienced burn care provider. The following factors are considered in determining the depth of a burn: how the injury occurred, causative agent (such as flame or scalding liquid), temperature and duration of contact with the causative agent, and thickness of the skin at the injury site.



Figure 57-2 • Fourth-degree burn to second digit. Used with permission from University of Texas Medical Branch, Galveston, TX.

Extent of Body Surface Area Injured

Various methods are utilized to estimate the TBSA affected by burns; among them are the rule of nines, the Lund and Browder method, and the palmer method. These tools assist the treatment team in making decisions about the plan of care, which may include transfer of the patient to a burn center. Burn centers are hospital based and are specially equipped with the resources and personnel to treat patients with burns from the time of injury through their rehabilitation. Burn center designation is conferred jointly by the ABA and the American College of Surgeons (ABA, 2019). [Chart 57-2](#) provides the ABA criteria for referral to a burn center.

Rule of Nines

The most common method of estimating the extent of burns in adults is the rule of nines (see [Fig. 57-3](#)). This system is based on anatomic regions, each representing approximately 9% of the TBSA, allowing clinicians to rapidly estimate percent of body burned. If the burn affects

only a portion of an anatomic area, the TBSA is calculated accordingly—for example, if approximately half of one arm were burned, the TBSA burned would be 4.5%.

Lund and Browder Method

A more precise method of estimating the extent of a burn is the Lund and Browder method, which recognizes the percentage of surface area of various anatomic parts, especially the head and legs, as it relates to the age of the patient. By dividing the body into very small areas and providing an estimate of the proportion of TBSA accounted for by each body part, clinicians can obtain a reliable estimate of TBSA burned. The initial evaluation made on arrival of the patient to the hospital should be revised within the first 72 hours, because demarcation of the wound and its depth present themselves more clearly by this time. The Lund and Browder chart is readily available in both printed and electronic formats (ABA, 2018).

Chart 57-2

American Burn Association Criteria for Referral to a Burn Center

- Partial-thickness burns covering 10% of total body surface area or greater
- Burns involving the face, hands, feet, genitalia, perineum, or major joints
- Third-degree burns
- Electrical burns, including lightning injury
- Chemical burns
- Inhalation injury
- Burn injury in patients with preexisting medical disorders
- Any patients with burns and concomitant trauma
- Children with burn injuries in facilities that do not specialize in pediatric care
- Patients who will require special social, emotional, or long-term rehabilitation

Adapted from American Burn Association. (2018). *Advanced burn life support (ABLS) course provider manual 2018*. Chicago, IL: Author.

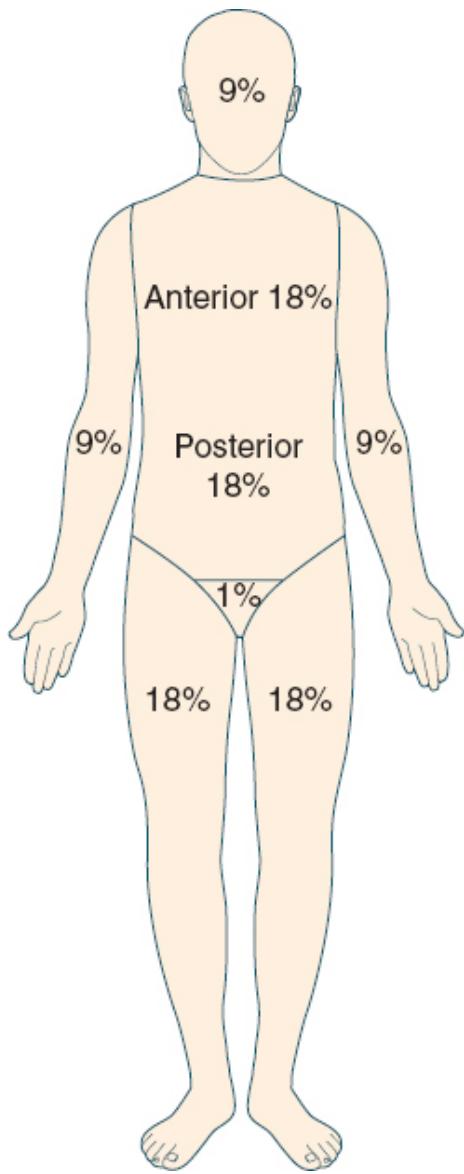


Figure 57-3 • The rule of nines. Estimated percentage of total body surface area (TBSA) in the adult is calculated by sectioning the body surface into areas with a numerical value related to nine. (Note: The anterior and posterior head total 9% of TBSA.)

Palmer Method

In patients with scattered burns, or very large burns with minimal sparing, the palmer method is an expeditious method to determine extent of injury. The size of the patient's hand, including the fingers, is approximately 1% of that patient's TBSA (ABA, 2018).

Pathophysiology

Burns are exceptionally traumatic injuries as the initial injury evolves and worsens over time. Burn injury is the result of a chemical exposure or heat transfer from one site to another, causing tissue destruction through coagulation, protein denaturation, or ionization of cellular contents. The burn wound is not homogenous; rather, tissue necrosis generally occurs at the center of the injury with regions of tissue viability toward the periphery. The central area of the wound is termed the *zone of coagulation* due to the characteristic coagulation necrosis of cells that occurs (see Fig. 57-4). The surrounding zone, the *zone of stasis*, describes an area of injured cells that may remain viable but, with persistent ischemia, will undergo necrosis within 24 to 48 hours. The outermost zone, the *zone of hyperemia*, sustains minimal injury and may fully recover spontaneously over time.

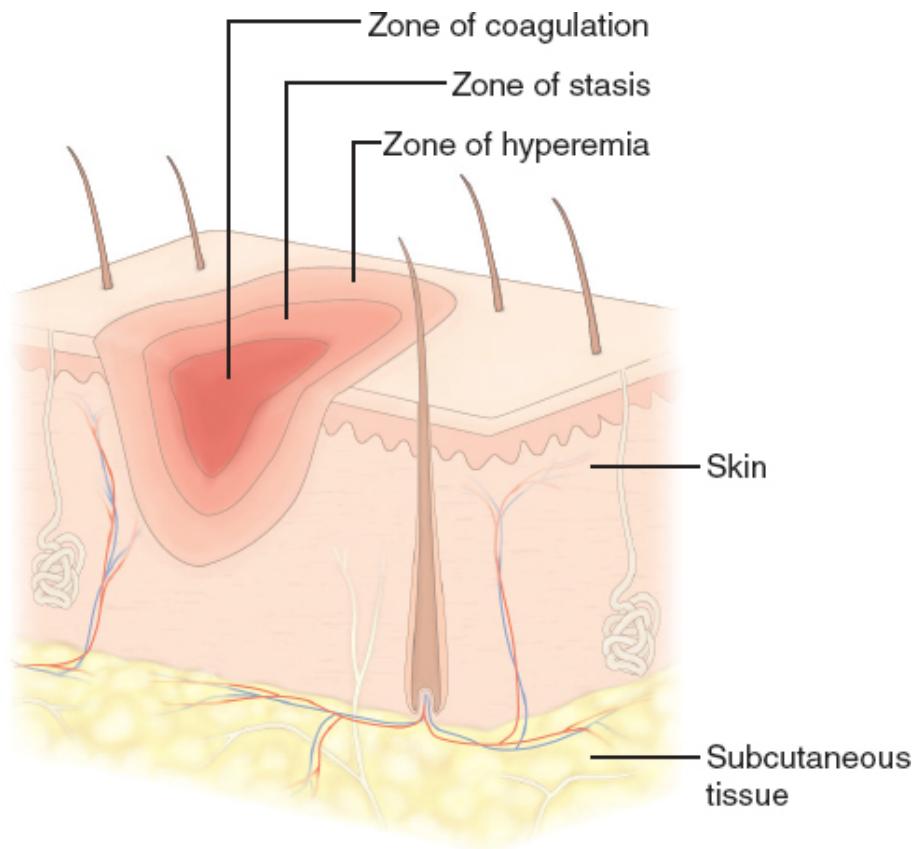


Figure 57-4 • Zones of burn injury. Each burned area has three zones of injury. The zone of coagulation (the innermost area, where cellular death occurs) sustains the most damage. The zone of stasis (the middle area) has a compromised blood supply, inflammation, and tissue injury. The zone of hyperemia (the outermost area) sustains the least damage.

The skin and the mucosa of the upper airways are the most common sites of tissue destruction, although deep tissues, including the viscera, can be damaged by electrical burns (see [Chart 57-3](#)) or prolonged contact with a heat or chemical source. The release of local mediators, changes in blood flow, tissue edema, and infection can cause progression in severity of the burn injury.

Another potential mechanism of burn injury is radiation exposure. This has received increased attention because of threats of terrorism and recent world events. Radiation injuries produce two detrimental effects. The first is a thermal effect, which results in cutaneous burn injuries. The second effect is damage to the cellular deoxyribonucleic acid (DNA), which may be localized or affect the whole body. Morbidity and mortality are dose

dependent (see [Chapter 68](#)). Treatment for the cutaneous injury is the same as other burns discussed in this chapter.

The depth of a burn injury depends on the temperature of the burning agent and the duration of contact with the agent. In adults, exposure to temperatures of 54°C (130°F) for 30 seconds will result in burn injury. At 60°C (140°F), tissue destruction occurs in 5 seconds (this is a common setting for home water heaters; see [Chart 57-1](#) for discussion of appropriate water heater setting). At 71°C (160°F) or higher, a full-thickness burn occurs instantaneously (ABA, 2018).

It is important to recognize injuries that affect more than approximately 20% TBSA as severe injuries, as they produce both local and systemic effects. The systemic inflammatory response to a severe burn injury signals the release of proinflammatory and anti-inflammatory cytokines, prompting hypermetabolism effects that produce organ dysfunction, a pronounced catabolic response, systemic compromise and, potentially, mortality (Rehou, Shahrokhi, Natanson, et al., 2018).

Chart 57-3

Electrical Burns

Electrical injuries are devastating and complex burns. Heat generated by electricity is directly responsible for tissue damage, but unlike most thermal burns, visual examination of wounds is not predictive of burn size and severity. It is helpful to know the circumstances of the injury to anticipate potential tissue damage and complications. Superficial injuries present themselves as contact points on physical examination. Deep tissue injuries caused by the conduction of electrical current through the body may not be visible on initial clinical presentation, but in most circumstances should be assumed on presentation so that timely intervention may be initiated. Mechanisms of injury include flash, conductive, and lightning injury.

Flash Injury

An electrical flash generates light and heat. Injury occurs from the heat generated to exposed areas or by flames from ignition of clothing. Flash burns are thermal burns and have fewer complications; patients with flash injuries have shorter lengths of stay than those with conductive injuries.

Conductive Injury

Conductive electrical injuries occur when the current overcomes the skin's resistance and travels through the body. The amount and severity of tissue damage is directly proportional to the strength of the current (voltage), duration of contact with the source, which organs lay along the pathway of current, and whether the current is direct or alternating. Conduction of electricity through the nerves and vessels and along the outside of bones generates heat, causing damage to adjacent tissues and direct injury to the peripheral nerves. Deep muscle injury may be present without injury to superficial muscles, masking the true extent of the injury. In addition, electrical current immediately contracts muscles as it travels through the body causing possible skeletal and joint injuries in high-voltage contact. Although the majority of reported electrical injuries are high-voltage (>1000 volts) injuries, significant physical and psychological morbidity also occur with low-voltage (<1000 volts) injuries as well.

Entrance and exit wounds or contact points can help identify the probable current path and therefore anticipated tissue and organ involvement. Direct current (DC) travels in one direction, is associated with an explosion and likely concomitant trauma from the blast. Alternating current (AC) passes back and forth from the point of contact, through the body and back to the source many times per second and

can hold the victim to it, increasing contact time. Compartment syndrome is common with electrical injuries due to the edema that results from injured tissue compounded by the large fluid volumes required for resuscitation to prevent kidney failure. As a result, invasive decompressive therapies such as fasciotomies, nerve releases, ocular releases, and laparotomies may be required.

Lightning Injury

Lightning injuries can result from a direct strike, a high-voltage DC injury that is usually fatal, or a side flash wherein the current discharges from an object nearby through the air to an adjacent object or person. Side flashes are the most common cause of injury and result in immediate deep polarization of the entire myocardium with possible cardiac arrest. Respiratory arrest is also expected because electric current can temporarily inactivate the brain's respiratory center. Lightning strikes carry approximately 10% mortality rate, with many survivors reporting permanent morbidity and debilitating symptoms including neurologic disabilities, depression, sleep disorders, chronic, and at times, intense pain, memory loss, attention deficits, numbness, dizziness, stiffness in joints, irritability, fatigue, weakness, and muscle spasms.

Management

Resuscitation fluid calculations based on total body surface area are inaccurate in conductive electrical injuries, including some lightning injuries. It is difficult to quantify the extent of tissue injury without surgical exploration because the damage may not be visible on physical examination. Serum creatinine kinase levels are useful in determining the degree of muscle injury in the early phases of care. Myoglobinuria, common with muscle damage, may cause kidney failure if not treated. Intravenous (IV) fluid administration titrated to a higher target of urine output per hour than usual may be indicated until the urine is no longer red. It is common practice to add 50 mEq of sodium bicarbonate per liter of IV fluid in an effort to assist in alkalinizing the urine. Serum myoglobin and urine myoglobin levels may be monitored as indicators of the need for continued resuscitation.

Finally, the surgical treatment of an electrical injury is as complex as the injury itself. Vasculature is commonly affected; thus, progressive tissue necrosis occurs over time. Sequential surgical débridement may be necessary, using caution to preserve viable tissue.

Adapted from American Burn Association. (2018). *Advanced burn life support (ABLS) course provider manual 2018*. Chicago, IL; Culnan, D. M., Farner, K., Bitz, G. H., et al. (2018). Volume resuscitation in patients with high-voltage electrical injuries. *Annals of Plastic Surgery*,

80(3 Suppl 2), S113–S118; National Weather Service. (n.d.). *Lightning safety tips and resources*. Retrieved on 11/30/2019 at: www.weather.gov/safety/lightning; Walker, A., & Salerno, A. (2019). Shocking injuries: Knowing the risks and management for electrical injuries. *Trauma Reports*, 20(4), 1–25.

Severe injuries ultimately encompass changes in pathophysiology of all body systems as presented in [Table 57-2](#). These pathologic responses occur in trauma injuries, but the magnitude, duration, and severity are significantly higher with burn injuries.

Cardiovascular Alterations

When a burn injury occurs, there is an immediate decrease in cardiac output that precedes the loss of plasma volume. The systemic inflammation causes the release of free oxygen radicals that increase capillary permeability, causing increased plasma loss and subsequent peripheral edema as water migrates to the interstitium. As a compensatory response to intravascular fluid loss, the sympathetic nervous system releases catecholamines, resulting in an increase in peripheral resistance (vasoconstriction) and an increase in pulse rate that further decreases tissue perfusion. Due to vasoconstrictive compensatory responses secondary to plasma volume loss through capillary leak, the workload of the heart and oxygen demand increase (Gillenwater & Garner, 2017; Wurzer, Culnan, Cancio, et al., 2018).

Hypovolemia is the immediate consequence of ensuing plasma volume loss and results in decreased perfusion and oxygen delivery to organs and tissues. As capillary leakage continues, vascular volume, cardiac output, and blood pressure decrease. This is the onset of early burn shock. Burn shock is initially a type of hypovolemic shock secondary to intravascular volume loss (see [Chapter 11](#)).

Unlike traumatic injuries, often characterized by blood loss, only plasma is lost in the burn injury. Prompt, appropriate enteral or parenteral fluid resuscitation maintains the blood pressure in the low to normal range and improves cardiac output (see later discussion). However, even with adequate fluid resuscitation, cardiac filling pressures (central venous pressure, pulmonary artery pressure, and pulmonary artery wedge pressure) remain low during the initial burn shock period. Unless sufficient IV fluids are administered to maintain vascular volume, distributive shock occurs (see [Chapter 11](#)).

TABLE 57-2

Pathophysiologic Changes with Severe Burns

Body System	Physiologic Changes
Cardiovascular	Cardiac depression, edema, hypovolemia
Pulmonary	Vasoconstriction, edema
Gastrointestinal	Impaired motility and absorption, vasoconstriction, loss of mucosal barrier function with bacterial translocation, increased pH
Kidney	Vasoconstriction
Other	Altered thermoregulation, immunodepression, hypermetabolism

Adapted from Bielson, C. B., Duethman, N. C., Howard, J. M., et al. (2017). Burns: Pathophysiology of systemic complications and current management. *Journal of Burn Care & Research*, 38(1), e469–e481.

Generally, the greatest volume of intravascular fluid leak occurs in the first 24 to 36 hours after the burn injury, peaking at approximately 6 to 8 hours after the initial burn injury. As the capillaries begin to regain their integrity, burn shock resolves and fluid shifts back into the vascular compartment. Intrinsic diuresis will begin and continue for several days to 2 weeks in the previously healthy adult.

Fluid and Electrolyte Alterations

Edema forms rapidly after a burn injury. A superficial burn will cause localized edema to form within 4 hours, whereas a deeper burn will continue to form edema up to 18 hours post injury. The increased perfusion to the injured area in the presence of increased capillary permeability reflects the amount of microvascular and lymphatic damage to the tissue. In burns greater than 20% TBSA, inflammatory mediators stimulate local and systemic reactions resulting in extensive shift of intravascular fluid, electrolytes, and proteins into the surrounding interstitium (Gillenwater & Garner, 2017).



Concept Mastery Alert

For patients in the emergent/resuscitative phase, nurses should do a primary survey and closely monitor circulation. As the taut, burned tissue becomes unyielding to the edema beneath its surface, it begins to act like a tourniquet, especially if the burn is circumferential. As edema increases, pressure on small blood vessels in the distal extremities obstructs blood flow resulting in consequent tissue ischemia and potentially acute compartment syndrome. See Chapter 37 for discussion of acute compartment syndrome. Patients in the acute/intermediate phase must be closely monitored for the development of venous thromboembolism (VTE).



Figure 57-5 • Escharotomy of forearm. Used with permission from University of Texas Medical Branch, Galveston, TX.

Treatments for edema may include elevation of the extremity or, in severe cases, cutting of the **eschar** (i.e., devitalized tissue) via **escharotomy** (i.e., surgical incision through eschar), or decompression of edema formation via **fasciotomy** (i.e., surgical incision through fascia to relieve constricted muscle) to restore tissue perfusion (see Figs. 57-5 and 57-6).

Reabsorption of edema begins about 4 hours post injury and is complete approximately 4 days postburn injury. However, the rate of

reabsorption depends on the depth of injury to the tissue. Although adequate fluid resuscitation is paramount to maintaining tissue perfusion, excessive fluid administration increases edema formation in both burned and unburned tissue causing ischemia and necrosis.

Immediately after burn injury, hyperkalemia (excessive potassium) may result from massive cell destruction. Hypokalemia (potassium depletion) may occur later with fluid shifts and inadequate potassium replacement. Serum sodium levels vary in response to fluid resuscitation. Hyponatremia (serum sodium depletion) may be present from plasma loss or may occur during the first week of the acute phase, as water shifts from the interstitial space and returns to the vascular space.



Figure 57-6 • Fasciotomy of upper arm. Used with permission from University of Texas Medical Branch, Galveston, TX.

At the time of burn injury, some red blood cells may be destroyed, and others damaged. Despite this, the early hematocrit may be elevated due to plasma loss (hemoconcentration). Abnormalities in coagulation, including a decrease in platelets (thrombocytopenia) and prolonged clotting and prothrombin times also occur.

Pulmonary Alterations

Inhalation injuries, caused by inhalation of thermal and/or chemical irritants, are categorized as upper airway injury (above the glottis) or lower airway injury (below the glottis). Injuries above the vocal cords can be thermal or chemical, whereas injuries below the vocal cords are usually chemical (ABA, 2018). Approximately 2% to 14% of patients admitted to burn centers have an inhalation injury (ABA, 2018). The presence of inhalation injury is important to recognize, as it is one of the highest causes of mortality, along with age of the patient and burn size. History of the injury, such as a flame injury occurring in an enclosed space, and clinical signs such as singed facial hair or carbonaceous sputum (i.e., sputum with carbon particles which appears black; soot), are indicators for the potential presence of a smoke inhalation injury. Bronchoscopy is considered the standard test for definitive diagnosis as initial chest x-rays appear normal. The extent of pulmonary damage is directly related to the temperature and the concentration of toxic gases.

Upper Airway Injury

Upper airway injury is obstructive; it is caused by severe upper airway edema from direct thermal injury or secondary edema from face or neck burns in the early postburn period. Protective intubation is often warranted to maintain patency of the airway (ABA, 2018; Jones et al., 2017). Because of the cooling effect of rapid vaporization in the oropharynx, direct heat injury does not normally occur below the level of the glottis. However, with steam exposure or in blast injuries, thermal injury to the lower airways is possible because the upper airway cannot effectively protect the lower airway in these cases (Jones et al., 2017).

Lower Airway Injury

Inhalation injury below the glottis results from inhaling the products of incomplete combustion or noxious gases and is often the source of death at the scene of a fire. Smoke inhalation causes loss of ciliary action, triggers an inflammatory response causing hypersecretion, producing severe mucosal edema and potential bronchospasm. A reduction in alveolar surfactant production produces atelectasis (collapse of alveoli) in the parenchyma. Expectoration of carbon particles in the sputum is the cardinal sign of a lower airway inhalation injury. Aggressive pulmonary toilet is critical to maintain airway patency and clear resulting viscous sputum. Outcomes are improved in lower airway injuries when patients can expectorate carbonaceous sputum naturally (i.e., among patients who

are not endotracheally intubated and mechanically ventilated) (Jones et al., 2017).

Noxious gases, such as carbon monoxide (CO) and hydrogen cyanide, contribute to lower airway injuries. CO poisoning is a factor in most fatalities at the scene of a fire as it combines with hemoglobin and displaces oxygen to form **carboxyhemoglobin**. The affinity of hemoglobin for CO is 200 times greater than that for oxygen, and if significant quantities of CO are present, then tissue hypoxia will occur. Treatment is administration of 100% oxygen to displace the CO molecules bound to hemoglobin, bringing the half-life of CO down to 45 minutes (ABA, 2018).

Hydrogen cyanide is a rapid systemic toxin also associated with mortality. Signs and symptoms are similar to CO poisoning and can include shortness of breath, headache, vertigo, confusion, and mucous membrane irritation. The cardiopulmonary effects initially cause a hyperdynamic response followed by bradycardia and hypotension leading to death. Hydrogen cyanide poisoning may be suspected in a patient with persistent lactic acidosis after resuscitation (ABA, 2018). Gaseous cyanide is a result from incomplete combustion of many items found in homes today.

Bronchoconstriction (caused by release of histamine, serotonin, and thromboxane [a powerful vasoconstrictor]) and chest constriction secondary to circumferential torso burns can contribute to deterioration. Even without pulmonary injury, hypoxia may be present. Early in the postburn period, catecholamine release in response to the stress of the burn injury alters peripheral blood flow, thereby reducing oxygen delivery to the periphery. Later, hypermetabolism and continued catecholamine release lead to increased tissue oxygen consumption, which can also lead to hypoxia. Administration of supplemental oxygen will ensure that adequate oxygen is available to the tissues. Restrictive pulmonary excursion may occur with full-thickness burns encircling the thorax resulting in decreased tidal volume. In such situations, an escharotomy may be necessary to restore adequate chest excursion (ABA, 2018).

Kidney Alterations

Kidney function may be altered as a result of decreased blood volume postburn injury due to the compensatory response to intravascular volume loss. Adequate fluid volume replacement can restore renal blood flow, increasing the glomerular filtration rate and urine volume. Additionally, destruction of red blood cells at the injury site may result in free

hemoglobin in the urine. If muscle damage occurs (e.g., from electrical burns), myoglobin is released from the muscle cells and excreted by the kidneys causing the urine to be red. If there is inadequate blood flow through the kidneys caused by the hemoglobin and myoglobin occluding the renal tubules, acute tubular necrosis and acute kidney injury will occur (see [Chapter 48](#)). Increased abdominal pressure from the injury can also cause kidney ischemia.

Immunologic Alterations

The immunologic defenses of the body are significantly altered by a burn injury. Skin, the largest barrier to infection, when compromised continually exposes the patient to the environment. The burn injury itself produces systemic release of cytokines and other substances that cause leukocyte and endothelial cell dysfunction. Burn centers must provide an infection-controlled environment to protect the patient and minimize exposure to potentially harmful organisms (Palmieri, 2019).

Thermoregulatory Alterations

Integumentary loss also causes an inability to regulate body temperature resulting in various complications. Patients with burn injuries often exhibit low body temperatures in the early hours after injury not necessarily due to initial first aid, which may include cooling of the wounds, but more likely from the amount of TBSA involved, the IV resuscitation fluids administered, and exposure resulting in increased evaporative heat loss (Ehrl, Heidekrueger, Rubenbaugher, et al., 2018). Burn centers often have additional heating sources to help maintain the patient's body temperature through environmental warming.

Gastrointestinal Alterations

Patients who are critically ill, especially those with burns, are predisposed to altered gastrointestinal (GI) motility. Impaired enteric nerve and smooth muscle function, inflammation, surgery, medications such as vasopressors, and inadequate tissue perfusion are some causes of GI dysfunction. Indicators of GI organ ischemia include increased bladder pressure, increasing serum lactate, and feeding intolerance. Three of the most common GI alterations in patients with burns are paralytic ileus (absence of intestinal peristalsis), Curling's ulcer, and translocation of bacteria. Decreased peristalsis and bowel sounds are manifestations of paralytic ileus. Gastric distention and nausea may lead to vomiting;

therefore, gastric decompression is advised. Gastric bleeding secondary to massive physiologic stress may be signaled by occult blood in the stool, regurgitation of “coffee-ground” material from the stomach, or bloody vomitus. These signs suggest gastric or duodenal erosion (Curling’s ulcer). Probiotics may be useful in maintaining intestinal barrier function through avoidance of colonization of pathogenic microorganisms (Culnan, Capek, & Sheridan, 2018).

Thermal injury damages the liver through induction of hepatic edema, apoptosis, insulin resistance associated with metabolic derangements, and development of a fatty liver. In addition, with severe burn injury, acute pancreatitis is common and may result in a threefold increase in amylase or lipase, feeding intolerance, or abdominal pain (Culnan et al., 2018).

Patients with large TBSA burns are also at risk for life-threatening abdominal compartment syndrome (ACS) due to large volumes of fluid required for resuscitation, fluid shifts to the interstitium causing edema formation, and decreased abdominal wall compliance due to eschar formation. Increased pressure in the abdominal cavity contributes to GI tract and abdominal organ ischemia (see [Chapter 11](#)). Ramirez, Palmieri, Greenhalgh, and colleagues (2018) reviewed 10 years of cases of ACS in patients with burns and found support for early laparotomy as definitive treatment of ACS.

Management of Burn Injury



Burn recovery generally occurs in three phases: emergent/resuscitative, acute/intermediate, and rehabilitation. Although priorities exist for each of the phases, assessment and management of problems and complications will overlap. [Table 57-3](#) summarizes the priorities of care for each phase.



Emergent/Resuscitative Phase

On-the-Scene Care

The first step in management is to remove the patient from the source of injury and stop the burning process while preventing injury to the rescuer. Rescue workers' priorities include establishing an airway, supplying oxygen (100% oxygen if CO poisoning is suspected), inserting at least one large-bore IV catheter for fluid administration, and covering the wound with a clean, dry cloth or gauze. Continuous irrigation of chemical injury must begin immediately. Chart 57-4 describes the procedures and care required at the burn scene. The outward physical appearance of the person burned is often distracting, but the internal systemic effects pose the greater threat to life.

An immediate primary survey of the patient is performed assessing the ABCDEs: *airway* (A) with consideration given to protecting the cervical spine, *gas exchange or breathing* (B), *circulatory and cardiac status* (C), *disability* (D) including neurologic deficit, and *expose and examine* (E) while maintaining a warm environment (ABA, 2018).

TABLE 57-3**Phases of Burn Care**

Phase	Duration	Priorities
Emergent/resuscitative	From onset of injury to completion of fluid resuscitation	<ul style="list-style-type: none"> • Primary survey: A, B, C, D, E • Prevention of shock • Prevention of respiratory distress • Detection and treatment of concomitant injuries • Wound assessment and initial care
Acute/intermediate	From beginning of diuresis to near completion of wound closure	<ul style="list-style-type: none"> • Wound care and closure • Prevention or treatment of complications, including infection • Nutritional support
Rehabilitation	From major wound closure to return to individual's optimal level of physical and psychosocial adjustment	<ul style="list-style-type: none"> • Prevention and treatment of scars and contractures • Physical, occupational, and vocational rehabilitation • Functional and cosmetic reconstruction • Psychosocial counseling

Adapted from American Burn Association. (2018). *Advanced burn life support (ABLS) course provider manual 2018*. Chicago, IL: Author; Serghiou, M. A., Ott, S.,

Cowan, A., et al. (2018). Burn rehabilitation along the continuum of care. In D. Herndon (Ed.). *Total burn care* (5th ed.). Edinburgh: Saunders Elsevier.

Chart 57-4

Emergency Procedures at the Burn Scene

- **Extinguish the flames or remove from source.** A fire requires oxygen and fuel once ignited. When clothing catches fire, the flames can be extinguished if the person drops to the floor or ground and rolls (“stop, drop, and roll”) or uses anything available, such as a blanket, rug, or coat, to smother the flames. The older adult, or others with impaired mobility, could be instructed to “stop, sit, and pat” to prevent concomitant musculoskeletal injuries. Standing still forces the person to breathe flames and smoke, while running fans the flames. If the burn source is electrical, the electrical source must be disconnected safely before approaching the patient.
- **Cool the burn.** After the flames are extinguished, the burned area and adherent clothing are soaked with *cool* water to cool the wound and halt the burning process. However, *never* apply ice directly to the burn, *never* wrap the person in ice, and *never* use cold soaks or dressings for longer than 20 or so minutes; such procedures may worsen tissue damage and lead to hypothermia in people with larger burns.
- **Remove restrictive objects.** If possible, remove affected, nonadherent clothing immediately. Adherent clothing may be left in place once cooled. Other clothing and all jewelry, including all piercings, should be removed to allow for assessment and to prevent constriction secondary to rapidly developing edema.
- **Cover the wound.** The burn should be covered as quickly as possible to minimize bacterial contamination, maintain body temperature by decreasing evaporative heat loss, and decrease pain by preventing air currents from coming in contact with the exposed nerves in the injured surface. Any clean, dry cloth can be used as an emergency dressing. Ointments and salves should *not* be used. Other than the dressing, no medication or material should be applied to the burn wound at the scene.
- **Irrigate chemical burns.** Chemical burns resulting from contact with a corrosive material are irrigated immediately and continuously with copious amounts of water. Most chemical laboratories have a shower for these types of emergencies. If a chemical contact occurs at home, brush off the chemical agent if dry, remove contaminated and all potentially contaminated clothes immediately, and rinse all areas of the body that have come in contact with the chemical. Rinsing can occur in the shower or any other source of continuous running water. If a chemical gets in or near the eyes, the eyes should be flushed with cool, clean water immediately and copiously. Outcomes for

the patient with chemical burns are significantly improved by rapid, sustained flushing of the injury with water at the scene.

Adapted from American Burn Association. (2018). *Advanced burn life support (ABLS) course provider manual 2018*. Chicago, IL.



Quality and Safety Nursing Alert

Airway patency and breathing must be assessed during the initial minutes of emergency care. Immediate therapy is directed toward establishing a patent airway and giving humidified 100% oxygen. If qualified personnel and equipment are available and the patient with burns has severe respiratory distress and/or airway edema, the rescuers must insert an endotracheal tube and initiate mechanical ventilation. No food or fluid is given by mouth, and the patient is placed in a position that will prevent aspiration of vomitus, because nausea and vomiting may occur, and protection of the airway is always a priority.

The secondary survey focuses on obtaining a history, the completion of the total body systems assessment, initial fluid resuscitation, and provision of psychosocial support of the conscious patient (see [Chapter 67](#)) (ABA, 2018).

Medical Management

Long-term outcomes are impacted by the quality of care received in the first few hours after injury (ABA, 2018). Initially, the patient is transported to the nearest emergency department (ED) so that lifesaving measures can be initiated. Early referral to a burn center is then made if indicated.

Initial priorities in the ED remain airway, breathing, and circulation. For mild pulmonary injury, 100% humidified oxygen is given, and the patient is encouraged to cough so that secretions can be expectorated or removed by suctioning. For more severe situations, it may be necessary to remove secretions by bronchial suctioning and administer bronchodilators and mucolytic agents. Continuous monitoring of airway patency is critical; a previously stable airway may rapidly deteriorate as edema increases and toxic effects of smoke inhalation become apparent.

Once urgent respiratory needs are appropriately addressed, fluid resuscitation is initiated. Fluid resuscitation in patients with burns greater than 20% TBSA addresses the intravascular volume deficit to improve tissue and organ perfusion caused by plasma loss, with the least amount of fluid possible. Daily weights and trends in laboratory test results require close monitoring in the immediate postburn (resuscitation) period to monitor fluid status. Both underresuscitation and overresuscitation with IV fluids are associated with poor outcomes. Shock, ischemic complications, and multiple organ dysfunction syndrome (MODS) occur with underresuscitation (see [Chapter 11](#)), and heart failure and pulmonary edema occur with overresuscitation (see [Chapter 25](#)).

In order to facilitate fluid administration, peripheral IV access may be obtained initially; however, in larger burns, central venous access is recommended due to the large volumes required. Once the TBSA is calculated, fluid resuscitation with lactated Ringer (LR) should be initiated using ABA resuscitation formulas. LR is the crystalloid of choice because its pH and osmolality most closely resemble human plasma.

The ABA (2018) fluid resuscitation formula for adults within 24 hours post thermal or chemical burn is as follows:

$$2 \text{ mL LR} \times \text{patient's weight in kilograms} \times \% \text{TBSA second-, third-, and fourth-degree burns}$$

For adults with electrical burns:

$$4 \text{ mL LR} \times \text{patient's weight in kilograms} \times \% \text{TBSA second-, third-, and fourth-degree burns}$$

Timing is one of the most important considerations in calculating fluid needs in the first 24 hours post burn. The starting point is the time of injury—not the time of arrival to the treating facility (ABA, 2018). The infusion is regulated so that half of the total calculated volume is given in the first 8 hours postburn injury. The second half of the calculated volume is infused over the next 16 hours.

These formulas are only guidelines. It is imperative that the rate of infusion be titrated hourly as indicated by physiologic monitoring of the patient's response. Each patient has a unique injury and optimum results require individualized treatments based on patient response (Gillenwater & Garner, 2017). Urinary output continues to be the standard for assessing patient response to fluid resuscitation. A urine output of 0.5 to 1 mL/kg/h in adults indicates appropriate resuscitation in thermal and chemical injuries, whereas in electrical injuries a urine output of 75 to

100 mL/h is desired (ABA, 2018). Other indicators such as blood pressure or heart rate are not useful in assessing adequate intravascular volume in patients with major burns due to the marked inflammatory response.

After adequate respiratory function and circulatory status have been established, the patient is assessed for cervical spine and/or head injuries if involved in a traumatic or electrical injury. All clothing and jewelry are removed because they may contain chemicals, retain heat, or become constrictive as edema rapidly develops. For chemical burns, flushing of the exposed areas with copious amounts of clean water is continued. The patient is checked for contact lenses. These are removed immediately if chemicals have come in contact with the eyes or if facial burns have occurred. In addition, the eyes are examined promptly for injury to the corneas. An ophthalmologist may be consulted for complete assessment via fluorescent staining to assess for corneal damage.

The patient's temperature must be monitored because hypothermia may develop rapidly, and manipulation of the environment may be necessary. A temperature less than 35°C (95°F) causes vasoconstriction, which may increase tissue ischemia and necrosis.

It is important to validate an account of the burn scenario provided by the patient, witnesses at the scene, and first responders. Information should include the time and the source of the burn injury, the scene of injury (particularly if the patient was in an enclosed space), length of exposure, prior treatment, and any history of concomitant traumatic injury. A history of preexisting medical conditions, allergies, medications, and the use of drugs, alcohol, and tobacco is obtained to assist with the treatment plan.

An indwelling urinary catheter is inserted to permit accurate monitoring of urine output and fluid needs and as a measure of kidney function for patients with moderate to severe burns. If the burn exceeds 20% to 25% TBSA, a nasogastric tube is inserted and connected to low intermittent suction. All patients who are intubated should have a nasogastric tube inserted to decompress the stomach, and to prevent vomiting and aspiration. Often, patients with large burns become nauseated as a result of the GI effects of the burn injury, such as paralytic ileus, and the effects of medications such as opioids.

Clean sheets are placed under and over the patient to protect the burn wound from contamination, maintain body temperature, and reduce pain caused by air currents passing over exposed nerve endings. Baseline height, weight, arterial blood gases, hematocrit, serum electrolytes, blood

alcohol level, drug panel, urinalysis, and chest x-rays may be obtained. Because poor tissue perfusion accompanies burn injuries, only IV analgesia is given in small repeated doses, which is crucial for pain reduction in the emergent phase. If the patient has an electrical burn, a baseline electrocardiogram is also obtained and continuous cardiac monitoring is initiated. Because burns are contaminated wounds, tetanus prophylaxis is given if the patient's immunization status is not current or is unknown.



Quality and Safety Nursing Alert

If necessary, a blood pressure cuff may be placed around a patient's burned extremity. The cuff must be of the correct size with accommodations made for edema.

Although the major focus of care during the emergent phase is physiologic stabilization, the nurse must also attend to the patient's and the family's psychological needs. Anxiety accompanies burn injuries and must be addressed on an ongoing basis. A burn injury is a crisis—one that causes varying emotional responses that may result in conflicts that may precipitate ethical dilemmas. The patient's and family's coping abilities and available supports are assessed. The nurse must consider special circumstances surrounding the burn injury when providing care. Examples include cases of abuse, neglect, suicide attempts, and injury/death of other family members or friends from the same event.

Nursing Management

Nursing assessment in the emergent phase of burn injury focuses on the major priorities for any trauma patient; the burn wound is a secondary consideration to stabilization of airway, breathing, and circulation. The nurse monitors respiratory status closely, and pulses are evaluated, particularly in areas of circumferential burn injury to an extremity. Initially, cardiac monitoring is indicated if the patient has a history of cardiac disease, electrical injury, or altered respiratory conditions. The nurse should monitor vital signs with knowledge of expected abnormalities consistent with burn injury such as tachycardia, tachypnea.

If all extremities are burned, determining blood pressure may be difficult. A clean dressing applied under the blood pressure cuff protects the wound from contamination. Because increasing edema makes blood

pressure difficult to auscultate, a Doppler (ultrasound) device or a noninvasive electronic blood pressure device may be helpful. In patients with severe burns, an arterial catheter is preferred for blood pressure measurement and is helpful for collecting blood specimens. Peripheral pulses in burned extremities are checked frequently either by palpation or the use of a Doppler. Elevation of burned extremities above the level of the heart is indicated for edema reduction. Large-bore IV catheters (e.g., 16 to 18 gauge) and an indwelling urinary catheter are inserted, if not already in situ, and the nurse's documentation must include hourly assessment of fluid intake and urine output.

Red-colored urine suggests the presence of hemochromogens from damage to red blood cells and myoglobin, the by-product of muscle damage (ABA, 2018). This anomaly is associated with deep burns caused by electrical injury or prolonged contact with heat or flame. Glycosuria, a common finding in the early postburn hours, results from the release of liver glycogen stores in response to stress.

The nurse assists with calculating the patient's expected fluid requirements and monitoring the patient's response to fluid resuscitation. Nurse-driven resuscitation protocols have been shown to decrease the amount of fluid given and improve patient outcomes in the emergent/resuscitative phase (Stewart, Ladd, Kovler, et al., 2019). Nursing responsibilities consist of appropriate fluid administration, strict monitoring of intake and output, monitoring the patient's response, and notifying the treatment team of significant assessment findings and any abnormal laboratory values.

To help guide treatment, the following are essential: documentation of body temperature, body weight, and pre-burn weight; history of allergies, tetanus immunization, past medical and surgical history, and current illnesses; and a list of current medications. The nurse performs a head-to-toe assessment, focusing on signs and symptoms of concomitant illness, associated trauma, or developing complications. Assessing the extent of the burn wound using the rule of nines or facilitated with anatomic diagrams (described previously) is performed. Additionally, the nurse works with the primary provider to clinically assess and document the initial areas of full- and partial-thickness injury. Psychosocial considerations of the patient and family and communication with the treatment team are imperative early in the course of care.

Nursing care of the patient in the emergent/resuscitative phase of burn injury is detailed in [Chart 57-5](#).



Acute/Intermediate Phase

The acute/intermediate phase of burn care follows the emergent/resuscitative phase and begins 48 to 72 hours after the burn injury. During this phase, attention is directed toward continued assessment and maintenance of respiratory and circulatory status, fluid and electrolyte balance, and GI and kidney function. Infection prevention and control, burn wound care (e.g., wound cleaning and débridement, topical antibacterial/antimicrobial therapy, application of dressings, wound grafting), pain management, modulation of the hypermetabolic response, and early positioning/mobility are priorities in the acute/intermediate stage of recovery.

Medical Management

Pulmonary complications are common in burn injury. Airway obstruction caused by upper airway edema can take as long as 48 hours to develop. Changes detected by x-ray and arterial blood gas analysis may occur as the effects of resuscitative fluid and the chemical reactions of smoke ingredients with lung tissues become evident. Diagnosis is largely based on history and clinical presentation, monitoring of arterial blood gases with carboxyhemoglobin levels, and direct observation of the airway by fiberoptic bronchoscopy (ABA, 2018). To lessen the effects of upper airway edema, elevation of the patient's head of the bed may be helpful. Stridor and dyspnea are ominous because they are late signs of impending airway obstruction. Early protective intubation to maintain airway patency should be considered as obstruction may occur very rapidly. However, intubation and mechanical ventilation are significant contributors to pulmonary infections. Ideally, the best practice is to remove the endotracheal tube as soon as possible so that a route for pathogens is not accessible to the lungs (ABA, 2018).

Late pulmonary complications secondary to inhalation injuries include mucosal sloughing of the airway and cast formation from cellular debris, which can lead to obstruction, increased secretions, inflammation, atelectasis, airway ulceration, pulmonary edema, and tissue hypoxia. Although research results are mixed, nebulized heparin therapy may be administered because it is thought to have some effect on the inflammatory cascade and formation of fibrin casts in the airways (Suresh

& Dries, 2018). Pneumonia, acute lung injury (ALI), and acute respiratory distress syndrome (ARDS) may also occur.

Ventilator-associated pneumonia (VAP) is a common complication of any patient who is hospitalized and mechanically ventilated and is particularly exacerbated in the patient with an inhalation injury. It affects as many as 10% to 20% of patients on mechanical ventilation longer than 48 hours. See [Chapter 19](#), [Chart 19-6](#), for discussion of “bundled” strategies to prevent VAP and [Chapter 19](#) for discussion of respiratory failure and ARDS.

As capillaries regain their integrity, 48 or more hours after the burn, fluid shifts from the interstitial to the intravascular compartment and intrinsic diuresis begins. If cardiac or kidney function is inadequate, fluid overload may occur, and symptoms of heart failure may emerge (see [Chapter 25](#)). Administration of fluids and electrolytes continues cautiously during this phase of burn care due to fluid shifts, evaporative fluid loss from large burn wounds, and the patient’s physiologic responses to the burn injury. Blood components are given as needed to treat surgical blood loss and anemia.

Hyperthermia is common in patients after burn shock resolves. A resetting of the core body temperature in patients who are severely burned results in a body temperature a few degrees higher than normal for several weeks after the burn. This can be compounded by body temperature increases from sepsis.

Central venous, arterial, or specialty catheters (e.g., hemodialysis catheters, Zoll® catheters) may be required for monitoring hemodynamics. Commonly, patients with major burns need multiple invasive line sites due to the amount and frequency of fluid and medications required. Whenever possible, burned areas of the body are avoided as insertion sites for invasive lines.

One of the most important medical interventions for patients with burns that have positively affected mortality is early **excision** (surgical removal of tissue). The presence of the open wounds or invasive organisms triggers the response to a large burn injury, a systemic cascade of events (Culnan, Sherman, Chung, et al., 2018). Excising the necrotic tissue can ameliorate this response and preserve underlying viable tissue.

Infection Prevention and Control

There are multifactorial reasons why patients with burns incur some of the highest risks for health care–associated infections (HAIs). The systemic response to a burn injury results in dysregulation of the immune

system, predisposing the patient to invasion by environmental pathogens (Lachiewicz, Hauck, Weber, et al., 2017). The wound provides a perfect medium for bacterial proliferation, as well as a conduit to the bloodstream (Ramos, Cornistein, Cerino, et al., 2017). Because of the loss of the epidermal barrier, presence of transmittable bacteria, and the ubiquity of mold species in the environment, it is critical that the nurse prioritizes infection prevention in the plan of care (Sood, Vaidya, Dam, et al., 2018). In addition, to support vital organs and bodily functions, invasive procedures are required which may undermine the body's natural defenses (Ramos et al., 2017).

Chart 57-5



PLAN OF NURSING CARE

Care of the Patient during the Emergent/Resuscitative Phase of Burn Injury

NURSING DIAGNOSIS: Impaired gas exchange associated with carbon monoxide (CO) poisoning, smoke inhalation, and upper airway obstruction

GOAL: Maintenance of adequate tissue oxygenation

Nursing Interventions	Rationale	Expected Outcomes
<ol style="list-style-type: none"> Provide 100% humidified oxygen. Assess breath sounds, and respiratory rate, rhythm, depth and symmetry of chest excursion. Monitor patient for signs of hypoxia. Report abnormalities to primary provider. Observe for the following: <ol style="list-style-type: none"> Erythema or blistering of lips or buccal mucosa Singed nasal hairs Burns of face, neck, or chest Increasing hoarseness Soot in sputum or tracheal tissue in respiratory secretions Monitor arterial blood gas values, pulse oximetry readings, and carboxyhemoglobin levels. Prepare to assist with intubation and escharotomies of chest. 	<ol style="list-style-type: none"> Humidification provides moisture to injured tissues; supplemental oxygen increases alveolar oxygenation. These factors provide baseline data of assessment and evidence of increasing respiratory compromise. These signs indicate possible inhalation injury and risk of respiratory dysfunction. Increasing PaCO₂ and decreasing PaO₂ and O₂ saturation may indicate need for mechanical ventilation. Intubation allows airway protection and mechanical ventilation. Escharotomy enables adequate 	<ul style="list-style-type: none"> Absence of dyspnea Arterial oxygen saturation >95% by pulse oximetry (in the absence of CO poisoning) Arterial blood gas levels within normal limits Respiratory rate, pattern, and breath sounds normal

chest excursion in circumferential chest burns.

NURSING DIAGNOSIS: Impaired airway clearance associated with exposure to smoke

GOAL: Maintain patent airway and adequate airway clearance

Nursing Interventions	Rationale	Expected Outcomes
<ol style="list-style-type: none"> Maintain patent airway through proper patient positioning, removal of secretions, and artificial airway if needed. Provide humidified oxygen as prescribed. Encourage patient to turn, cough, and deep breathe. Encourage patient to use incentive spirometry. Perform endotracheal suction as needed. 	<ol style="list-style-type: none"> A patent airway is crucial to respiration. Humidification liquefies secretions and facilitates expectoration. These activities promote mobilization and removal of secretions. 	<ul style="list-style-type: none"> Patent airway Respiratory secretions are minimal, colorless, and thin.

NURSING DIAGNOSIS: Hypovolaemia associated with increased capillary permeability and evaporative losses from the burn wound

GOAL: Restoration of optimal fluid and electrolyte balance and perfusion of vital organs

Nursing Interventions	Rationale	Expected Outcomes
<ol style="list-style-type: none"> Monitor vital signs, hemodynamics, and urine output, as well as record strict intake and output and daily weights. Maintain IV lines and regulate fluids at prescribed and 	<ol style="list-style-type: none"> Hypovolemia is a major risk immediately following a burn injury. Overresuscitation with IV fluids might cause fluid overload. 	<ul style="list-style-type: none"> Urine output between 0.5 and 1.0 mL/kg/h (30–50 mL/h; 75–100 mL/h if

- appropriate rates following urine output.
3. Observe for symptoms of deficiency or excess of serum sodium, potassium, calcium, phosphorus, and bicarbonate.
 4. Elevate head of patient's bed and burned extremities, if not contraindicated.
 5. Notify primary provider immediately of decreased urine output and hemodynamic changes.
- Adequate fluids are necessary for perfusion of vital organs and maintenance of fluid and electrolyte balance.
2. Adequate fluids are necessary for perfusion of vital organs and maintenance of fluid and electrolyte balance.
 3. Rapid shifts in fluid and electrolyte status are possible in the postburn period.
 4. Elevation promotes venous return.
 5. Rapid fluid shifts must be detected early to prevent complications.
- electrical burn injury)
 - Mean arterial pressure ≥ 60 mm Hg
 - Voids clear yellow urine with specific gravity within normal limits
 - Serum electrolytes within normal limits

NURSING DIAGNOSIS: Hypothermia associated with loss of skin microcirculation and open wounds

GOAL: Maintenance of adequate body temperature

Nursing Interventions	Rationale	Expected Outcomes
<ol style="list-style-type: none"> 1. Assess core body temperature frequently. 2. Provide a warm environment by increasing room temperature or adjunct therapies as needed (overbed warmers, blankets, heat lamps, etc.). 3. Work quickly when wounds must be exposed. 	<ol style="list-style-type: none"> 1. Frequent temperature assessments help detect hypothermia. 2. Minimizes resting energy expenditure. 3. Limiting exposure minimizes evaporative heat loss from wound(s). 	<ul style="list-style-type: none"> • Body temperature remains $>37^{\circ}\text{C}$ (98.6°F) • Absence of chills or shivering

NURSING DIAGNOSIS: Acute pain associated with chemical or physical injury

GOAL: Control of pain

Nursing Interventions	Rationale	Expected Outcomes
<ol style="list-style-type: none"> 1. Use pain intensity scale to assess pain level. Differentiate restlessness due to pain from restlessness due to hypoxia. 2. Administer IV antispasmodic agents as prescribed and assess for effectiveness. 	<ol style="list-style-type: none"> 1. Pain scales provide baselines for evaluating effectiveness of pain relief measures. Hypoxia can cause similar signs and must be ruled out before analgesic medication is given. 2. IV administration is necessary because of altered tissue 	<ul style="list-style-type: none"> • States pain level is decreased and is acceptable to patient's pain goal • Absence of nonverbal cues of pain

3. Provide emotional support and reassurance.
3. Fear and anxiety increase the perception of pain.

NURSING DIAGNOSIS: Anxiety associated with fear and the emotional impact of burn injury

GOAL: Minimization of patient's and family's anxiety

Nursing Interventions	Rationale	Expected Outcomes
<p>1. Assess patient's and family's understanding of burn injury, coping skills, and family dynamics.</p> <p>2. Explain all procedures to the patient and the family in clear, simple terms.</p> <p>3. Administer prescribed antianxiety medications if the patient remains extremely anxious despite nonpharmacologic interventions.</p>	<p>1. Previous successful coping strategies can be fostered for use in the present crisis. Assessment allows planning of individualized interventions.</p> <p>2. Increased understanding alleviates fear of the unknown. High levels of anxiety may interfere with understanding of complex explanations.</p> <p>3. Anxiety levels during the emergent phase may exceed the patient's coping abilities.</p>	<ul style="list-style-type: none"> • Patient and family verbalize understanding and acceptance of emergent burn care • Patient and family's anxiety levels will be minimized

COLLABORATIVE PROBLEMS: Acute respiratory failure, distributive shock, acute kidney injury, compartment syndrome, paralytic ileus, Curling's ulcer

GOAL: Absence of complications

Nursing Interventions	Rationale	Expected Outcomes
Acute Respiratory Failure		
1. Assess for increasing dyspnea, stridor, changes in respiratory patterns.	1. Such signs reflect deteriorating respiratory status.	• Breathes spontaneously with adequate tidal volume
2. Monitor pulse oximetry, arterial blood gas values.	2. Abnormal findings may indicate respiratory failure.	• Arterial blood gas values within acceptable limits
3. Monitor chest x-ray results.	3. X-ray may disclose pulmonary injury or infection.	• Chest x-ray findings normal
4. Assess for restlessness, confusion, difficulty attending to questions, or decreasing level of consciousness.	4. Such manifestations may indicate cerebral hypoxia.	• Absence of cerebral signs of hypoxia
5. Report deteriorating respiratory status immediately to primary provider.	5. Acute respiratory failure is life-threatening, and immediate intervention is required.	
6. Prepare to assist with intubation or escharotomies as indicated.	6. Intubation allows mechanical ventilation. Escharotomies allow adequate chest excursion with respirations.	
Distributive Shock		

1. Assess for decreasing urine output and alterations in vital signs and hemodynamics.
 2. Assess for progressive edema as fluid shifts occur.
 3. Adjust fluid resuscitation in collaboration with the primary provider in response to physiologic findings.
1. Such signs and symptoms may indicate distributive shock and inadequate intravascular volume.
2. As fluid shifts into the interstitial spaces in burn shock, edema occurs and may compromise tissue perfusion.
3. Optimal fluid resuscitation prevents distributive shock and improves patient outcomes.
- Urine output between 0.5 and 1.0 mL/kg/h (30–50 mL/h; 75–100 mL/h if electrical burn injury)
 - Blood pressure within patient's normal range
 - Hemodynamics remain within normal limits
 - No signs or symptoms of impaired perfusion

Acute Kidney Injury

1. Monitor urine output, blood urea nitrogen (BUN), and serum creatinine levels.
 2. Report decreased urine output or increased BUN and creatinine values to primary provider.
 3. Assess urine for hemoglobin or myoglobin. Administer increased fluids as prescribed.
1. These values reflect renal function.
2. These laboratory values indicate possible kidney failure.
3. Hemoglobin or myoglobin in the urine predisposes patient to increased risk of kidney failure. Fluids help to flush hemoglobin and myoglobin from renal tubules.
- Adequate urine output
 - BUN and serum creatinine values remain normal

Compartment Syndrome

1. Assess peripheral pulses frequently (with Doppler ultrasound device if needed).
 2. Assess warmth, capillary refill, sensation, and movement of extremity frequently. Compare affected with unaffected extremity if possible.
 3. Remove blood pressure cuff after each reading.
 4. Elevate burned extremities if not contraindicated.
 5. Report loss of pulse or sensation or presence of pain to primary provider immediately.
 6. Prepare to assist with escharotomies.
1. Pulse assessments are crucial to assess for adequate perfusion.
 2. These assessments may signal worsening peripheral perfusion.
 3. Cuff may act as a tourniquet as extremities swell.
 4. Elevation reduces edema formation.
 5. These signs and symptoms may indicate impaired tissue perfusion.
 6. Escharotomies relieve the constriction caused by edema.
- Peripheral pulses detectable
 - Signs of adequate peripheral perfusion

Paralytic Ileus

1. Auscultate for 1. Presence of bowel • Normal bowel

bowel sounds, abdominal distention.	sounds indicates normal peristalsis. Abdominal distention reflects inadequate decompression.	• Absence of abdominal distention
2. Maintain nasogastric tube on low intermittent suction until bowel sounds resume.	2. This measure relieves gastric and abdominal distention.	

Curling's Ulcer

1. Assess gastric aspirate and stools for blood.	1. Blood indicates possible gastric or duodenal ulcer bleeding.	• Gastric aspirate and stools do not contain blood
2. Administer histamine-2 blockers and/or antacids as prescribed.	2. Such medications reduce gastric acidity and risk of ulceration.	

Causative agents of burn infections include bacteria, fungi, or viruses. Hydrotherapy equipment, direct or indirect contamination from healthcare workers' hands, environmental surfaces, and translocation of microorganisms from other body systems—most notably, the GI tract—are all common sources of potential contamination in the burn unit that require hypervigilance. Whether the burn wound is healing through spontaneous reepithelialization or is being prepared for skin grafting, protection from pathogens is crucial. Infection impedes burn wound healing by promoting excessive inflammation and damaging tissue. Clinical signs of infection include progressive erythema, warmth, tenderness, and malodorous exudate.

A multiple-strategy approach is crucial in prevention and control of burn wound infections. Such strategies include:

- The use of barrier techniques (e.g., gowns, gloves, eye protection, and masks if needed)
- Environmental cleaning with periodic cultures of patient care equipment (with special attention to hydrotherapy equipment)
- Application of appropriate topical antimicrobial agents

- Appropriate use of systemic antibiotic and antifungal agents (careful use and close monitoring of culture sensitivities are needed due to increasing challenges of antibiotic resistance in healthcare environments)
- Early excision and closure of the burn wound
- Control of hyperglycemia (with insulin as indicated, even in a patient without a prior diagnosis of diabetes)
- Management of the hypermetabolic response (see [Chapter 11](#))

There are varying practices in the burn community regarding obtaining cultures for surveillance. In some burn centers, patients may be cultured on admission to screen for the presence of regionally known pathogens. Wounds are generally cultured on admission, prior to cleaning, with each surgical case, and for clinical suspicion of infection. Antimicrobial therapy is tailored to culture results. The broad use of prophylactic antibiotics is not supported by current research (Ramos et al., 2017).

Wound Cleaning

Proper management of burn wounds prevents wound deterioration. The goal of wound care is removal of nonviable tissue and wound exudate, and elimination of previously applied topical agents. Gentle cleaning with mild soap, water, and a washcloth can prevent infection by decreasing the bacteria and debris on the wound surface. Hair in and around the burn area, except the eyebrows, should be clipped short or shaved.

Various processes may facilitate cleaning burn wounds. Patients who are hemodynamically unstable may have their wounds washed at the bedside, whereas patients who are ambulatory may shower themselves or with assistance. Patients who are nonambulatory can be bathed and receive wound care using shower carts—mobile stretchers made with removable sides, drainage holes, and positioning capabilities. Retractable water hoses suspended from walls and ceilings provide the nurse with easy access to a clean water source for washing the wounds. Whatever method employed, the goal is to protect the wound from acute proliferation of pathogenic organisms on the surface through mechanical washing to prevent invasion of deeper tissues until the wounds are closed through spontaneous healing or skin grafting. Strategies for the prevention of cross-contamination include the use of plastic liners on the shower carts and chairs, water filtration systems or point-of-care filters, and thorough decontamination of equipment after each use.

Patient comfort and ability to participate in the prescribed treatment are important considerations. During bathing, patient participation is

encouraged to promote exercise and range of motion of the extremities. During wound cleaning, the nurse inspects all skin for any signs of redness, breakdown, or local infection. This also provides the nurse an opportunity for targeted patient education.

During treatment, the patient is continuously assessed for signs of hypothermia. The temperature of the water is maintained at 37.8°C (100°F), and the temperature of the room should be maintained between 26.6° and 29.4°C (80° and 85°F) to prevent hypothermia. Other assessment considerations include patient fatigue, changes in hemodynamic status, and pain unrelieved by analgesic medications or relaxation techniques.

Topical Antibacterial Therapy

Variations in topical wound care for nonsurgical burn wounds exist among burn centers across the country. Selections are based on the individualized needs of each patient. The goal of topical therapy is to provide a dressing with the following characteristics:

- Effective against gram-positive and gram-negative organisms and fungi
- Penetrates the eschar but is not systemically toxic
- Is cost-effective, available, and acceptable to the patient
- Is easy to apply and remove, decreases the frequency of dressing changes, decreases pain, and minimizes nursing time

No single topical medication is universally effective, and the use of different agents at different times in the postburn period is best practice.



Quality and Safety Nursing Alert

Prudent use and alternation of antimicrobial agents can result in reduction of resistant strains of bacteria, greater effectiveness of the agents, and a decreased risk of sepsis. Table 57-4 describes select topical antimicrobial agents.

Wound Dressing

After the prescribed topical agents are applied, the wound is covered with several layers of dry dressings with lighter dressing over joints to allow for mobility. Dressings may also require modification to accommodate splints or other positioning devices. Circumferential dressings should

always be applied distally to proximally to promote return of excess fluid into the central circulation. In the case of hand or foot burns, the fingers and toes should be wrapped individually to promote mobility and function while healing.

Burns to the face may be left open to air once cleaned and the topical agent has been applied to maintain a moist environment. Careful attention ensures the topical agent does not come in contact with the eyes or mouth. A light, nonrestrictive dressing may be applied to the face to absorb excess exudate if needed.

Occlusive dressings, bulky gauze, and a topical antimicrobial agent may be used over areas with new skin grafts to protect the new graft and promote an optimal condition for its adherence to the recipient site. Ideally, these surgical dressings remain in place for 3 to 5 days, to allow growth of the microcirculation into the new graft before removal for inspection of the graft. When occlusive dressings are applied, precautions are taken to prevent two body surfaces from touching one another, such as fingers or toes, ear and scalp, the areas under the breasts, any point of flexion, or between the genital folds. Functional body alignment positions are maintained by using splints or by regular repositioning of the patient.



Quality and Safety Nursing Alert

Dressings can impede circulation if they are wrapped too tightly. The peripheral pulses must be checked frequently and burned extremities elevated. If the patient's pulse is diminished, this is a critical situation and must be addressed immediately.

TABLE 57-4

Overview of Select Topical Antimicrobial Agents
Used for Burn Wounds

Agent	Indication/Comment	Application	Nursing Implications
General			
Antimicrobial ointment	Antibacterial coverage and promotion of a moist wound environment	Apply 1/16-inch layer of ointment with a clean glove daily.	Ensure removal of residual ointment at the time of wound cleaning prior to applying a new layer. Monitor closely for signs and symptoms of local infection.
Specific Agents			
Silver sulfadiazine 1% water-soluble cream	Bactericidal agent for many gram-positive and gram-negative organisms, as well as yeast and <i>Candida albicans</i> Minimal penetration of eschar	Apply 1/16-inch layer of cream with a clean glove 1–3 times daily.	Anticipate formation of pseudoeschar (proteinaceous gel), which can be removed.
Mafenide acetate 5% hydrophilic-based solution or cream	Antimicrobial agent for gram-positive and gram-negative organisms Diffuses through eschar and avascular tissue (e.g., cartilage)	Apply twice a day with a clean glove.	Is a strong carbonic anhydrase inhibitor and may cause metabolic acidosis. Application may cause considerable pain initially.
Silver nitrate 0.5% aqueous solution	Effective against most strains of <i>Staphylococcus</i> and <i>Pseudomonas</i> and many gram-negative organisms. Does not penetrate eschar	Apply solution to gauze dressing and place over wound. Keep the dressing wet but covered with dry gauze and dry blankets to decrease vaporization.	Monitor serum sodium (Na^+) and potassium (K^+) levels and replace as prescribed. Silver nitrate solution is hypotonic and acts as a wick for sodium and potassium. Protect bed linens and clothing from

Silver-impregnated dressings (sheets or mesh)	Broad antimicrobial effects (product specific) Delivers a uniform, antimicrobial concentration of silver ions to the burn wound.	Apply directly to wound. Cover with absorbent secondary dressing if needed.	May produce a pseudoeschar from silver after application. Can be left in place for several days (product specific).
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Adapted from IBM Micromedix®. (2020). *Formulary advisor, New York Presbyterian Weill Cornell Medicine*. New York. Available pass-protected. Retrieved on 4/14/2020 at: www.micromedexsolutions.com/micromedex2/librarian/ssl/true

Dressings that adhere to the wound bed may be removed more comfortably and with less damage to healing tissue by moistening the dressing with water or saline. The patient may participate in removing the dressings, providing some degree of control over this painful procedure. The wounds are then cleaned and débrided to remove any remaining topical agent, exudate, and nonviable tissue. Sterile scissors and forceps may be used to trim loose eschar and encourage separation of devitalized tissue. During this procedure, the wound and surrounding skin are carefully inspected. Documentation should include color, odor, size, exudate, signs of reepithelialization, any changes from the previous dressing change, and other key characteristics.

Wound Débridement

The goals of **débridement** (removal of *devitalized* tissue) are:

- Removal of devitalized tissue or burn eschar in preparation for grafting and wound healing
- Removal of tissue contaminated by bacteria and foreign bodies, thereby protecting the patient from invasion of bacteria

There are four types of débridement—natural, mechanical, chemical, and surgical.

Natural Débridement

With natural débridement, the devitalized tissue separates from the underlying viable tissue spontaneously. Bacteria present at the interface of the burned tissue and healthy viable tissue gradually liquefy the fibrils of

collagen, a protein present in skin, tendon, bone, cartilage, and connective tissue, that hold the eschar in place. Proteolytic and other natural enzymes cause this phenomenon. The process may take weeks to months to occur.

Mechanical Débridement

Mechanical débridement involves the use of surgical tools to separate and remove the eschar. This technique, performed by primary providers, specially trained nurses, or physical therapists, is usually performed with routine dressing changes. If bleeding occurs, hemostatic agents or pressure may be applied to achieve hemostasis. Dressing changes and wound cleaning aid the removal of wound debris. Wet-to-dry dressings are not advised for burn care because of the possibility of removing viable epithelial cells along with necrotic tissue. Wet-to-wet or wet-to-moist dressings may be used instead.

Chemical Débridement

Topical enzymatic agents are available to promote débridement of burn wounds. Because such agents usually do not have antimicrobial properties, they may be combined with topical antibacterial therapy to protect the patient from bacterial invasion. Heavy metals such as silver can deactivate débriding agents; therefore, caution is necessary to ensure that the topical antimicrobial agent does not interfere with the chemical débridement. Alternating topical medications may also be effective in achieving débridement without infection.

Surgical Débridement

Early surgical excision to remove devitalized tissue along with early burn wound closure has long been recognized as one of the most important factors contributing to survival in a patient with a major burn injury. Surgical débridement occurs before the natural separation of eschar transpires from bacterial lysis of collagen fibers at the dermal–eschar junction. This may be performed as soon as possible after the burn, once the patient is hemodynamically stable and edema has decreased. Ideally, the wound is covered immediately with a skin graft (if necessary) and a dressing. If the wound bed is not ready for a skin graft at the time of excision, a temporary biologic or synthetic dressing may be applied until an autograft can be successfully applied during a subsequent surgery.

The use of surgical excision carries with it risks and complications, especially with large burns. The procedure creates a high risk of extensive

blood loss with lengthy operating and anesthesia times. Blood losses sustained during surgical procedures, wound care, and ongoing hemolysis exacerbate anemia. Blood transfusions may be required periodically to maintain adequate hemoglobin levels for oxygen delivery to the myocardium. See [Chapter 28](#) for discussion of blood component therapy.

When conducted in a timely and efficient manner, surgical excision results in shorter lengths of stay and decreased risk of complications from invasive burn wound sepsis. Once débrided, granulation tissue fills the void created by the wound, creates a barrier to bacteria, and serves as a bed for epithelial cell growth. A wound covering is applied to keep the wound bed moist and promote the granulation process.

Wound Grafting

The patient with deep partial- or full-thickness burns may be a candidate for skin grafting to decrease the risk of infection; prevent further loss of protein, fluid, and electrolytes through the wound; minimize evaporative heat loss; and reduce scarring. Special attention is warranted when grafting the face (for cosmetic, functional, and psychological reasons); functional areas, such as the hands and feet; and areas over joints. Grafting permits earlier function and reduces scar **contractures** (shrinkage of burn scar through collagen maturation). When burns are very extensive, the order in which areas are grafted is chosen based on the ability to achieve wound closure as soon as possible; therefore, the chest and abdomen or back may be grafted first to reduce the overall open wound size.

Autografts

Autografting remains the preferred autologous method for definitive burn wound closure after excision. **Autografts** are the ideal means of covering burn wounds because the grafts are the patient's own skin and therefore are not rejected by the patient's immune system. They can be split-thickness, full-thickness, or epithelial grafts. Because the **donor site** (the area from which skin is taken to provide the autograft) for a full-thickness graft includes both the epidermis and dermis, its use must be cautiously considered because the donor site cannot heal spontaneously.

Split-thickness autografts are most commonly used and can be applied in sheets (see [Fig. 57-7](#)), or they can be expanded by meshing so that they cover more than a given donor site area (see [Fig. 57-8](#)). Skin meshers enable the surgeon to cut tiny slits into a sheet of donor skin, making it possible to expand, covering larger areas with smaller amounts of donor

skin. Expanded grafts adhere to the recipient site more easily than sheet grafts and prevent the accumulation of blood, serum, air, or purulent material under the graft that would prevent revascularization and adherence. However, any kind of graft other than a sheet graft contributes to scar formation as it heals. The use of widely meshed (largely expanded) grafts may be necessary in large wounds but should be viewed as a compromise in terms of cosmesis.



Figure 57-7 • Split-thickness sheet graft. Used with permission from University of Texas Medical Branch, Galveston, TX.

If blood, serum, air, fat, or necrotic tissue is present between the recipient site and the graft, there may be partial or total loss of the graft. Infection, mishandling of the graft, sheer injury with mobilization or trauma during dressing changes account for most other instances of graft loss. The use of split-thickness grafts allows the remaining donor site to retain sweat glands and hair follicles, minimizing healing time.

Cultured epithelial autograft (CEA) has emerged as an important procedure in the management of massive burns. In burns that cover more than 90% TBSA, CEA may be the only option because the availability of nonburned skin as donor sites will not be sufficient for grafting. CEA involves obtaining full-thickness biopsies of the patient's unburned skin

that are cultured to promote growth of keratinocytes. The final product is available approximately 3 weeks later for grafting (see Fig. 57-9). Meticulous attention is required to apply CEA to body surfaces because it is extremely fragile and prone to graft loss. Use of CEA can be cost prohibitive; besides its direct costs, it also requires inordinately extended LOS for the patient.



Figure 57-8 • Split-thickness meshed graft. Used with permission from University of Texas Medical Branch, Galveston, TX.



Figure 57-9 • Application of cultured epithelial autologous grafts. Used with permission from University of Texas Medical Branch, Galveston, TX.

Care of the graft site

Protection and immobility are key in caring for skin grafts postoperatively. Occlusive dressings encased in bulky gauze wraps are commonly used initially after grafting to immobilize the graft and support the humid environment required for optimal healing. Occupational or physical therapists may construct splints to immobilize joints affecting newly grafted areas. Homograft, xenograft, or synthetic dressings (discussed later) may also be used to protect fragile grafts or widely expanded meshed grafts.

The first dressing change is usually performed 3 to 5 days after surgery, or earlier if clinical signs of infection or bleeding are present. Infection, bleeding beneath the graft, and shearing forces are the most common reasons for graft loss in the early postoperative period. Patients must be positioned and turned carefully to avoid disturbing the graft or applying pressure on the graft site. If an extremity has been grafted, it is elevated to reduce edema. The patient may begin actively exercising the grafted area 5 to 7 days after surgery. This may vary with individual burn center's protocols.

Care of the donor site

The donor site is a clean, usually superficial wound created in a surgical environment that the surgeon uses to obtain a piece of skin for grafting of the wound bed. After the skin is excised, a hemostatic agent such as thrombin or epinephrine may be applied directly to the donor site to promote hemostasis. A myriad of dressings are available to cover donor

sites once hemostasis is obtained. Because a donor site is usually a partial-thickness wound, it is very painful, an additional potential site of infection, and very susceptible to pressure injury. With proper care, the donor site should heal spontaneously within 7 to 14 days in an adult who was previously healthy and nonsmoking (Foster, Richey, Osborn, et al., 2020).

Homografts and Xenografts

Homografts (or allografts) and **xenografts** (or heterografts) are also referred to as biologic dressings and are intended as temporary wound coverage. Homografts are pieces of skin obtained from recently deceased or living humans other than the patient. Xenografts consist of skin taken from animals (usually pigs). Therefore, the body's immune response will eventually reject either of them as a foreign substance.

In extensive burns, biologic dressings provide temporary wound coverage and protection of granulation tissue until autografting is possible. As a temporary dressing, they also decrease the wound's evaporative water and protein loss, provide an effective barrier against entry of bacteria, and decrease pain by protecting nerve endings. Biologic dressings can be left open to air or covered with a dressing. They stay in place for varying lengths of time, but are removed in instances of bacterial colonization, infection, or rejection of the dressing by the body. They may also be used as a test graft in preparation for autografting to determine if the wound bed will accept the graft. Once the biologic dressing appears to be "taking," or adhering to the granulating surface with minimal underlying exudation, the patient is ready for an autologous skin graft. Another advantage of biologic dressings is that fewer dressing changes may be required.

Homografts tend to be the most expensive biologic dressings. They are available from skin banks in fresh and cryopreserved (frozen) forms. Homografts are thought to provide the best infection control of all biologic or biosynthetic dressings available. Revascularization occurs within 48 hours, and the graft may be left in place for several weeks.

Pigskin, an effective xenograft, is available from commercial suppliers. It is available fresh, frozen, or lyophilized (freeze-dried) for longer shelf life. Pigskin is used for temporary covering of clean wounds such as superficial partial-thickness wounds and donor sites. Although pigskin does not vascularize, it adheres to clean superficial wounds, providing pain control and reducing evaporative fluid loss allowing the underlying wound to reepithelialize (Aly, Dannoun, Jimenez, et al., 2018).

When grafting is not possible, surgically applied skin substitutes have been created that replace the epidermis or the dermis either temporarily or permanently. Each provides advantages and disadvantages that are important to consider in product selection.

Biosynthetic and Synthetic Dressings

Problems with availability, sterility, and cost have prompted the search for biosynthetic and synthetic dressings, which may eventually replace biologic dressings as temporary wound coverings. There are currently many products on the market, but they tend to be cost prohibitive for most patients and in most healthcare settings.

Pain Management

A burn injury is considered one of the most painful types of trauma that a person can experience. The nature of the injury may expose nerve endings to the atmosphere; and the patient may require multiple procedures, débridements, surgeries, and treatments. Moving, changing position, and receiving occupational and physical therapy cause additional discomfort. Adequate pain management must address background, breakthrough, and procedural pain.

Background pain is a continuous level of discomfort experienced even when the patient is inactive or not undergoing any procedures. The goal of treatment is to provide a long-acting analgesic agent that will provide uniform coverage for this long-term discomfort. It is helpful to use small escalating doses when initiating analgesia to reach the level of pain control that is acceptable to the patient and facilitates their participation in recovery. The use of patient-controlled analgesia gives control to the patient and often achieves this goal.

Breakthrough pain is described as acute, intense, and episodic. It is generally related to an activity or movement of the affected area. Short-acting agents are used for breakthrough pain to achieve pain control if needed. Procedural pain is discomfort that occurs with procedures such as daily wound treatments, invasive line insertions, and physical and occupational therapy. The goal is to plan proper analgesia to facilitate comfort for the patient throughout the procedure.

Most severe burns are a combination of partial- and full-thickness burns that influence the amount of pain the patient experiences. Superficial and partial-thickness burns are very painful because the nerve endings are not protected, resulting in excruciating pain with exposure to temperature, pressure, air currents, and movement. In a full-thickness

burn, the nerve endings are destroyed, and there is numbness and decreased sensation to that area. Thus, the patient often underestimates severe injuries. Memories of the pain patients experience may persist for a long time. Educating patients and their families about burn pain and its relationship to the depth of injury as well as the pain management plan is an important priority for the nurse.

Pharmacologic treatment for the management of burn pain includes the use of opioids, nonsteroidal anti-inflammatory drugs, anxiolytics, and anesthetic agents. These and other pain management strategies are discussed in [Chapter 9](#). For treatment of anxiety, benzodiazepines may be used in conjunction with opioids. The use of anesthetics in a nonoperative setting (i.e., moderate sedation) requires administration and monitoring by qualified personnel. Recent advances include the use of agents with rapid onset and short duration, which have been very effective in pain control during a planned procedure. In the provision of holistic patient care, the use of nonpharmacologic pain and anxiety interventions must not be overlooked. Nonpharmacologic therapies include relaxation techniques, distraction, guided imagery, hypnosis, therapeutic touch, humor, music therapy, and virtual reality techniques.

Modulation of Hypermetabolism

Burn injuries produce profound metabolic abnormalities fueled by the exaggerated stress response to the injury. The body's response has been classified as hyperdynamic, hypermetabolic, and hypercatabolic. Hypermetabolism can affect morbidity and mortality by increasing the risk of infection and slowing the healing rate.

Nutrition should be provided as soon as possible upon arrival to the burn center and may require placement of a nasogastric tube for adequate calorie delivery. Patients who are critically ill may even have their feedings continued intraoperatively if the airway is protected. Several formulas exist for estimating the daily metabolic expenditure and caloric requirements of patients with burn injuries. Carbohydrates are the most important energy source for patients who are severely burned (Culnan et al., 2018). Fat, although a required nutrient, should be provided in more limited quantities. When the oral route is used, high-protein, high-calorie meals and supplements are given. Dietary consultations are useful in helping patients meet their nutritional needs. Daily calorie counts aid in assessing the adequacy of nutritional intake.

Early excision and grafting of the burn wound is one of the most important factors in ameliorating hypermetabolism by removing eschar,

thereby lessening the effects of inflammatory mediators. Appropriate manipulation of environmental temperatures decreases energy expenditure by the patient (Rizzo, Rowan, Driscoll, et al., 2017). Insulin therapy in patients with burns is required to treat the hyperglycemia that occurs from accelerated gluconeogenesis and is beneficial in muscle protein synthesis. Oxandrolone, an anabolic steroid, is commonly given to patients with burns because it improves protein synthesis and metabolism. Administration of propranolol (a beta-blocker) decreases heart rate and blocks harmful catecholamine effects.

Nursing Management

Nursing management of the patient in the acute/intermediate phase is focused on the following priorities: restoring fluid balance, preventing infection, modulating hypermetabolism, promoting skin integrity, relieving pain and discomfort, promoting mobility, strengthening coping strategies, supporting patient and family processes, and monitoring and managing complications.

Restoring Normal Fluid Balance

To reduce the risk of fluid overload and consequent heart failure and pulmonary edema, daily weights and careful calculation of intake and output measurement are utilized to guide therapy. Thirst, a normal body response to hypovolemia, may cause the patient to drink excessive amounts of water, driving the serum sodium to dangerously low levels. Serum sodium levels should be trended as fluid shifts may lead to metabolic derangements. Changes in physical assessment and hemodynamic indicators are also useful in evaluating the patient's response to treatment.

Preventing Infection

The patient with burns is at risk for infection from multiple sources, which may include open wounds, lung injury, GI ischemia, and indwelling catheters. Increased temperature, tachycardia, tachypnea, and leukocytosis are inherently present in the patient with burns, masking clinical signs of infection. Therapeutic interventions are complex due to the patient's altered physiology.

A major part of the nurse's role during the acute phase of burn care is detection and prevention of infection. The nurse is responsible for providing a clean environment, including the promotion of protective

isolation interventions. The nurse protects the patient from sources of contamination, including other patients, staff members, visitors, and equipment. Patients can inadvertently promote migration of microorganisms from one burned area to another by touching their wounds or dressings. Bed linens can also spread infection through either colonization with wound microorganisms or fecal contamination. Regular bathing of unburned areas and changing of linens can help prevent infection. Fresh flowers, plants, and fresh fruit baskets are not permitted in the patient's room because of the risk of microorganism growth. Changing invasive lines and tubing routinely in accordance with Centers for Disease Control and Prevention (CDC) recommendations and institutional policy, and then promptly removing them when no longer indicated, will prevent many HAIs.

Modulating Hypermetabolism

The nurse collaborates with the dietitian or nutrition support team to develop a plan that meets the needs of the patient. Family members may be encouraged to bring nutritious and favorite foods to the hospital. High-calorie nutritional supplements may be necessary. Nutritional intake must be accurately documented. Vitamin and mineral supplements may be prescribed.

If caloric goals cannot be met by oral feeding, a feeding tube is inserted and used for continuous or bolus feedings of specific formulas. The volume of residual gastric secretions should be checked periodically to ensure absorption. The patient should be weighed each day and the results tracked to properly assess appropriate weight parameters and to attenuate catabolism of lean muscle mass.

Promoting Skin Integrity

Wound care is usually the single most time-consuming element of burn care after the emergent phase. The primary provider prescribes the desired topical antibacterial agents and specific biologic, biosynthetic, or synthetic wound coverings and plans for surgical excision and grafting. The nurse needs to make astute assessments of wound status, use creative approaches to dressing of wounds, and support the patient during the emotionally distressing and significantly painful experience of wound care.

Assessment of the burn wound requires an experienced eye, hand, and sense of smell. Important wound assessment features include size, color, odor, presence of eschar and exudate, epithelial buds (small pearl-like

clusters of cells on the wound surface), bleeding, granulation tissue, the status of graft take, healing of the donor site, and the condition of the surrounding skin. Any significant changes in the wound are reported to the primary provider because they may indicate burn wound infection and require immediate intervention.

The nurse also assists the patient and family by providing education, support, and encouragement to take an active part in dressing changes and wound care when appropriate. Discharge planning needs for wound care must be anticipated early in the course of burn management, and the strengths of the patient and family are assessed and used in preparing for the patient's eventual discharge and home care needs. Family presence during dressing changes promotes feelings of readiness for discharge.

Relieving Pain and Discomfort

Pain management continues to be a priority during the acute phase of burn recovery. Frequent assessment of pain is required, and analgesic and anxiolytic medications are administered as prescribed. To increase its effectiveness, analgesic medication is provided before the pain becomes severe. Nonpharmacologic interventions can be used to alter the patient's perceptions of and responses to pain. Frequent reassessment of responses to interventions, whether pharmacologic or nonpharmacologic, is essential.

Postburn pruritus (itching) affects almost all patients with burns and is one of the most distressing symptoms in the postburn period. Oral antipruritic agents, environmental conditions, frequent lubrication of the skin with water or silica-based lotion, and diversion activities all help to promote comfort in this phase. The instructions "pat, don't scratch" must be reinforced with patients in order to prevent further discomfort and infectious complications.

Lack of sleep and rest interfere with healing, comfort, and restoration of energy. If necessary, sleep aids may be prescribed on a regular basis in addition to analgesic and anxiolytic agents.

Promoting Physical Mobility

An early priority is prevention of the complications of immobility. Deep breathing, turning, and proper positioning are essential nursing practices that prevent atelectasis and pneumonia, control edema, and prevent pressure injuries and contractures. Specialty beds may be useful, and early mobility is strongly encouraged. If the lower extremities are burned, elastic pressure bandages should be applied before the patient is placed in

an upright position to promote venous return and minimize edema formation.

The burn wound is in a dynamic state for at least 1 year after wound closure. During this time, aggressive efforts must be made to prevent contracture and hypertrophic scarring. Both passive and active range-of-motion exercises are initiated from the day of admission and are continued after grafting within prescribed limitations. Splints or functional devices applied to the extremities may lessen contractures through compression and stretch. The nurse monitors the splinted areas for signs of vascular insufficiency, nerve compression, and skin breakdown. Occupational and physical therapists are consulted to develop a patient-specific plan of care throughout hospitalization and recovery.

Strengthening Coping Strategies

Much of the patient's energy goes into maintaining vital physical functions and wound healing in the early postburn weeks, leaving little emotional energy for coping. In the acute phase of burn care, the patient is facing the reality of the burn injury. Grief, depression, anger, regression, and manipulative behavior are common responses of patients who have burn injuries. Withdrawal from participation in required treatments and regression must be viewed with an understanding that such behavior may help the patient cope with an enormously stressful event.

The patient may experience feelings of anger. At times, the anger may be directed inward because of a sense of guilt, perhaps for causing the fire or even for surviving when others perished. The anger may also be directed outward toward those who escaped unharmed or those who are now providing care. One way to help the patient handle these emotions is to enlist someone to whom the patient can express feelings without fear of retaliation. A nurse, social worker, psychiatric liaison nurse, peer supporter, spiritual advisor, or counselor who is not involved in direct care activities may fill this role successfully.

Patients with burn injuries are very dependent on healthcare team members during the long period of treatment and recovery. However, even when physically unable to contribute much to self-care, they should be included in decisions regarding care and encouraged to assert their individuality in terms of preferences and recognition of their unique identities. As the patient improves in mobility and strength, the nurse works with the patient to set realistic expectations for self-care and planning for the future. Many patients respond positively to the use of contractual agreements and other strategies that recognize their

independence, set expectations for behavior, and encourage positive communication.

Supporting Patient and Family Processes

The life-altering burn injury has tremendous psychological, economic, and social impact on the patient and family. The nurse is instrumental in providing support to the patient and family as they adapt to the burn injury. Referrals for social services or psychological counseling should be made as appropriate. This support continues into the rehabilitation phase. Some burn centers offer structured support programs which provide evidenced-based communication training to patients who have survived a burn injury with the goal of helping them to become more effective peer supporters. The peer supporter will visit the hospitalized patient to provide psychosocial support. Many patients appreciate the opportunity to be able to share their experience with another person who has had a burn injury.

With only 70 verified burn centers in the United States (ABA, 2019), patients who experience major burns are commonly sent to burn centers far from home. Because burn injuries are sudden and unexpected, family roles are disrupted. If the primary caregiver or wage earner in the family is injured, roles may change, which adds more stress to the family. Therefore, both the patient and the family need thorough information regarding the patient's burn care and expected course of treatment. Barriers to learning and preferred learning styles are assessed and considered. This information is used to tailor education activities. Patient and family education is a priority and is best provided with a multimedia approach.

Monitoring and Managing Potential Complications

Acute Respiratory Failure and Acute Respiratory Distress Syndrome

The patient's respiratory status is monitored closely for increased difficulty in breathing, change in respiratory pattern, or onset of adventitious (abnormal) breath sounds. Typically, at this stage, signs and symptoms of injury to the respiratory tract become apparent. As described previously, signs of hypoxia, diminished breath sounds, wheezing, tachypnea, stridor, and sputum tinged with soot (or in some cases containing sloughed tracheal tissue) are among the many possible findings. Medical management of the patient with acute respiratory

failure requires intubation and mechanical ventilation (if not already in use). If ARDS has developed, higher oxygen levels, positive end-expiratory pressure, and pressure support are used with mechanical ventilation to promote gas exchange across the alveolar–capillary membrane (see [Chapter 19](#)).

Heart Failure and Pulmonary Edema

If the cardiac and renal systems cannot compensate for the excess vascular volume as fluid shifts back to the intravascular space, heart failure and pulmonary edema may result. The patient is assessed for signs of heart failure, including decreased cardiac output, oliguria, jugular vein distention, persistent edema, and the onset of an S₃ or S₄ heart sound. If invasive hemodynamic monitoring is used, increasing central venous, pulmonary artery, and pulmonary artery wedge pressures indicate increased fluid volume.

Crackles in the lungs and increased difficulty with breathing may indicate pulmonary edema, which should be reported promptly to the primary provider. In the meantime, the patient is positioned comfortably, with the head of the bed raised (if not contraindicated by other treatments or injuries) to promote lung expansion and gas exchange. Management of this complication includes providing supplemental oxygen, administering IV diuretic agents, carefully assessing the patient's response, and providing vasoactive medications, if indicated (see [Chapter 25](#)).

Sepsis

Sepsis is a leading cause of morbidity and mortality in patients with burn injuries. The signs of early sepsis are subtle, requiring a high index of suspicion and very close monitoring of changes in the patient's status. One of the challenges in recognizing sepsis is that burns are a noninfectious condition that triggers the systemic inflammatory response syndrome (SIRS), making it difficult to predict and diagnosis sepsis (Hill, Percy, Velamuri, et al., 2018). Because patients with burns are hypermetabolic, they display tachycardia, tachypnea, and elevated body temperature. These physiologic norms in patients with burns make the diagnosis of sepsis more challenging. See [Chapter 11](#) for treatment recommendations for sepsis.

Delirium

Delirium, a transient and often reversible state of acute brain dysfunction which manifests as alterations in consciousness or cognitive function

compared to the patient's baseline, may occur in patients secondary to the trauma sustained. Symptoms include restlessness, disorientation, sleep disorders, or anxiety; some patients experience hallucinations, delusions, or even become combative or suicidal. In patients with burns, a higher incidence of delirium has been found in those with a history of psychiatric issues or substance abuse, or in those with larger burns (Low, Meyer, Willebrand, et al., 2018).

There is ample literature to support the negative impact that pain, anxiety, and agitation have on both clinical and functional outcomes for patients with critical illnesses, yet this is not so for patients with burns who are in critical-care units. Depetris, Raineri, Pantet, and colleagues (2018) sought to assess current analgesia, sedation, and delirium monitoring and treatments in critical burn care to evaluate practice variations and adherence to current evidence-based practices. Although they found increasing awareness of patient delirium among burn care providers, delirium prevention practices vary widely, and they recommend further studies to establish burn-specific guidelines for prevention and treatment of this critical complication of severe burns (see Nursing Research Profile in [Chart 57-6](#)).

Chart 57-6



NURSING RESEARCH PROFILE

Nursing Knowledge, Attitudes, and Beliefs About Delirium in a Burn ICU

Powell, T. L., Nolan, M., Yang, G., et al. (2019). Nursing understanding and perceptions of delirium: Assessing current knowledge, attitudes, and beliefs in a burn ICU. *Journal of Burn Care and Research*, 40(4), 471–477.

Purpose

Patients with burns are at high risk for the development of delirium due to analgesia and sedation needs, prolonged mechanical ventilation, multiple operative procedures, and extended intensive care unit (ICU) stays. Delirium has grave negative effects on morbidity, mortality, and cognitive function and is common in this population. As the caregiver who spends the most time with the patient, the nurse must be attuned to early signs of delirium and initiate treatment. The purpose of this study was to evaluate and improve nurses' perceptions, attitudes, and knowledge about delirium while increasing compliance with administration of the Confusion Assessment Method for the ICU (CAM-ICU) tool and preventive interventions.

Design

The setting for this study was an 18-bed multispecialty burn ICU for both adults and children. Participants completed a survey that assessed attitudes regarding delirium, use of the CAM-ICU, and general knowledge of delirium before and after an educational intervention designed to improve recognition, prevention, and management of delirium. The researchers conducted a review of the literature and sought expert consultation to inform the development of the survey, which included select items used in the American Nurses Association (2015), study on delirium. In addition, post intervention, participants were asked to evaluate the effectiveness of the educational activities. The educational intervention, which occurred over 7 months, consisted of training a group of delirium nurse champions to serve as expert resources for the staff, creating an education board that addressed common questions and myths regarding delirium, and coordinating a week dedicated to delirium educational activities, including short videos and question and answer sessions.

Findings

Twenty-seven (38%) of the 71 burn ICU nurses participated in the project. Staff compliance with administration of the CAM-ICU assessment increased to 90% during the review time, and positive scores on the CAM-ICU decreased from 21% to 14%. Survey results indicated that nurses recognized the importance of assessing delirium

and providing interventions. However, 26% of the nurses did not endorse the need for the CAM-ICU as a screening tool. Qualitative themes described existing knowledge of delirium and knowledge gaps, barriers to implementation of the CAM-ICU, and views on nonpharmacologic and pharmacologic nursing interventions.

Nursing Implications

The results from this study support that targeted education increased awareness and general knowledge of delirium, as well as appropriate nursing interventions. However, the authors found that participants perceived challenges to using the CAM-ICU, including the time it takes to conduct the assessment and the complexity of using it with patients who are non-English speaking, sedated, or intubated, which limited behavioral change or consistent use of the tool. In general, staff perceived the project as empowering, specifically as the project helped to reinforce the role that nurses play in delirium prevention and management and the positive difference that their interventions make in this patient population.

Rehabilitation Phase

Rehabilitation begins immediately after the burn has occurred and often extends for years after the initial injury. For nurses who care for patients with burns, this can be one of the more physically demanding and challenging phases. One important focus of the burn team is to evaluate the patient carefully for late complications related to burn injuries as described in [Table 57-5](#).

Burn rehabilitation is comprehensive, complex, and requires a multidisciplinary approach to optimize the patient's physical and psychosocial recovery related to the injury. As patients begin to recover, they become more aware of the injuries and challenges they face. Individualized plans of care that are specific to the severity and location of injury are developed and reevaluated frequently. The increased survival of patients with significant burn injuries has translated into the need for additional and comprehensive burn rehabilitation programs worldwide. The ultimate goal is to return patients to the highest level of function possible within the context of their injuries. Specially trained occupational and physical therapists are essential for optimal patient outcomes.

Psychological Support

A patient's outlook, motivation, and support system are important to their overall well-being and ability to progress through the rehabilitation phase. Psychiatric disorders may have contributed to the cause of the burn injury itself. Examples include self-inflicted burns, suicide attempts, or intentional infliction on one person by another in cases of abuse. These are a few examples that illustrate the critical need for psychosocial resources in burn recovery. Although psychiatric disorders are not contributory to all burn injuries, the life-altering nature of burn injuries almost always causes temporary or permanent impairment of psychosocial adaptation.

In the acute phase of the injury, acute shock, terror, disbelief, confusion, and anxiety are common. Patients may be at risk for delirium and may experience temporary psychoses. Patients may be confused from medications they are taking, but they have an underlying sense of fear, anxiety, and pain. Early consultation with mental health professionals will assist in best meeting individual needs, which may include pharmacologic interventions with concurrent counseling. The rehabilitation phase may present a new set of challenges. While the patient is physically recovering, the reality and impact of the injury begin to set in as patients recognize that survival is expected. Patients may experience devastating grief and loss. The sense of loss may originate from physical injury, loss of control from the forced dependency on others for care, or loss of family members/friends who may have died from burn injuries. In residential fires, survivors may have lost their homes and all of their possessions.

TABLE 57-5

Complications in Rehabilitation Phase of Burn

Complications	Contributing Factors	Interventions
Neuropathies and nerve entrapment	Electrical injury, large deep burns, improper positioning, edema, scar tissue	<p>Assess peripheral pulses and sensation (neurovascular checks).</p> <p>Prevent edema and pressure by elevation, positioning, and prevention of constricting dressings.</p> <p>Assess splints for proper fit and application.</p> <p>Consult OT and PT departments for positioning.</p>
Wound breakdown and/or pressure injury formation	Shearing, pressure, inadequate nutrition	<p>Protect wound from pressure and shearing forces.</p> <p>Educate patient about importance of good nutrition.</p>
Hypertrophic scarring	Partial- and full-thickness burns	<p>Keep skin pliable and soft by using emollients.</p> <p>Apply pressure garments as prescribed.</p> <p>Massage.</p>
Contractures	Partial- and full-thickness burns	<p>Maintain position of joints in alignment.</p> <p>Perform gentle range-of-motion exercises.</p> <p>Consult OT and PT departments for exercises and positioning recommendations.</p>
Joint instability	Burn wound, burn scar, and contractures	<p>Maintain appropriate joint positioning through appropriate application of splints.</p> <p>Monitor joint pinning if indicated.</p>
Complex pain	Trauma and burns	<p>Provide adequate pain management.</p> <p>Consult OT and PT departments for exercises and desensitization.</p> <p>Promote gentle motion of affected extremities.</p>

OT, occupational therapy; PT, physical therapy.

Adapted from Serghiou, M. A., Ott, S., Cowan, A., et al. (2018). Burn rehabilitation along the continuum of care. In D. Herndon (Ed.). *Total burn care* (5th ed.).

Edinburgh: Saunders Elsevier; Thananopavarn, P., & Hill J. J. (2017). Rehabilitation of the complex burn patient with multiple injuries or comorbidities. *Clinics in Plastic Surgery*, 44(4), 695–701.

Posttraumatic stress disorder (PTSD) is a common psychiatric disorder in patients with burns. Patients with PTSD re-experience the injury event, exhibit an intensified perception of threat, and employ avoidance behaviors that sustain the symptoms (Low et al., 2018). Other psychological disorders that may be experienced by patients with burns include anxiety, depression, and sleep disturbances. The symptoms and psychological responses to stress are discussed further in [Chapter 5](#).

As recovery progresses, discharge planning must include strategies to assist the patient in reintegrating into their home, community, workplace, and school. For many patients, issues regarding quality of life may become very real at this point in recovery. This is an emotional time as the patient and family begin to live with new physical limitations and challenges in relationships. In addition to preparing the patient's support system, the patient and family must also prepare for the reactions from strangers.

Organizations such as the Phoenix Society for Burn Survivors, an international support group for patients with burns, offer a myriad of resources, education, opportunities for peer support, and strategies for reintegration. Alan Breslau, a survivor of burn injuries, who recognized the importance of peer support in psychosocial recovery (see the Resources section), founded the Phoenix Society in 1977. Peer support provides opportunities for reflection and personal growth and gives new meaning for the patient with burns through sharing experiences with others with similar burn injuries. Each year, the Phoenix Society hosts the World Burn Congress, which is a conference for survivors, their families, caregivers, burn care professionals, and firefighters. This forum offers education as well as an opportunity for patients with burns and their families to connect with others who have experienced similar life-changing events. Such interaction allows the patient and family to see that adaptation to a burn injury is possible.

Organizations that provide support for reintegration are able to offer education and training geared specifically to patients with burn injuries. Workshops on how to apply makeup to reduce the appearance of scars can benefit those with obvious facial scarring. This is one example of a strategy available to assist patients with burns who have body image

disturbances. Cultural influences play a strong factor in this process, because some cultures are particularly sensitive to physical appearance, a focus of importance which may also be reinforced by current media practices. The role of the nurse is to encourage patients to voice their concerns, provide empathy, and provide them with assistive resources.

Abnormal Wound Healing

Partial-thickness wounds involving the epidermis and superficial dermis tend to heal without scarring. Deeper wounds will likely develop scarring of variable degrees. As with other disorders, risk factors may be stratified as modifiable or nonmodifiable. For example, a nonmodifiable risk factor for scarring is heredity, because some patients are simply more prone to hypertrophic scar formation. The focus of patient education for nurses must be on how to best change or adapt the *modifiable* risk factors. Patients should be strongly encouraged to follow occupational therapist recommendations for scar prevention and management.

Normal scarring occurs in a superficial tissue injury and begins forming within 7 to 10 days post injury and progresses over the next 6 to 12 months. Abnormal scarring occurs after a longer period of wound healing and may form either hypertrophic or keloid scars.

Hypertrophic and Keloid Scars

Hypertrophic scars form within the boundaries of the initial wound and push outward on the perimeter of the wound. They are common in areas over joints and in the younger population. The scar becomes red (due to its hypervascularity), raised, and hard.

Keloid scars are irregularly formed and extend beyond the margins of the original wound. They are large, nodular, and ropelike, often causing itching and tenderness. They are more common in dark-pigmented skin, uncommon in children and older adults, and have familial tendencies.

Prevention and Treatment of Scars

Preventive treatment modalities aimed at scar contractures and excess hypertrophic tissue are routinely employed. Compression is introduced early in burn wound treatment. Elastic bandage wraps used initially help promote adequate circulation, but they can also be used as the first form of compression for scar management, followed by elasticized tubular bandages until the patient can be measured for a customized garment. Application of elastic pressure garments loosens collagen bundles and

encourages parallel orientation of the collagen to the skin surface. As pressure continues over time, collagen restructures and vascularity decreases. Although this therapy is somewhat controversial, pressure has shown to be beneficial in controlling scar formation over time (DeBruler, Baumann, Blackstone, et al., 2019). Recommended garment wear time is 23 hours per day; removing for bathing or wound care only.

Many areas of the body are difficult to compress due to the contours or location of the injury. Inserts, such as silicone sheets, are helpful for these small troublesome areas and are placed beneath the garment or compression dressing to enhance scar compression. Gentle superficial scar massage can be performed with a moisturizer several times a day.

Burn reconstruction is a treatment option after scars have matured and is discussed within the first few years after injury. This decision requires individualized planning, realistic expectations, and patience. The treatment team and the patient will ultimately decide on the best approach for long-term functionality and cosmesis.

NURSING PROCESS

Care of the Patient during the Rehabilitation Phase

Assessment

The nurse obtains information about the patient's education level, occupation, leisure activities, cultural background, religion, and family interactions. The patient's self-concept, mental status, emotional response to the injury and subsequent hospitalization, level of intellectual functioning, previous hospitalizations, response to pain and pain relief measures, and sleep pattern are also essential components of a comprehensive assessment. Information about the patient's general self-concept, self-esteem, and coping strategies in the past are valuable in assessing emotional needs.

Ongoing physical assessments related to rehabilitation goals include range of motion of affected joints, functional abilities in ADLs, early signs of skin breakdown, evidence of neuropathies (nerve damage), activity tolerance, and quality or condition of healing skin. The patient's participation in care and ability to demonstrate self-care in such areas as ambulation, eating, wound cleaning, toileting, and applying pressure wraps are documented on a regular basis.

Diagnosis

NURSING DIAGNOSES

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

- Activity intolerance associated with pain with exercise, limited joint mobility, muscle wasting, and limited endurance
- Disturbed body image associated with altered physical appearance and self-concept
- Impaired mobility due to contractures or hypertrophic scarring
- Lack of knowledge about postdischarge home care and recovery needs

COLLABORATIVE PROBLEMS/POTENTIAL COMPLICATION

Potential complications may include the following:

- Inadequate psychological adaptation to burn injury

Planning and Goals

The major goals for the patient include increased mobility and participation in ADLs; adaptation and adjustment to alterations in body image, self-concept, and lifestyle; increased understanding and knowledge of the injury, treatment, and planned follow-up care; and absence of complications.

Nursing Interventions

PROMOTING ACTIVITY TOLERANCE

The extensive physical rehabilitation can be painful and challenging for the patient. Strategies to maintain motivation and participation may be beneficial during this critical phase. The nurse incorporates physical and occupational therapy exercises in the patient's care to prevent muscle atrophy and to maintain the mobility required for daily activities. The patient's activity tolerance, strength, and endurance gradually increase if activity occurs over increasingly longer periods. Monitoring of fatigue and pain tolerance will assist with determining the amount of activity to be encouraged on a daily basis. Activities such as family visits and recreational therapy (e.g., video games, radio, television) can provide diversion, improve the patient's outlook, and increase tolerance for physical activity. In older adult patients and those with chronic illness and disability, rehabilitation must take into account preexisting functional abilities and limitations.

The nurse must schedule care in such a way that the patient has periods of rest and uninterrupted sleep. A good time for planned patient rest is after the stress of dressing changes and exercise, while pain interventions and sedatives are still effective. This plan must be clearly communicated to family members and other care providers. The patient may have insomnia related to frequent nightmares about the burn injury or other fears and anxieties about the outcome of the injury. The nurse reassures the patient and administers agents, as prescribed, to promote sleep. Reducing metabolic stress by relieving pain, preventing chilling or fever, and promoting the physical integrity of all body systems helps the patient conserve energy for therapeutic activities and wound healing.

IMPROVING BODY IMAGE AND SELF-CONCEPT

Patients who have survived burn injuries may lack the benefit of anticipatory grief often seen in a patient who is approaching surgery or dealing with the terminal illness of a loved one. As care progresses, the patient who is recovering from burns becomes aware of daily improvement and begins to express basic concerns: Will I be

disfigured or be disabled? How long will I be in the hospital? What about my job and family? Will I ever be independent again? How will this injury affect my sexual relationships? How can I pay for my care? Was my burn the result of my carelessness? Where will I live now?

When caring for a patient with a burn injury, the nurse needs to be aware that there are prejudices and misunderstandings in society about those viewed as different. Opportunities and accommodations available to others are often denied to those disfigured by scarring associated with a burn injury. These include social participation, employment, prestige, various roles, and status. The healthcare team must actively promote a healthy body image and self-concept in patients with burn injuries so that they can accept or challenge others' perceptions of those who are disfigured or disabled. Survivors themselves must show others who they are, how they function, and how they want to be treated.

PROMOTING PHYSICAL MOBILITY THROUGH PREVENTING CONTRACTURES OR HYPERTROPHIC SCAR FORMATION

With early and aggressive physical and occupational therapy, contractures or hypertrophic scars are rarely a long-term complication. However, surgical intervention is indicated if full range of motion in the patient with burns is not achieved.

MONITORING AND MANAGING POTENTIAL COMPLICATIONS

Impaired Psychological Adaptation to the Burn Injury. Some patients, particularly those with limited coping skills or psychological function, or a history of psychiatric problems before the burn injury, may not achieve adequate psychological adaptation to the burn injury. Psychological counseling or psychiatric referral may be made to assess the patient's emotional status, to help the patient develop coping skills, and to intervene if major psychological issues or ineffective coping is identified.

PROMOTING HOME, COMMUNITY-BASED, AND TRANSITIONAL CARE



Educating the Patient About Self-Care. The focus of rehabilitative interventions is directed toward outpatient care, home care, or care in a rehabilitation center. This includes wound care, dressing changes, pain management, nutrition, prevention of complications, and other care needs. Information and written instructions are provided about specific exercises and the use of

pressure garments and splints. The patient and family are provided education to assist them in their continued care needs after discharge (see [Chart 57-7](#)).

Continuing and Transitional Care. After discharge, care by a multidisciplinary treatment team is necessary. Some patients may require the services of an inpatient rehabilitation center before returning home. Patients should receive follow-up from a burn center when possible for periodic evaluation by the burn team, modification of outpatient treatment plan, and evaluation for reconstructive surgery. Many patients require outpatient physical or occupational therapy several times a week. The nurse coordinates all aspects of care and ensures that the patient's needs are met. Such coordination is an important aspect of assisting the patient to achieve independence.

Some patients may require referral for transitional care after discharge. The nurse assesses the patient's physical and psychological status as well as the adequacy of the home setting for safe and adequate care. The nurse monitors the patient's progress; assesses adherence to the plan of care; and assists the patient and family with wound care, exercises, and other physical needs. Patients experiencing difficulties with psychosocial adjustments are identified and appropriate referrals are made (see [Chapter 2](#), [Chart 2-6](#), for further discussion about assisting the patient's preparation for home care).

Evaluation

Expected patient outcomes may include:

1. Demonstrates adequate activity tolerance
 - a. Has energy available to perform daily activities
 - b. Shows gradual increased tolerance and endurance in physical activities
 - c. Obtains adequate sleep and rest daily
2. Adapts to altered body image
 - a. Verbalizes accurate description of alterations in body image and accepts physical appearance
 - b. Demonstrates interest in resources that may improve function and perception of body appearance (e.g., cosmetics, wigs, and prostheses as appropriate)
 - c. Socializes with significant others, peers, and usual social group
 - d. Seeks and achieves return to role in family, school, and community as a contributing member

3. Demonstrates physical mobility adequate to perform ADLs
 - a. Demonstrates range of motion appropriate for injury
 - b. Absence of complications from wound healing
4. Demonstrates knowledge of required self-care and follow-up care
 - a. Verbalizes detailed plan for follow-up care
 - b. Demonstrates ability to perform or direct wound care and prescribed exercises
 - c. Returns for follow-up appointments as scheduled
 - d. Identifies resource people and agencies to contact for specific problems
5. Exhibits no complications
 - a. Exhibits psychosocial adaptation to burn injury
 - b. Verbalizes understanding of diagnosis and treatment plan

Outpatient Burn Care

The increased availability of outpatient surgery and access to expert burn care in outpatient settings make this option possible for the treatment of minor burns as well as follow-up for the patient with more severe burns once discharged. The goals for treatment in an outpatient setting may include burn wound management, pain management, scar and reconstructive care, psychosocial care, and rehabilitation. However, a number of factors must be considered when determining if outpatient care is appropriate for the patient: age, past medical history, extent and depth of the burn, location of the burn wounds, availability of family support systems and community resources, the patient's ability and willingness to adhere to a therapeutic regimen, distance from home to the outpatient setting, and availability of transportation to and from home and the outpatient setting.

Chart 57-7



HOME CARE CHECKLIST

The Patient with a Burn Injury

At the completion of education, the patient and/or caregiver will be able to:

- State the impact of the burn injury and treatment on physiologic functioning, performance of ADLs and IADLs, roles, relationships, and spirituality.
- State how to contact all members of the treatment team (e.g., interdisciplinary burn team, healthcare providers, home care professionals, and durable medical equipment and supply vendors).
- State the name, dose, side effects, frequency, and schedule for all medications.
- Demonstrate psychosocial adaptation and social integration through verbalizing understanding of the following:
 - Changes in lifestyle and emotional adjustment to injury take time. It is not uncommon for patients to report nightmares or “flashbacks” of the injury. If this becomes disruptive, it should be discussed with the treatment team.
 - Resume previous interests and activities gradually.
 - Consider community and other resources such as burn support groups. Many books, videos, and Web sites are also available and may be invaluable in assisting with burn recovery.
 - Programs are available to assist with school reintegration and return to work. The treatment team should be consulted as needed.
 - Burn care (dressings, medications, therapy) can be very expensive. A social worker or care manager may find funding assistance programs if needed.
- Demonstrate adaptation of the home environment, assisted as needed by team members (e.g., social worker, care manager).
- State burn skin precautions:
 - Apply sunblock with the highest sun protection factor (SPF) possible to protect exposed burned skin from the sun. Light-colored clothing, long pants, and long-sleeved shirts may also be necessary to protect from the sun.
 - Use wide-brimmed hats if face or ears have been burned to protect the area from the sun.
 - Avoid further trauma to burned skin; leave blisters that may form intact.

- Lubricate healed burned skin with lotion (as prescribed); avoid scratching.
- Use only mild soaps and lotions (i.e., products without perfume or deodorants) on burned areas. Keeping skin clean overall is important to support good hygiene and prevent infection.
- Avoid tight clothing over burned areas so as not to restrict movement or irritate newly healed areas.
- Select white cotton, loose-fitting clothing so that dyes in colored clothes do not irritate healing skin.
- Wear clothing and gloves to protect healing skin from unnecessary bruises, bumps, and scratches.
- Be aware that tolerance to extremes in temperatures may be affected.
- Itching is a normal, uncomfortable part of healing and burn recovery; do not scratch, pat areas; apply mild moisturizers to decrease itching from dryness. Medications for itching can be discussed with the treatment team.
- Demonstrate wound care technique:
 - Take prescribed pain medications if needed 30 minutes prior to wound care to achieve maximum effectiveness.
 - Use mild soap, water, and a clean washcloth to clean wounds.
 - Apply prescribed topical medications and dressings as instructed.
 - Inspect wounds carefully with each dressing change for signs of infection, including increased redness, swelling, drainage, or foul odor.
- State aspects of ADLs and exercise:
 - Perform as much of own care as possible.
 - Adhere to the exercise regimen given by the therapists. Although physical rehabilitation is tiring, daily participation is essential.
 - Plan for adequate rest and sleep.
 - When at rest, swollen limbs should be elevated.
 - Describe approaches to controlling pain (e.g., take antispasmodic agents as prescribed; use nonpharmacologic interventions).
 - State changes in diet necessary to promote health (e.g., nutrient-rich foods, rather than empty calories).
 - State changes in fluid intake needed to prevent constipation associated with the use of analgesic medications.
- Discuss management of burn scar:

- Massage with mild lotion or cream to stretch skin to maintain/increase its elasticity.
- Wear compression garments 23 hours a day if instructed.
- Discoloration of the skin for many months is an expected normal part of healing.
- Discuss resumption of intimacy:
 - Resumption of sexual relationships is the rule rather than the exception and should occur when comfortable for all.
 - Expect sensitivity of and around the genital area for several months if these areas were burned.
- State correct use of medical devices:
 - Follow occupational therapist's instructions for splint use and cleaning.
 - Use crutches, walkers, or other assistive devices as instructed.
 - If devices such as shower chairs or grab bars are needed in the home, this should be arranged prior to discharge.
- State time and date of follow-up appointments, therapy, and testing:
 - Keep a list of questions to ask team members.
 - Bring medications, or a list of current medications, to each visit for the team to review.
 - Identify the need for health promotion, disease prevention, and screening activities.
 - Identify the contact details for support services for patients and their caregivers/families.

ADLs, activities of daily living; IADLs, instrumental activities of daily living.

The frequency of follow-up visits is individualized. The initial outpatient visit for a discharged patient with burn injuries is usually scheduled within 3 to 5 days after hospital discharge. A survivor's follow-up appointment schedule will vary and decrease in frequency over time, based on patient's needs. Patient and family education is paramount and should include verbal and written instructions as well as return demonstration of the wound or scar care required. The importance of notifying the outpatient setting about changes in symptoms and of keeping follow-up appointments is emphasized to the patient and family. Physical therapy and occupational therapy are often provided in the outpatient burn setting. The rehabilitation goals are to increase range of motion, strengthen muscles, and build the patient's activity tolerance.

through a specific, individualized plan of care that includes routine visits for up to 2 years or more following the injury.

The patient's adaptation to lifestyle changes and emotional status should be assessed during the outpatient visits and proper referrals made for counseling services. These assessments may be difficult to recognize due to the infrequent nature of the visits; therefore, it is helpful to incorporate family response and interactions into the assessment. The healthcare team must also be alert to issues of substance abuse, safety concerns, suicidal thoughts, depression, and PTSD.

CRITICAL THINKING EXERCISES

1  ebp A 55-year-old man is hospitalized for a smoke inhalation injury with a 15% TBSA burn to his upper torso and extremities. He has been placed on 100% oxygen per non-rebreather mask and started on a morphine drip for pain control. He awakens when verbally stimulated, but he does not consistently follow directions. Which evidence-based tools should you use to assess the patient's neurologic and pulmonary status, and his response to pain management? What evidence-based nursing interventions should be integrated into the plan of care to support his pulmonary status and to manage the distress associated with his burn and high oxygen requirement?

2  pq A 65-year-old man was admitted overnight to the burn unit with an 18% partial-thickness scald burn. The day after admission, in the early afternoon, you note that the patient's heart rate has increased to 160 bpm, temperature is 38.7°C (101.7°F), and his capillary refill time has increased to greater than 2 seconds. After alerting the charge nurse, what interventions do you anticipate? What are your priority interventions?

3  ipc An 85-year-old woman is admitted to the burn center with a 65% TBSA full-thickness burn. She is a widow, with no living children, but has a neighbor who is her identified surrogate decision maker. Her body mass index (BMI) on admission is 16.7 kg/m² and she reports weight loss over the last year and a poor appetite. She takes no medications and has not seen a medical provider for many years. She reports a strong religious background and states that she believes that God has always watched over her and is doing so now. She consents to a workup for a mass that was observed in a routine chest x-ray. A biopsy of the lesion obtained after consent shows a poorly differentiated adenocarcinoma. She continues to agree to daily wound care but refuses surgery. The oncology consulting service states that she may benefit from chemotherapy. The surgery team believes that she would benefit from supplemental feeding via a feeding tube. Her pain is well controlled. What interprofessional consultation service could help to best facilitate patient-centered outcomes for this patient? Describe how the various members of this team could support this patient.

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Resources

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