ASSISTING IN OPHTHALMOLOGY AND OTOLARYNGOLOGY

SCENARIO

Kim Tou, CMA (AAMA), works in an outpatient clinic that specializes in the diagnosis and treatment of eye and ear disorders. Kim has been asked by her supervisor to help orient Amy Ling to the practice. Amy recently graduated from a medical assistant program and is familiar with basic eye and ear procedures, but she has many questions about her responsibilities at the clinic. Amy will be responsible for performing initial Snellen and Ishihara screening examinations on new patients and for assisting the ophthalmologist and optician in the practice with eye treatments. She also will have to be comfortable performing audiometry hearing screening on pediatric patients, performing ear irrigations, and administering otic medications. Kim recognizes that it is important that Amy be able to perform these skills with accuracy and confidence, but she also must be sensitive to the communication and patient education needs of patients with eye and ear disorders.

While studying this chapter, think about the following questions:

- What is the basic anatomy and physiology of the eye and of the ear?
- What are the major types of refractive errors?
- With what disorders of the eye and ear does Amy need to be familiar?
- How is a Snellen test performed?
- What are the important steps Amy should follow in performing eye and ear irrigations and medication applications?
- How is an examination with an audiometer conducted?
- How should Amy perform a throat culture?
- How should Kim prepare Amy to care for patients with sensory loss?

LEARNING OBJECTIVES

1. Define, spell, and pronounce the terms listed in the vocabulary.
2. Apply critical thinking skills in performing the patient assessment and patient care.
3. Explain the differences among an ophthalmologist, optometrist, and optician.
4. Identify the anatomic structures of the eye.
5. Describe the process of vision.
6. Differentiate among the major types of refractive errors.
7. Summarize typical disorders of the eye.
8. Define the various diagnostic procedures for the eye.
9. Conduct a visual acuity test using the Snellen chart.
10. Assess color acuity.
11. Explain the purpose of eye irrigations and the instillation of medication.
12. Properly irrigate a patient’s eyes.
13. Accurately instill eye medication.
14. Identify the structures and explain the functions of the external, middle, and inner ear.
15. Describe the conditions that can lead to hearing loss, including conductive, neurogenic, and congenital hearing losses.
16. Define the major disorders of the ear, including otitis, impacted cerumen, and Ménière’s disease.
17. Explain the various otic diagnostic procedures.
18. Use an audiometer to measure the hearing acuity of a patient accurately.
19. Identify the purpose of ear irrigations and instillation of ear medication.
20. Demonstrate ear irrigations.
22. Summarize the nose and throat examination.
23. Perform a throat culture.
24. Describe the effect of sensory loss on patient education.
Vocabulary

accommodation The adjustment of the eye that allows a person to see various sizes of objects at different distances.
ambylopia (am-ble-o'-pe-uh) Reduction or dimness of vision with no apparent organic cause; often referred to as lazy eye syndrome.
audiologist (au-de-ah'-lah-jist) An allied healthcare professional who specializes in the evaluation of hearing function, detection of hearing impairment, and determination of the anatomic site of impairment.
cones Structures in the retina that make the perception of color possible.
fovea centralis (fo'-ve-uhl/zen-trah'-luhs) A small pit in the center of the retina that is considered the center of clearest vision.
gonioscopy (goon'-ee-os'-kuh-pee) A procedure in which a mirrored optical instrument is used to visualize the filtration angle of the anterior chamber of the eye; the procedure is used to diagnose glaucoma.
hertz A unit of measurement used in hearing examinations; a wave frequency equal to 1 cycle per second.
miotic (mi-ah'-tik) Any substance or medication that causes constriction of the pupil.
mydriatic (mid-reh'-uh-tik) A topical ophthalmic medication that dilates the pupil; it is used in diagnostic procedures of the eye and as a treatment for glaucoma.

optic disc The region at the back of the eye where the optic nerve meets the retina; it is considered the blind spot of the eye, because it contains only nerve fibers and no rods or cones and thus is insensitive to light.
optic nerve The second cranial nerve, which carries impulses for the sense of sight.
otosclerosis (oh-toh-skleh-roh'-uhhs) The formation of spongy bone in the labyrinth of the ear, which often causes the auditory ossicles to become fixed and unable to vibrate when sound enters the ears.
ottotoxic (oh-toh-tahk'-sihk) A medicine or substance capable of damaging the eighth cranial nerve or the organs of hearing and balance.
psoriasis (puh-rih'-uh-suhs) A usually chronic, recurrent skin disease marked by bright red patches covered with silvery scales.
rods Structures in the retina of the eye that form the light-sensitive elements.
seborrhea (seh-buh-reh'-uh) An excessive discharge of sebum from the sebaceous glands, forming greasy scales or cheesy plugs on the body.
tonometer (toh-nom'-uh-ter) An instrument used to measure intraocular pressure.

A medical assistant is responsible for performing a wide variety of procedures in an ophthalmologic or otolaryngologic practice. First, the medical assistant must be familiar with the normal anatomy and physiology of the eyes, ears, nose, and throat. With an understanding of how these specialty sensory organs function, the medical assistant can master the skills needed to become a valuable asset to the physician who specializes in the treatment of eye and ear disorders.

This chapter covers the conditions most frequently seen in the ambulatory care setting. Many subspecialty areas are available to medical assistants in the eye, ear, nose, and throat (ENT) medical practice. Learning the fundamental procedures now will provide you with a base on which to build the advanced techniques you will need if you choose to concentrate your expertise in these areas.

EXAMINATION OF THE EYE

Ophthalmology is the science of the eye and its disorders and diseases. A physician who specializes in the diagnosis and treatment of the disorders and diseases of the eye is an ophthalmologist. An ophthalmologist is a licensed medical physician who can diagnose eye disorders, prescribe medication, conduct eye screenings, prescribe glasses or contact lenses, and perform optic surgery. An optometrist is not a medical doctor but is licensed and has earned a degree as a Doctor of Optometry (OD). An optometrist can perform eye examinations, diagnose vision problems and eye diseases, and treat visual defects through corrective lenses and eye exercises. Opticians are trained to fill prescriptions written by ophthalmologists and optometrists for corrective lenses by grinding the lenses and dispensing eyewear.

Anatomy and Physiology of the Eye

The eyes are the smallest, yet the most detailed and complex, organs of the body. Each is located within a bony cavity (or orbit) in the skull. The bony orbit protects and supports the eye. Only approximately one sixth of the eye lies outside the orbit. The eyelid helps protect the eye from trauma. The eyebrows help keep irritants out of the eyes. The eyelashes line the margins of the eyelids and help trap foreign particles.

The conjunctiva is a thin mucous membrane that lines the eyelid and covers the outside of the eyeball except for the most central portion, which is covered by the cornea. The mucus secreted from the conjunctiva helps keep the eye moist. The eye blinks every 2 to 3 seconds, causing the lacrimal gland, located in the superior outer portion of the upper eyelid, to secrete tears. Tears move across the eyes, cleansing and moistening the surface, and drain into the lacrimal canals in the medial corner of the eye. The tears then drain into the nasal cavity through the nasolacrimal duct. Consequently, when a person cries, the excess tears ultimately empty into the nose, producing a watery nasal discharge.

The Eyeball

The eyeball consists of three layers. The outermost layer is made up of the white, opaque sclera and the transparent cornea. The
sclera is a tough, fibrous lining that protects the entire eyeball lying within the orbit, whereas the transparent cornea covers the exposed one sixth of the eyeball. The cornea acts as a clear window that allows light to enter the eye. The cornea also refracts, or changes, the direction of light rays after they enter the eye. The cornea was one of the first tissues to be transplanted, and corneal transplants now are common. Long-term success after corneal implant surgery is excellent.

The choroid is the posterior portion of the middle layer of the eye. It is the eye’s vascular layer, and it contains many blood vessels that supply nutrients to the outer layers of the retina. The choroid also has a brown pigment that absorbs excess light rays that could interfere with vision. In the anterior part of this layer, the choroid creates the iris and the ciliary body. The iris is the colored portion of the eye. It is doughnut shaped, with the opening of the pupil in the center. The iris contains muscles that regulate the size of the pupil according to the intensity of the light; it becomes smaller in bright light and opens wider in dim light. The ciliary body contains both the ciliary muscle, which regulates the shape of the lens, and the ciliary processes, which secrete aqueous humor.

The inner layer of the eye includes the retina in the posterior portion and the lens in the anterior portion. The rods and cones, optic nerve, optic disc, and fovea centralis are located in the retina. The delicate tissue of the retina is composed of light-sensitive neurons that convert light into neurologic impulses. These impulses travel by means of the optic nerve to the brain, where they are converted into a visual form. Any damage to the retina has the potential to cause partial or complete blindness, because the neurologic center of vision is located in the retina.

The lens is a transparent, biconvex body that helps focus light after it passes through the cornea. The lens and the ciliary body divide the eye into two cavities. The posterior cavity, which is between the lens and the retina, contains the transparent, gel-like vitreous humor. Vitreous humor maintains the shape of the posterior eyeball. The anterior cavity, between the cornea and the lens, is filled with aqueous humor, which is continuously produced by the ciliary processes. Aqueous humor helps maintain normal pressure within the eye and provides nutrients to the lens and cornea (Figure 37-1).

**Vision**

Vision requires light and depends on the proper functioning of all parts of the eye (Table 37-1). A visual impulse begins with the passage of light through the cornea, where the light is refracted; it then passes through the aqueous humor and the pupil into the lens. The ciliary muscle adjusts the curvature of the lens to again refract the light rays so that they pass into the retina, triggering the photoreceptor cells of the rods and cones. At this point, the light energy is converted into an electrical impulse, which is sent through the optic nerve to the visual cortex of the occipital lobe of the brain; there, the light impulse is interpreted and a picture is created.

**Disorders of the Eye**

**Refractive Errors**

Four major types of refractive errors result when the eye is unable to focus light effectively on the retina. Refraction is the ability of

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**FIGURE 37-1** Anatomy of the eye.

**TABLE 37-1 Functions of the Major Parts of the Eye**

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sclera</td>
<td>External protection</td>
</tr>
<tr>
<td>Cornea</td>
<td>Light refraction</td>
</tr>
<tr>
<td>Choroid</td>
<td>Blood supply</td>
</tr>
<tr>
<td>Iris</td>
<td>Light absorption and regulation of pupil width</td>
</tr>
<tr>
<td>Ciliary body</td>
<td>Secretion of vitreous fluid; changes the shape of the lens</td>
</tr>
<tr>
<td>Lens</td>
<td>Light refraction</td>
</tr>
<tr>
<td>Retinal layer</td>
<td>Light receptor that transforms optic signals into nerve impulses</td>
</tr>
<tr>
<td>Rods</td>
<td>Distinguish light from dark and perceive shape and movement</td>
</tr>
<tr>
<td>Cones</td>
<td>Color vision</td>
</tr>
<tr>
<td>Central fovea</td>
<td>Area of sharpest vision</td>
</tr>
<tr>
<td>Macula lutea</td>
<td>Center of the retina; contains the fovea centralis, the area of most highly acute vision</td>
</tr>
<tr>
<td>External ocular muscles</td>
<td>Move the eyeball</td>
</tr>
<tr>
<td>Optic nerve</td>
<td>One of a pair of nerves that transmit visual stimuli to (cranial nerve II) the brain</td>
</tr>
<tr>
<td>Lacrimal glands</td>
<td>Produce tears</td>
</tr>
<tr>
<td>Eyelid</td>
<td>Protects eye</td>
</tr>
</tbody>
</table>

Modified from Damjanov I: Pathology for the health-related professions, Philadelphia, 1996, Saunders.

the lens of the eye to bend parallel light rays coming into the eye so that the rays are focused simultaneously on the retina. An error of refraction means that the light rays are not refracted or bent properly and consequently do not focus correctly on the retina. Defects in the shape of the eyeball can cause a refractive error.
Most refractive errors can be corrected with corrective lenses (Figure 37-2).

**Hyperopia (Farsightedness).** When light enters the eye and focuses behind the retina, a person has hyperopia. This disorder occurs when the eyeball is too short from the anterior to posterior wall. An individual with hyperopia has difficulty seeing objects that are close, at reading or working level. A convex corrective lens helps the eye's internal lens place objects directly on the retina and create a sharp, detailed image, or refractive surgery may be done to correct the shape of the lens.

**Myopia (Nearsightedness).** Myopia occurs when light rays entering the eye focus in front of the retina, causing objects at a distance to appear blurry and dull. Objects viewed at reading or working level are seen clearly. In this disorder, the eyeball is elongated from the anterior to the posterior walls, and the image cannot be sharpened by the internal lens of the eye. A concave corrective lens is used to focus the light rays on the retina, or surgery can be done to change the shape of the lens. However, the surgery is performed only on adults who have had a stable eye prescription for at least 1 year.

**Presbyopia.** As people age, the lens of the eye becomes less flexible, and the ciliary muscles weaken; consequently, changing the point of focus from distance to near becomes difficult; this is called presbyopia. The condition results in difficulty seeing at reading level. A combination corrective lens, known as a bifocal lens or progressive lens correction, is used to focus both distal and proximal objects directly on the retina. Presbyopia actually starts at approximately age 10, but most people do not report an alteration in vision until the early forties. Conductive keratoplasty is the new laser procedure used to treat presbyopia.

**Astigmatism.** Astigmatism occurs when the light rays entering the eye are focused irregularly. This usually occurs because the cornea or the lens is not a smooth sphere, but rather has an irregular shape. Ophthalmologists describe the lens as being shaped like a football rather than a sphere, such as a basketball.

This causes the light rays to be unevenly or diffusely focused on the retina, resulting in blurred vision. It is like attempting to focus on objects seen through a wavy piece of window glass. Astigmatism can be corrected with glasses, contacts, or surgery. Surgical correction attempts to reshape the cornea into a more spherical or uniformly curved surface.

**Signs and Symptoms of Refractive Errors**
Refractive errors in vision can lead to squinting, frequent rubbing of the eyes, and headaches. The individual notices blurred vision or fading of words at reading level, or both. Some refractive errors are familial in nature.

**Treatment of Refractive Errors**
Eyeglasses and contact lenses are the traditional treatments for visual acuity problems caused by refractive errors. However, problems with the shape of the lens can be corrected surgically. The surgery is performed on an outpatient basis and requires only a short stay in the facility. Medical assistants employed in an outpatient eye surgery facility must be trained to fulfill this specialized role.

**CRITICAL THINKING APPLICATION 37-1**
Amy is assisting Dr. Haner with visual acuity examinations. He asks her whether she understands the cause of refractive errors. Amy doesn’t really know, so later she asks Kim over lunch what the different refractive disorders are and why they occur. What information should Kim include in her answer?

**SURGICAL CORRECTION OF REFRACTIVE ERRORS**
Most types of health insurance do not cover surgery for refractive corrections. On average, each eye costs $1,000.
Strabismus

Strabismus is failure of the eyes to track together, which means both eyes do not look in the same direction at the same time. Adults can develop strabismus because of a condition or disease elsewhere in the body, such as diabetes mellitus, muscular dystrophy, hypertension, or a head injury. In children, strabismus is caused by weakness in the muscles that control eye movement. If the condition appears in infancy or childhood, it is most commonly associated with amblyopia. Amblyopia often is correctable until approximately age 7 or until the retina is fully developed. Treatment involves having the child wear a patch over the unaffected eye so that the muscles of the “lazy” eye are strengthened. The main symptom in all age groups is diplopia (double vision).

Nystagmus

A constant, involuntary movement of one or both eyes is called nystagmus. The eye movement can be in any direction and is accompanied by blurred vision. A child may be born with the problem (congenital nystagmus), or the condition may be acquired as a result of a brain tumor, an inner ear lesion, multiple sclerosis, or substance abuse. Nystagmus is caused by an abnormal function in the part of the brain that controls eye movements. Congenital nystagmus is more common than acquired nystagmus, is usually milder, does not worsen over time, and is not associated with any other disorder. A patient with the signs and symptoms of nystagmus first should have a neurologic evaluation to determine the cause of the disorder, with treatment based on those findings. However, congenital nystagmus has no cure. Affected individuals typically are not aware of the eye movements, but they may have a decrease in visual acuity that can be corrected with surgery or corrective lenses.

Infections of the Eye

Many acute disorders of the eye are seen in the ophthalmologist’s office. These include the following:

- Hordeolum (stye): A localized, purulent infection of a sebaceous gland of the eyelid. The area is inflamed, swollen, and painful. The infection usually is caused by staphylococci, and it is treated with warm compresses and either topical or systemic antibiotics.

- Chalazion: A small cyst that results from blockage of a meibomian gland (sebaceous gland) that lubricates the posterior margin of the eyelid. The cyst can become infected, inflamed, swollen, and painful. It may disappear spontaneously or may need to be removed surgically.

- Keratitis: Inflammation of the cornea that results in superficial ulcerations. It can be caused by the herpes simplex virus, bacteria, or fungi, or it may develop as a result of corneal trauma (e.g., intense light). Symptoms include inflammation, tearing, pain, and photophobia. The condition is treated with ophthalmic ointments, eyedrops, and use of an eye patch.

- Conjunctivitis: Inflammation of the conjunctiva caused by irritation, allergy, or bacterial infection. Bacterial conjunctivitis (pinkeye) is highly contagious and produces a purulent discharge. Symptoms include inflammation, swelling and itching of the sclera, photophobia, and tearing. Bacterial infections are treated with antibiotic ophthalmic preparations.

- Blepharitis: Inflammation of the glands and lash follicles along the margins of the eyelids that may be caused by a staphylococcal infection, allergies, or irritation. Symptoms include itching and inflammation along the eyelash margins, and the condition is treated with antibiotic ophthalmic ointment.

Disorders of the Eyeball

Corneal Abrasion

The cornea, the transparent outer covering of the eye, is prone to abrasion because of its location. Symptoms of corneal abrasion include pain, inflammation, tearing, and photophobia. The abrasion usually is caused by a foreign body in the eye or by direct trauma, such as from poorly fitting or dirty contact lenses. A corneal ulcer may form and become infected.

The diagnosis is based on the patient’s signs and symptoms, but it can be confirmed with the instillation of fluorescein stain (Figure 37-3). After instillation of the stain, the physician uses a cobalt blue filtered light to visualize the abrasions, which appear green (Figure 37-4). If the abrasions are caused by a foreign body,
impaired vision. This condition may result from injury to the eye, exposure to extreme heat or radiation, or inherited factors. However, most cataracts develop slowly and progressively as a result of the natural aging deterioration of the lens of the eye and typically occur after age 60. With advanced cataracts, the pupil of the eye appears white or gray.

Blurred and dimmed vision are the initial symptoms of a cataract. The patient may need a brighter reading light or must hold objects closer to the eyes for better viewing. Continued clouding of the lens may cause diplopia. The patient also needs frequent changes of eyeglass prescriptions. Patients with cataracts report difficulty with night vision (nyctalopia), seeing halo images around lights, and an increased sensitivity to glare. If left untreated, cataracts ultimately can lead to blindness.

When the patient’s vision becomes distorted or appears to be deteriorating, the ophthalmologist performs a slit lamp procedure, in which he or she examines the structures at the front of the eye using a combination of a low-power microscope and a high-intensity light that shines into the eye as a slit beam.

The only known effective treatment for a cataract is surgical removal of the lens. This is performed as an outpatient procedure in a clinic or hospital. After the eye has been anesthetized, the inner portions of the lens—the nucleus and the cortex—are removed. The physician may use an extracapsular extraction, in which the cataract is removed in one piece, or phacoemulsification, in which an ultrasonic probe is used to break up the cataract and the pieces are aspirated, before an artificial intraocular lens (IOL) is implanted. The incision may be closed with fine sutures, or it may be sutureless and self-sealing. The procedure usually takes 15 minutes, and the patient typically can leave the facility after 1 hour. Patients should be aware that they will not be able to drive until cleared by the ophthalmologist and that they may need help at home until their vision is clear.

The patient is seen in the office the day after surgery and as frequently as needed for the next month. The vision gradually improves until it stabilizes, usually within 2 to 6 weeks, and the patient then is fitted with new corrective lenses to match the improved vision.

Glaucoma

One of the most common and serious ocular disorders is a group of diseases known as glaucoma. Glaucoma is characterized by increased intraocular pressure (IOP), which damages the optic nerve and causes blindness if left untreated. It rarely occurs in people under age 40 and usually is seen in individuals over age 60. The cause is unknown, but a hereditary tendency toward the development of the most common forms has been noted. Glaucoma is responsible for approximately 12% of all cases of blindness. It is the leading cause of blindness among African-Americans, and it strikes approximately 2% of all individuals over age 40 in the United States.

The ciliary body constantly produces aqueous humor, which should circulate freely between the anterior and posterior chambers of the eye and eventually empty into the general circulation. A healthy eye is filled with fluid in an amount carefully regulated to maintain the shape of the eyeball. In chronic open-angle glaucoma, the channels that drain the fluid malfunction, and
over time aqueous humor builds up, resulting in increased pressure, which affects the blood supply to the retina and the optic nerve. With acute closed-angle glaucoma, the opening of the drainage system narrows or closes completely, causing a sudden increase in IOP (Figure 37-5).

Patients can have chronic open-angle glaucoma for a long time before symptoms occur. Early detection through regular ophthalmic examinations that include IOP measurements is crucial to prevent permanent vision loss. Needing to change eyeglass prescriptions frequently, a loss of peripheral vision, mild headaches, and impaired adaptation to the dark are some of the signs and symptoms that may be seen with chronic glaucoma.

Acute closed-angle glaucoma has more obvious symptoms; the patient complains of severe pain, headaches, inflammation, photophobia, and seeing halos around lights. If left untreated, acute glaucoma can cause permanent blindness in a matter of days.

Screening for glaucoma is conducted during a complete eye examination. The ophthalmologist first uses a tonometer with a slit lamp to measure the IOP. The air puff tonometer records the degree of indentation of the cornea from a puff of pressurized air without touching the eye. An applanation tonometer records the pressure needed to indent the cornea when the instrument is applied to the front surface of the eye. Gonioscopy also can be used to examine the aqueous fluid drainage system and determine whether the glaucoma is the open- or closed-angle type. In addition, an ophthalmoscopic examination can identify cupping of the optic disc, which indicates atrophy of the optic nerve.

Open-angle glaucoma can be relieved with miotic and beta-blocker eyedrops. The combinations of drugs used to treat glaucoma can vary considerably. Miotic medications increase the outflow of aqueous humor, and beta blockers reduce the production of aqueous humor (Table 37-2). It is imperative that the patient use the prescribed eyedrops and take the oral medications daily to prevent further damage to the optic nerve. Laser surgery may be performed to create an opening or to build a new channel for drainage of the aqueous humor. The goal of treatment in any type of glaucoma is to diagnose the disease early and effectively treat its progression, because any loss of sight that has occurred because of increased IOP cannot be regained. In closed-angle glaucoma, medications to lower IOP are prescribed so that surgery can be performed to create a channel for aqueous fluid to circulate. This is a medical emergency, because the pressure must be relieved within a few hours or permanent vision damage occurs.

**TABLE 37-2 Ophthalmic Medications**

<table>
<thead>
<tr>
<th>DRUG NAME</th>
<th>CLASS AND USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neosporin ung</td>
<td>Antifungal and steroid combination</td>
</tr>
<tr>
<td>Chloropic, Cifoxan, erythromycin and Garamycin ung</td>
<td>Topical antibiotic ointments</td>
</tr>
<tr>
<td>Viproptic</td>
<td>Antifungal, antiviral</td>
</tr>
<tr>
<td>Pred-4, Tobradex</td>
<td>Antiinflammatory agents, corticosteroids</td>
</tr>
<tr>
<td>Ocufen, Acular, Voltaren</td>
<td>Topical antiinflammatory agents, nonsteroidal antiinflammatory drugs, cromoglycic acid</td>
</tr>
<tr>
<td>Isopto Atropine</td>
<td>Mydriatic eyedrops; eye examinations</td>
</tr>
<tr>
<td>Betagan, Ocupress</td>
<td>Beta-blocker eyedrops; glaucoma treatment</td>
</tr>
<tr>
<td>Iopidine</td>
<td>Alpha-adrenergic eyedrops; glaucoma treatment</td>
</tr>
<tr>
<td>Isopto Carpine, Pilocar</td>
<td>Miotic eyedrops; glaucoma treatment</td>
</tr>
</tbody>
</table>

**Macular Degeneration**

The macula lutea, the part of the retina near the optic nerve, defines the center of the field of vision. Macular degeneration is a progressive deterioration of the macula lutea, which causes loss of central vision; the patient can see only the edges of the visual field. It affects more than 10 million Americans and is the leading cause of blindness in those over age 55.

Two types of macular degeneration can occur. The dry form accounts for 90% of the cases; it is painless and develops slowly, affecting sharp vision over time, so that reading or other activities that require fine detailed vision become impossible. Wet macular degeneration causes 90% of all severe vision losses from the disease and has a very acute onset and rapid progression. Dry macular degeneration is caused by the breakdown of light-sensitive cells in the macula region; the wet form occurs when new blood vessels behind the retina form and leak blood and fluid into the macula. The condition is age related, but additional risk factors include cigarette smoking, family history, cardiovascular disease, elevated blood cholesterol levels, light eye color, and excessive sun exposure. The disease has no known cure, but recent research indicates that antioxidants, including caroteene, selenium, zinc, and vitamins C and E, may prevent the condition or slow its progress.

**Diagnostic Procedures**

A complete examination of the eye is technical and requires expensive equipment and the expertise of an ophthalmologist. However, a primary care physician performs some basic examinations and treatments of the eye. The ophthalmoscope is used to examine the interior of the eye. It projects a bright, narrow beam of light through the lens and illuminates the interior parts of the eye and retina. It is helpful for detecting disorders of the eyes and certain systemic disorders, such as diabetes mellitus.
The eyelids are examined for edema, which may be the result of nephrosis, heart failure, allergy, or thyroid deficiency. Blepharoptosis, also called ptosis, is a drooping of the upper eyelid that can be caused by a disorder of the third cranial nerve, muscular weakness as seen in muscular dystrophy, or myasthenia gravis.

The pupils of the eyes are normally round and equal. Normal pupils constrict rapidly in response to light. This is demonstrated by shining a bright, pinpoint light into one eye from the side of the patient's head. The pupil of an illuminated eye constricts, and the pupil of the other eye constricts equally. This test is called light and accommodation (L&A). An older patient's eyes do not accommodate as well as a younger person's do. Each eye is checked this way. The patient then is asked to look at the physician's finger as it is moved directly toward the patient's nose to check for eye coordination. If the pupils are equal and round, respond normally to light, and adjust and focus on objects at different distances in a reasonable length of time, the physician charts the acronym PERRLA.

### PERRLA

<table>
<thead>
<tr>
<th>P</th>
<th>Pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Equal</td>
</tr>
<tr>
<td>R</td>
<td>Round</td>
</tr>
<tr>
<td>R</td>
<td>Receive to</td>
</tr>
<tr>
<td>L</td>
<td>Light and</td>
</tr>
<tr>
<td>A</td>
<td>Accommodation</td>
</tr>
</tbody>
</table>

Special techniques used in the ophthalmologist's office include examinations performed with a slit lamp biomicroscope (Figure 37-6). This device is used to view the fine details in the anterior segments of the eye. It may be used to view a foreign body, because it gives a well-illuminated and highly magnified view of the area. For this examination, the physician first orders the administration of a mydriatic eye drop to dilate the pupil and enhance visualization of eye structures.

A patient with exophthalmia (abnormal protrusion of the eye, possibly resulting from an overactive thyroid or a tumor behind the eyeball) is checked with an exophthalmometer. This instrument measures how far the eye protrudes beyond the edge of the eye socket and helps determine the level of tissue swelling and enlargement behind the eye.

**Distance Visual Acuity**

Distance visual acuity frequently is part of a complete physical examination (Procedure 37-1). It is widely used in schools and industry and is the best single test available for vision screening. Many cases of myopia, astigmatism, and hyperopia have been detected with this routine test. The chart most commonly used is the Snellen alphabetic chart (Figure 37-7). This chart displays various letters of the alphabet, which the patient must identify in ever smaller font sizes. Patients with a limited knowledge of the English alphabet can be tested with the E chart. In addition, a chart that uses pictures as symbols is available. This chart is used for young children or individuals who do not know the alphabet. The symbol on the top line of the chart can be read by persons with normal vision at 200 feet. In each of the succeeding rows, from the top down, the size of the symbols is reduced so that a person with normal vision can see them at distances of 100, 70, 50, 40, 30, and 20 feet, consecutively.

The patient must not be allowed to study the chart before the test. The room or hall should be long enough so that the 20-foot distance can be marked off accurately and without interruptions from patient and staff traffic. The chart should be hung at the patient's eye level and illuminated with maximum light, without glare on the chart. Most adults do not need the standard Snellen chart explained, but if the E chart is used, an explanation must be given as to how the Es are to be read. The patient may point up or down or right or left toward the part of the letter that is open. If the E chart is to be used for a child, practice with an index card that has a large E drawn on it before the child is tested. Turn the card in different directions to simulate the position of the "fingers" of the E on the chart, and give the child the opportunity to demonstrate the direction of the E fingers by pointing his or her own fingers in the same direction (Figure 37-8).

Because this is a gross screening of distance visual acuity, the eyes typically are tested with corrective lenses; the patient therefore should not remove glasses or contact lenses unless the physician requests it. Indicate in the patient's medical record whether the assessment was done with or without corrective lenses. Record the results of each eye separately and as fractions. The numerator (top number) is the distance of the patient from the chart (always 20 feet) and the denominator (bottom number) is the lowest line read satisfactorily by the patient. For example, if the patient reads the 20 line at 20 feet, the fraction 20/20 is recorded for that eye. The last line the patient can read without squinting or straining and with no more than two mistakes is the line recorded in the patient's chart for that eye. The medical assistant should document the outcomes of the test with appropriate abbreviations, using OD (right eye), OS (left eye), and OU (both eyes).

**Near Visual Acuity**

Near visual acuity can be tested with the near vision acuity chart (Figure 37-9). This is frequently given to patients initially to screen for presbyopia or hyperopia. If the patient wears corrective lenses, they should be worn during the test. The size of the type on the card varies from newspaper headlines
PROCEDURE 37-1

Perform Patient Screening Using Established Protocols: Measure Distance Visual Acuity with the Snellen Chart

GOAL: To determine the patient’s degree of visual clarity at a measured distance of 20 feet using the Snellen chart.

EQUIPMENT and SUPPLIES
- Snellen eye chart
- Eye occluder
- Pen or pencil and paper
- Patient’s record

PROCEDURAL STEPS

1. Sanitize your hands.
   **PURPOSE:** To ensure infection control.
2. Prepare the examination room. Make sure the room is well lit, a distance marker is 20 feet from the chart.
3. Identify the patient and explain the procedure. Instruct the patient not to squint during the test, because this temporarily improves vision. The patient should not have an opportunity to study the chart before the test is given. If the patient wears corrective lenses, they should be worn during the test.
   **PURPOSE:** Explanations help gain patient cooperation and alleviate apprehension.
4. Position the patient in a standing or sitting position at the 20-foot marker.
   **PURPOSE:** Twenty feet is the standard testing distance.
5. Check that the Snellen chart is positioned at the patient’s eye level.
6. Instruct the patient to cover the left eye with the occluder and to keep both eyes open throughout the test to prevent squinting (Figure 1).
   **PURPOSE:** Traditionally, the right eye is tested first.
7. Stand beside the chart and point to each row as the patient reads aloud down the chart, starting with the 20/70 row (Figure 2).
   **PURPOSE:** Starting with larger letters gives the patient confidence and allows for accommodation of vision.
8. Proceed down the rows of the chart until the smallest row the patient can read with a maximum of two errors is reached. If one or two letters are missed, the outcome is recorded with a minus sign and the number of errors (e.g., 20/40 –2). If more than two errors are made, the previous line should be documented.
9. Record any of the patient’s reactions while reading the chart.
   **PURPOSE:** Reactions such as squinting, leaning, tearing, or blinking may indicate that the patient is having difficulty with the test.
10. Repeat the procedure with the left eye.
11. Repeat the procedure with both eyes.
12. Document the procedure in the patient’s record, including the date and time, visual acuity results, and any reactions by the patient. Also record whether corrective lenses were worn.
   **PURPOSE:** Procedures that are not recorded are considered not done.

DOCUMENTATION EXERCISE

The medical assistant conducted a Snellen exam on Truman Anderson, who wears contacts. The results were: right eye 20/60; left eye 20/30, but he missed one letter at the 20/30 line: both eyes 20/40. Truman did not squint or strain during the exam.

FIGURE 1

FIGURE 2

8/01/XX 2:20 pm Visual acuity completed c Snellen chart. OD 20/60, OS 20/30-1, OU 20/40 + corrective lenses. No squinting noted. Kim Tov, CMA (AAMA)
**Critical Thinking Application 37-2**

Susie Anthony, a 19-year-old patient, is seen today for a general eye examination. The physician orders a routine Snellen test, and Kim administers it. Susie wears contacts. With her right eye, she reads without errors to the 20/25 line; however, she squints and makes three errors at the 20/20 line. With her left eye, Susie makes two mistakes at the 20/30 line. How should Kim document this procedure?

**Interpreting Snellen Outcomes**

- The patient always stands 20 feet from the chart.
- Each outcome is a record of how well the patient can see compared with normal vision.
- Example: A patient with a 20/40 reading can see that line correctly standing at 20 feet, but an individual with normal vision can see the same line correctly at 40 feet.
- Example: A patient with a 20/15 reading can see that line accurately standing at 20 feet, but a person with normal vision must stand at 15 feet to have the same vision.

**Ishihara Color Vision Test**

Defects in color vision are classified as either congenital or acquired. Congenital defects are caused by an inherited color vision defect and are found most often in males. Acquired defects are caused by eye injury or disease. The Ishihara test is a simple, convenient, and accurate procedure that detects total colorblindness as well as the red-green blindness that is prevalent in congenital blindness (Procedure 37-2). The test assesses the perception of primary colors as well as shades of colors.
CHAPTER 37 Assisting in Ophthalmology and Otolaryngology

60

Nothing can take the place of "the only pair of eyes you will ever have." That is why you are exercising such good judgment in taking care of them as you are now doing.

50

For this reason, you will welcome the suggestion about lenses which are designed and made to give you "greater comfort and better appearance." In man’s earliest days he had little use for glasses. He used his eyes chiefly for long distance.

40

He worked by daylight and at tasks with little detail. But now, you use your eyes for much close work—reading, writing, sewing and many other uses which the eyes of primitive man did not know. Now your eyes meet all sorts of lighting conditions, artificial and natural.

30

Many of these conditions produce "overbrightness" or glare. Sometimes it is the direct or reflected glare of sunlight; often it is direct or reflected from artificial light. And very often this glare is uncomfortable—impairs your efficiency. But special lenses, developed by America’s leading optical scientists, combat this glare.

25

These lenses give you more comfortable vision and blend harmoniously with your complexion. These lenses are less conspicuous. We are glad to recommend them because they will give you greater comfort and better appearance. Thousands of satisfied wearers testify to their real benefits.

20

You are wise in taking good care of "the only pair of eyes you will ever have." You know how valuable they are, that you can never have another pair. For this reason, you will welcome the suggestion about lenses which are designed and made to give you "greater comfort and better appearance." In man’s earliest days he had little use for glasses.

The above lenses subtend the visual angle of 5° at the designated distance in inches.

FIGURE 37-9 Near vision acuity chart.

The test booklet contains polychromatic plates made up of colored dots in numeric patterns. The numbers are one color, and the background dots are a different color. Patients with average visual acuity can read the numbers within the dot matrix without difficulty. Patients with color vision defects are unable to read the number or see a totally different number. A section of plates is included that contains colored line trails through a background of dots. These plates are designed to be used with children or adults who are unable to read numbers. In this situation, the patient uses a finger to follow the dotted trail through the picture.

The test should be administered in a quiet room that is well illuminated by sunlight and not artificial lighting. If this is not possible, create the best situation possible. If a quiet outside patio area is available, use it or try to set the electric lights to create an artificial sunlight effect. The test uses 14 color plates. The basic test consists of plates 1 through 11. Plates 12 through 14 are used if the patient appears to be having difficulty with the red-green differentiations. The medical assistant records the number of plates that were read correctly. If the score is 10 or higher, the patient is within the average range. If the score is 7 or lower, the patient is suspected of having a color deficiency, and the ophthalmologist performs additional assessment tests using more precise color vision testing equipment.

I Treatment Procedures

Eye Irrigation

The eye is irrigated to relieve inflammation, remove drainage, dilute chemicals, or wash away foreign bodies. Sterile technique and equipment must be used to prevent contamination (Procedure 37-3). Follow the procedure as prescribed, making sure the patient is comfortable. Record the treatment in the patient’s medical record immediately after it has been completed. Remember, if it is not recorded, it has not been done.

Foreign bodies in the eye are very irritating and may cause considerable pain. Most foreign bodies are superficial and can be removed easily. Occasionally, a foreign particle may be deeply embedded and require eye surgery. Notify the physician immediately if a patient comes into the office with something in his or her eye.

The first objective of the physician’s examination is inspection. The patient is asked to look to either side and up and down so that the anterior surface of the eye can be inspected. For the physician to fully inspect under the upper lid, the patient must cooperate by looking downward while the physician everts the upper lid using a cotton-tipped applicator. While the lid is maintained in an everted position, any foreign materials may be rinsed away with sterile water or saline solution. If the physician’s order is for you to remove the foreign body, do so with irrigation only. If this technique is unsuccessful, cover both of the patient’s eyes with a gauze dressing and notify your supervisor immediately.

SAFETY ALERT

Never attempt to remove a foreign body from the cornea using an applicator. Scratches to the cornea may result, causing scar formation and impaired vision.

CRITICAL THINKING APPLICATION 37-3

The physician tells Kim to irrigate the left eye of a 22-year-old patient to remove a foreign body. She is to irrigate the eye with sterile normal saline solution until clear. How should Kim document this procedure?

Instillation of Medication

Medication may be instilled into the eye to treat an infection, soothe an eye irritation, anesthetize the eye, or dilate the pupils before examination or treatment (Procedure 37-4). Ophthalmic medications are available in several forms. Liquid drops usually are supplied in small squeeze bottles with tips that allow one drop at a time to be dispensed; or, the bottle may contain a dropper with a small rubber attachment used to dispense the medication by drops. Eye ointments are dispensed in small metal or plastic tubes with an ophthalmic tip that allows them to be dispensed in a small ribbon of ointment directly into the bottom eyelid (see Table 37-2).
PROCEDE 37-2

Perform Patient Screening Using Established Protocols: Assess Color Acuity Using the Ishihara Test

GOAL: To assess a patient's color acuity correctly and record the results.

EQUIPMENT and SUPPLIES
- Room area with natural light
- Ishihara color plate book
- Pen, pencil, and paper
- Watch with a second hand
- Patient's record

PROCEDURAL STEPS

1. Assemble the equipment and prepare the room for testing. The room should be quiet and illuminated with natural light.
   PURPOSE: Natural light is needed to test colors correctly.

2. Greet the patient by name and explain the procedure. Use a practice card during the explanation and make sure the patient understands that he or she has 3 seconds to identify each plate.
   PURPOSE: To make sure you have the right patient. Also, an informed patient is a cooperative patient. The first plate is a practice plate and is designed to be read correctly.

3. Hold up the first plate at a right angle to the patient's line of vision and 30 inches from the patient. Be sure both of the patient's eyes are kept open during the test (Figure 1).

4. Ask the patient to tell you the number on the plate. Record the plate number and the patient's answer (Figure 2).

5. Continue this sequence until all 11 plates have been read. If the patient cannot identify the number on the plate, place an x in the record for that plate number. Your record should look like this:
   Plate 1 = pass, Plate 2 = pass, Plate 3 = x, Plate 4 = pass, and so on.

6. Include any unusual symptoms in your record, such as eye rubbing, squinting, or excessive blinking.

7. Place the book back in its cardboard sleeve and return it to its storage space.
   PURPOSE: The Ishihara color plates need to be stored in a closed position away from external light to protect the colors.

8. Record the procedure in the patient's record, including the date and time, the testing results, and any patient symptoms shown during the test.
   PURPOSE: Procedures that are not recorded are considered not done.

SAFETY ALERT
Whatever the medication, the dispenser should never touch the eye while the prescribed amount of medication is administered. This can traumatize the eye and contaminate the medication applicator.

CRITICAL THINKING APPLICATION 37-4
Amy is ordered to administer Humorsol 0.25%, 1 drop to the left eye, to a 75-year-old patient recently diagnosed with glaucoma. How should Amy document this procedure?

Aseptic Procedures in Ophthalmology
A major concern in ophthalmologic procedures is the contamination of eye medication applicators. Because of the concern of cross-contamination, the use of stock ophthalmic medications is discouraged. The sterility of all eye medications is critical for good patient care. Newly opened sterile solutions should be used for each patient and either discarded after instillation or given to the patient for home use. All instruments used to remove a foreign body should be sterile.
PROCEDEUR 37-3

Assist the Physician with Patient Care: Irrigate a Patient’s Eyes

**GOAL:** To cleanse one or both eyes as ordered by the physician.

**EQUIPMENT and SUPPLIES**
- Prescribed sterile irrigation solution
- Sterile irrigating bulb syringe and sterile basin or prepackaged solution with dispenser
- Basin for drainage
- Sterile gauze squares
- Disposable drape
- Towel
- Nonsterile disposable gloves
- Biohazard waste container
- Patient’s record

**PROCEDURAL STEPS**

1. Sanitize your hands.
   **PURPOSE:** To ensure infection control.
2. Check the physician’s orders to determine which eye requires irrigation (or whether both eyes require it) and the type of solution to be used.
   **PURPOSE:** To check the abbreviations: OD (right eye), OS (left eye), OU (both eyes).
3. Assemble the materials needed.
4. Check the expiration date of the solution; read the label three times.
   **PURPOSE:** To follow the rules for administering medications.
5. Greet the patient by name and explain the procedure.
   **PURPOSE:** To make sure you have the right patient. Also, explanations help gain the patient’s cooperation and ease apprehension.
6. Assist the patient into a sitting or supine position, making sure that the head is turned toward the side of the affected eye. Place the disposable drape over the patient’s neck and shoulder.
   **PURPOSE:** This position causes the solution to flow away from the unaffected eye, reducing the chance of cross-contamination of the healthy eye.
7. Put on gloves and rinse your gloved hands under warm water to remove all powder from the gloves or wear powder-free gloves.
   **PURPOSE:** Gloves help hold the eye open, but powder may irritate the eyes.
8. Place or have the patient hold a drainage basin next to the affected eye to receive the solution from the eye. Place a poly-lined drape under the basin to prevent the solution from getting on the patient.
9. Moisten a gauze square with solution and cleanse the eyelid and lashes. Start at the inner canthus (near the nose) and move to the outer canthus (farthest from the nose). Dispose of the gauze square in the biohazard container after each wipe (Figure 1).
   **PURPOSE:** Debris on the lids or lashes must be cleaned away before the conjunctiva is exposed.
10. If using a bulb syringe, pour the required volume of room-temperature irrigating solution into the basin and draw the solution into the bulb syringe. If an irrigating solution in a prepackaged dispenser is used, remove the lid.
    **PURPOSE:** Cold solution causes the patient pain and discomfort.
11. Separate and hold the eyelids with the index finger and thumb of one hand. With the other hand, place the syringe or dispenser on the bridge of the nose parallel to the eye.
    **PURPOSE:** To support and steady the dispenser.
12. Squeeze the bulb or dispenser, directing the solution toward the lower conjunctiva of the inner canthus; allow the solution to flow steadily and slowly from the inner to the outer canthus. Do not touch the eye or eyelids with the applicator (Figure 2).
    **PURPOSE:** To prevent possible injury to the eye.
PROCEDURE 37-3—cont’d

13. Refill the syringe or continue to gently squeeze the prepackaged bottle and continue the procedure until the amount of solution ordered by the physician has been administered or until drainage from the eye is clear.

14. Dry the eyelid with sterile gauze, moving from the inner canthus to the outer canthus. Do not use cotton balls, because fibers might remain in the eye.

15. Dispose of the irrigation results and clean the work area.

16. Remove your gloves and sanitize your hands.

   PURPOSE: To ensure infection control.

17. Document the procedure in the patient’s record using appropriate abbreviations; include the date and time, the type and amount of solution used, which eye was irrigated, any significant reactions by the patient, and the results.

   PURPOSE: Procedures that are not recorded are considered not done.

DOCUMENTATION EXERCISE

Toby Kramer is ordered eye irrigations until clear because of sand in both eyes. You use 50 mL of irrigation solution in the right eye and 125 cc in the left eye. After the procedure is complete, the sclera appears red and Toby complains of irritation in both eyes.

8/06/XX 9:00 am OD irrigated with 50 mL normal saline solution and OS with 125 mL. Postprocedure sclera appears inflamed and pt c/o bilateral irritation. Kim Tau, CMA

PROCEDURE 37-4

Assist the Physician with Patient Care: Instill an Eye Medication

GOAL: To apply medication to one or both eyes as ordered by the physician.

EQUIPMENT and SUPPLIES

- Sterile medication with sterile eye dropper or ophthalmic ointment
- Disposable drape
- Sterile gauze squares
- Disposable nonsterile gloves
- Patient’s record

PROCEDURAL STEPS

1. Sanitize your hands.

   PURPOSE: To ensure infection control.

2. Check the physician’s order to determine which eye requires medication (or whether medication is ordered for both eyes) and the name and strength of the medication to be used.

   PURPOSE: To prevent a medication error.

3. Assemble the equipment and supplies.

4. Read the label of the medication three times.

   PURPOSE: To follow the rules for administering medications.

5. Greet the patient by name and explain the procedure.

   PURPOSE: To make sure you have the right patient. Also, explanations help gain the patient’s cooperation and ease apprehension.

6. Put on nonsterile gloves and rinse your gloved hands under warm water to remove all powder from the gloves or wear powder-free gloves.

   PURPOSE: Gloves help hold the eye open, but powder may irritate the eyes.

7. Assist the patient into a sitting or supine position. Ask the patient to tilt the head backward and look up.

   PURPOSE: Looking up helps prevent the applicator’s tip from touching the cornea. It also helps keep the patient from blinking as the medication is instilled. For eyedrops, draw the medication into the dropper. For an eye ointment, remove the cap.

8. Pull the lower conjunctival sac downward (Figure 1).

   PURPOSE: To create a pocket for the medication.

9. Administer the prescribed number of drops or amount of ointment into the eye. For eyedrops, place the drops in the center of the lower conjunctival sac, with the tip of the dropper held parallel to the eye and 1⁄2 inch above the eye sac. For eye ointment (ung), squeeze a thin ribbon along the lower conjunctival sac from the inner canthus to the outer canthus, making sure not to touch the eye with the applicator.

   PURPOSE: Placing the medication in the conjunctival sac rather than on the eyeball prevents injury to the cornea. Touching the eye with the applicator could injure the eye and contaminates the applicator (Figure 2).

FIGURE 1
EXAMINATION OF THE EAR

Otorhinolaryngology is the medical specialty that deals with the ear, nose, and throat. It frequently is referred to as otolaryngology or even as a single specialty of otology or laryngology. Usually, the specialty otorhinolaryngology is referred to simply as ear, nose, and throat (ENT).

Anatomy and Physiology of the Ear

The ears are only a small part of the actual organ of hearing. Most of this structure lies hidden in the temporal bone. Anatomically, the organ of hearing is divided into three sections: the outer ear, the middle ear, and the inner ear (Figure 37-10).

Outer or External Ear

The outer ear consists of the auricle, or pinna, the fleshy part of the ear that can be seen on the side of the head, and the external auditory canal, the tube that extends from the auricle to the tympanic membrane (eardrum).

The auricle collects sound waves and sends them down the auditory canal. The skin that lines the auditory canal contains numerous hair follicles and many nerve endings, as well as ceruminous glands that secrete cerumen (commonly called ear wax), which lubricates the canal. Both the hair and the waxy cerumen help prevent foreign objects from reaching the eardrum. The canal has a slight S shape and is approximately 1 inch (2.5 cm) long.

Middle Ear

The middle ear, sometimes called the tympanic cavity, is an air-filled chamber that begins with the tympanic membrane and terminates at the oval window. The middle ear contains the auditory ossicles or bones: the malleus, incus, and stapes. These three tiny bones are linked by minute ligaments to form a bridge across the space of the tympanic cavity. The malleus is next to the tympanic membrane, and the stapes is against the oval window. The eustachian tube opens into the middle ear cavity and connects to the nasopharynx. It is designed to equalize pressure in the middle ear with that in the external auditory canal. This equalized pressure makes hearing possible. Throat infections may spread to the middle ear through the eustachian tube, a very common occurrence in young children.

The tympanic membrane is a thin, disk-shaped tissue that totally seals off the outer ear from the middle ear. Sound waves conducted through the external auditory canal hit this membrane and cause it to vibrate. These vibrations are picked up by the
three ossicles and changed from air-conducted sound waves to bone-conducted sound waves. The ossicles transmit the bone-conducted sound waves through the middle ear to the oval window, which is the membrane that connects the middle and inner ear. At the oval window, the sound waves move into the fluids of the inner ear. This fluid motion excites the receptors, changing the bone-conducted sound into sensorineural impulses.

**Inner Ear**

The inner ear, called the *labyrinth*, is divided into the cochlea and the semicircular canals, which are joined by the vestibule. The semicircular canals function to maintain equilibrium, and the cochlea is responsible for the sense of hearing.

The organ of Corti, which contains the receptors for sound, is located within the cochlea. It is made up of hairlike sensory cells surrounded by sensory nerve fibers that form the cochlear branch of the eighth cranial nerve. Sound impulses cause the hairs to bend and rub against the nerve fibers, which initiate stimuli to travel through the cochlear nerve into the brain for sound interpretation.

The eighth cranial nerve transmits auditory impulses to the medulla oblongata. The impulses then travel to the thalamus and on to the auditory cortex of the temporal lobe of the brain, where they are interpreted into audible sound and speech patterns.

The semicircular canals are responsible for evaluating the position of the head in relation to the pull of gravity. The three canals are positioned at right angles to one another, on different planes (Figure 37-11). When the head turns rapidly, these fluid-filled canals must rapidly adjust and send the stimulated change into the central nervous system, which interprets the information and initiates the desired response to maintain balance. With repetitive or excessive stimulation to the equilibrium receptors, some people become nauseated and may vomit. This condition is known as *motion sensitivity* or *motion sickness*.

**Disorders of the Ear**

**Hearing Loss**

Two problems result in hearing loss: either a conduction problem or a sensorineural impairment. Some individuals have both conditions.
Conductive hearing loss is caused by a problem that originates in the external or middle ear, which prevents sound vibrations from passing through the external auditory canal, limits the vibration of the tympanic membrane, or interferes with the passage of bone-conducted sound in the middle ear. Some common causative factors in conductive hearing loss include impacted cerumen; trauma to the tympanic membrane, especially with scar formation; hemorrhage or fluid in the middle ear; otosclerosis; and recurrent chronic ear infections. Patients with conductive hearing loss receive the greatest benefit from a hearing aid. If the hearing loss is caused by a malfunction or congenital abnormality of the ossicles, a surgical procedure can be performed to replace the damaged ossicles with manufactured models.

A sensorineural hearing loss results from an abnormality either of the organ of Corti or of the auditory nerve. Viral infections (e.g., rubella, influenza, and herpes) can result in hearing loss, as can head trauma or certain ototoxic medications. The first sign of ototoxic drug complications usually is tinnitus, a ringing in the ears. This sometimes occurs with high doses of aspirin, certain antibiotics (erythromycin and vancomycin), and chemotherapeutic agents. A sensorineural hearing loss also can occur because of prolonged exposure to loud noise, such as repetitive noise in the workplace, or loud music, which damages the delicate cilia lining the organ of Corti. Presbycusis, the hearing loss that affects aging people, is caused by a reduction in the number of receptor cells in the organ of Corti and also is classified as a sensorineural loss. Children can be born with a congenital hearing deficit or deafness because of intrauterine infection or trauma (Figure 37-12).

If the sensorineural hearing loss cannot be improved by hearing aids, an option is surgical implantation of an artificial cochlea. Cochlear implants are complex devices that use electrical impulses to stimulate the auditory nerve, which then carries the current to the brain to be interpreted as sound. The implants do not create normal hearing but provide increased sound for a person with profound or complete hearing loss.

A mixed hearing loss is a combination of conductive and sensory deafness. This type of loss can result from tumors, toxic levels of certain medications, hereditary factors, and stroke.

**Otitis**

Two common types of otitis are seen in patients in an otology or family practice. The first affects the external ear canal and is called otitis externa, or swimmer’s ear. Otitis externa may be caused by dermatologic conditions, such as seborrhea or psoriasis, trauma to the canal, or continuous use of earplugs or earphones. Swimmers frequently have otitis externa because water collects in the ears and mixes with cerumen to form an ideal culture medium for bacteria and fungus. Patients with otitis externa complain of severe pain and have inflammation and swelling of the external auditory canal, hearing loss, and possibly purulent (containing pus) or serous drainage. The inflammation is treated with antibiotic or steroid ear drops, and the canal must be kept clean and dry or the condition can become chronic.

Otitis media is an inflammation of the normally air-filled middle ear, resulting in a collection of fluid behind the tympanic membrane. Otitis media can be either serous or suppurative. Serous otitis media occurs because of a buildup of clear fluid in the middle ear; patients complain of a full feeling and some hearing loss. In suppurative otitis media, purulent fluid is present in the middle ear, and the patient has fever, pain, and hearing loss. Otitis media often is associated with an upper respiratory tract infection caused by a virus or an allergic reaction that results
in swelling and inflammation of the sinuses and eustachian tubes. A child’s eustachian tube is shorter and narrower than that of an adult. The small size increases the chance that inflammation will block the tube and cause fluid to collect in the middle ear, which not only is uncomfortable but also interferes with the conduction hearing process (Figure 37-13).

**RISK FACTORS FOR OTITIS MEDIA**

**Factors that Cannot Be Controlled**
- Gender (male)
- Age (infants and younger children [6 to 18 months])
- Premature birth
- Family history
- Siblings
- Underlying disease (cleft palate, Down syndrome, asthma, allergies)
- Ethnicity (American Indian and Alaskan Inuit because of the shape of the eustachian tubes)
- Cochlear implants

**Factors that Can Be Controlled**
- Limit exposure to large-group child care settings.
- Do not expose the child to second-hand smoke.
- Hold the child upright during bottle feeding.
- Do not use a pacifier.
- Wash the hands frequently to prevent colds and flu.
- Have the child immunized with pneumococcal conjugate vaccine (Prevnar).

An otoscopic examination reveals that the normally pearly gray tympanic membrane is inflamed and bulging. Fluid or pus areas may be visible through the membrane. A *tympanogram* may be done to determine the air pressure of the middle ear and the mobility of the tympanic membrane. During a tympanogram test, a small earphone is placed in the ear canal and the air pressure is gently changed. This test is helpful for showing whether an ear infection or fluid is present in the middle ear (Figure 37-14). If fluid is present in the canal, it can be cultured to determine the causative pathogen. The individual may be given antibiotics, analgesics, and often a decongestant to promote

**FIGURE 37-14** A normal tympanogram shows a peak at normal pressure (0). An ear with fluid produces a flat tympanogram.
Impacted Cerumen

Cerumen normally is a soft, yellowish, waxy substance that lubricates the external auditory canal. Excessive secretion of cerumen can gradually cause hearing loss, tinnitus, a feeling of fullness, and otalgia (ear pain). Impacted cerumen that has been pushed up tightly against the eardrum is a common cause of conductive hearing loss, because sound vibrations cannot pass through the cerumen to initiate movement of the tympanic membrane. Individuals with psoriasis, abnormally narrow ear canals, or an excessive amount of hair growing in the ear canals are more prone to this condition.

An otoscopic examination quickly reveals this problem. If impacted cerumen is found, it must be removed. This can be done by softening the wax with oily drops, such as carbamide peroxide (Debrox), and then irrigating the ear with warm water until the plug is removed. Because this condition can recur, the patient may need to schedule periodic examinations. If the patient is experiencing hearing loss because of the impaction, it is immediately remedied with removal of the cerumen.

Ménière’s Disease

The semicircular canals of the inner ear, in coordination with the eighth cranial nerve, control balance and give a sense of how the body is positioned. The canals contain fluid (the endolymph), the filtration and excretion of which are controlled by the part of the canal called the endolymphatic sac. Ménière’s disease causes swelling and edema in this part of the semicircular canals, along with an overproduction or collection of excess endolymph. When this occurs, the patient shows signs. Although the cause of this problem is unknown, Ménière’s disease is a chronic, progressive condition that triggers episodes of recurring attacks of vertigo, tinnitus, a sensation of pressure in the affected ear, and advancing hearing loss. During an acute attack, patients experience nausea, vomiting, and problems with balance. The attacks can last a few hours to several days, and they increase in severity over time.

During the active periods of the disease, the patient is treated symptomatically with medications for nausea and vomiting. A salt-restricted diet, diuretics, and antihistamines may be prescribed to control edema in the labyrinth. Surgical destruction of the affected labyrinth is an option. Although this relieves symptoms, it may also result in permanent deafness if the cochlea is damaged.

RECOMMENDATIONS FOR TREATING OTITIS MEDIA

The development of drug-resistant strains of bacteria as a result of overprescription of antibiotics is a growing concern. Therefore, the American Academy of Pediatrics recommends the following for the treatment of otitis media:

- Delay treatment with antibiotics, giving the child’s immune system a chance to fight the infection by itself: this delay should last 24 hours in children 6 to 24 months old and 72 hours for older children. Approximately 61% of children improve within 24 hours regardless of whether they are treated. If the child does not improve, prescribe an appropriate antibiotic.
- The child typically improves within 48 to 72 hours, but the parent should understand how important it is to complete the antibiotic medication as ordered to prevent the infection from recurring.
- The physician may decide to treat otitis media with a short course of antibiotics (i.e., 5 days) but with a higher dose. The drugs of choice include amoxicillin (Amoxicil), azithromycin (Zithromax), and cefuroxime (Rocephin).
- Antibiotics will not help if otitis is caused by a virus. The child should be observed for possible complications, and analgesics should be administered for pain control. Viral otitis media typically resolves within 7 to 14 days.

The medical assistant plays a key role in helping parents understand why antibiotic therapy may not be recommended and in educating parents about the importance of administering a prescribed antibiotic at the time ordered using the correct dose and completing the entire prescription.

USEFUL QUESTIONS FOR GATHERING A HISTORY OF EAR PROBLEMS

- Are you experiencing nausea, vomiting, dizziness, ear pain, fever, headache, upper respiratory infection, ringing of the ears, drainage, loss of balance, or hearing loss?
- What are the onset, duration, and frequency of symptoms?
- Have you taken any medication for the symptoms? What? Has it been helpful?
- Do you have the problem in both ears?
• Are you experiencing pain? On a scale of 1 to 10, with 10 being the worst pain, how would you rate the pain? Is it localized or radiating, in one ear or both?
• Has anything you have tried relieved the symptoms?

![FIGURE 37-16 Instruments used in an otoscopic examination.]

Diagnostic Procedures

An ear examination involves viewing the external auditory canal with an otoscope covered by an ear speculum (Figure 37-16). Disposable plastic speculum covers should be used each time to prevent disease transmission. A normal otoscopic examination reveals an external auditory canal with a small amount of cerumen and a pearly gray and concave tympanic membrane. In addition to performing the otoscopic examination, the physician palpates the area around the pinna for abnormalities or sensations. A number of tests are used to assess hearing acuity, ranging from simple tuning fork tests to quantitative and qualitative audiometric testing. If a hearing loss is suspected, the next test usually is performed with a tuning fork.

Tuning Fork Testing

As mentioned in Chapter 32, tuning fork tests measure hearing by air conduction and bone conduction. (Remember that in bone conduction, the sound vibrates through the cranial bones to the inner ear.) Tuning forks are available in different sizes, each with a different frequency. The most commonly used tuning fork is the 512 Hz (hertz), which means it vibrates 512 cycles per second, the level of normal speech patterns. To activate the fork, the physician holds it by the stem and strikes the tines softly on the palm of the hand. Striking the tines too forcefully creates a tone that is too loud for diagnostic use. The two tests used to evaluate hearing are the Weber and Rinne tests. Both of these procedures are commonly used to evaluate conductive and sensory losses.

The Weber test is used if the patient reports that hearing is better in one ear than in the other. The vibrating fork is placed in the center of the top of the head, and the patient is asked in which ear the tone is louder or if the tone is the same in both ears. Because the patient is hearing the tone by bone conduction through the head, a normal result is hearing the sound equally in both ears.

The Rinne test is designed to compare air conduction sound with bone conduction sound. In this test the stem of the vibrating fork is placed on the patient's mastoid process, and the patient is instructed to raise a hand when the sound disappears. The fork is quickly inverted so that the vibrating tines are approximately 1 inch in front of the external ear canal. If the hearing is normal, the patient should still hear a sound. In normal hearing, the sound is heard twice as long by air conduction as by bone conduction.

Audiometric Testing

An audiometric test may be done in an otology or family practice and is performed by medical assistants who have received additional training. Audiometry measures the lowest intensity of sound an individual can hear (Figure 37-17, A). The patient, frequently a child, is assisted in placing headphones over the ears (Figure 37-17, B). Each ear is tested by delivering a single frequency at a specific intensity, starting with low frequency tones and going up to very high frequencies. The patient is asked to signal when he or she hears the sound. The results are printed on a graph, called an audiogram, or the medical assistant charts the results on a graph sheet (Procedure 37-5). An adult with normal hearing can hear tone frequencies below 25 decibels, and children with normal hearing can hear those below 15 decibels.

If initial screening indicates a hearing deficit, the physician may recommend an appointment with an audiologist for audiometric evaluation. The evaluation consists of a battery of tests that assesses the level of hearing impairment and provides valuable information as to how the patient may be helped. The first test evaluates speech comprehension and assesses the patient's ability to follow verbal instructions. Once this evaluation is complete, the patient is placed in a soundproof booth with earphones over the ears. From this point on, the audiologist speaks to the patient and conducts all testing through the earphones. The assessment includes testing the frequency, intensity, and audibility of sound. This process takes approximately 1 hour.

Aseptic Procedures in Otology

Routine examination instruments should be disinfected or sterilized according to office policy after each use and stored in a clean area. Surgical asepsis must be practiced when changing dressings and performing minor surgery. Medications, such as eardrops and nose drops, must be handled carefully to prevent contamination.

Treatment Procedures

Ear Irrigation

Irrigation of the ear is done to remove excessive or impacted cerumen, to remove a foreign body, or to treat the inflamed ear with an antiseptic solution (Procedure 37-6). When an ear irrigation is ordered by the physician, the medical assistant may
perform the procedure if he or she has had the proper training and is competent in the technique. To prevent discomfort for the patient, it is important to administer the irrigating solution with the applicator tilted up, toward the top of the external canal, so that the solution is not directed at the tympanic membrane. Some discomforts the patient may experience during an ear irrigation include vertigo, ear discomfort, coughing, or a tickle in the back of the throat. Perform the procedure as prescribed, making sure the patient is comfortable. Always chart the treatment and its results immediately after completion.

**FIGURE 37-17** A, An audiometer. B, Placing the headphones.

### PROCEDURE 37-5

**Perform Patient Screening Using Established Protocols: Measure Hearing Acuity with an Audiometer**

**GOAL:** To perform audiometric testing of hearing acuity.

**EQUIPMENT and SUPPLIES**

- Audiometer with adjustable headphones and graph paper
- Quiet area
- Patient’s record

**PROCEDURAL STEPS**

1. Sanitize your hands, assemble the equipment, and bring the patient into a quiet area (see Figure 37-17, A).
   **PURPOSE:** The testing room should be free of distractions and noise so that the patient can concentrate completely on the hearing evaluation.

2. Explain that the audiometer measures whether the patient can hear various sound wave frequencies through the headphones. Each ear is tested separately. When the patient hears a frequency, he or she should raise a hand to signal the medical assistant.
   **PURPOSE:** Patient education is needed for compliance with the examination.

3. Place the headphones over the patient’s ears, making sure they are adjusted for comfort (see Figure 37-17, B).

4. The audiometer tests each ear separately, starting at a low frequency. If the results are not automatically recorded by the machine, the medical assistant documents the patient’s response to the frequencies on a graph or audiogram. The results for the left ear are marked with an X, and those for the right ear are marked with an O (Figure 1). The medical assistant must have specialized training to conduct this test.

5. Frequencies are increased gradually to test the patient’s ability to hear. Each response by the patient is documented.

6. After one ear has been tested, the other ear is then tested, and the results are documented using the appropriate abbreviations: AU (both ears), AD (right ear), AS (left ear).

7. The results are given to the physician for interpretation.

8. The equipment is disinfected according to the manufacturer’s guidelines.

9. Sanitize your hands.
Instilling Otic Medications

Medication ordered for ear instillation is given to soften impacted cerumen, to relieve pain, or as an antibiotic drop for an infectious pathogen (Procedure 37-7). Patients with ear conditions may be in considerable pain and have difficulty hearing, which makes health teaching a challenge. Wait until after the procedure has been completed and the patient is more comfortable to reinforce health behaviors.

EXAMINATION OF THE NOSE AND THROAT

If you are working in an ENT specialty office, you also will assist in the examination of the nasal cavity and the throat. The nasal cavity is examined to inspect the mucous membrane of the nostrils. The common cold and allergies are the main causes of changes in the mucosa. The physician may use a nasal speculum to visualize the nostrils and examines the nasal sinuses by palpation and transillumination.

The throat is the area that includes the larynx and pharynx; it can be viewed with the aid of a mirror and either a tongue depressor or a gauze square for grasping the tongue. In the nasopharynx, the physician looks for enlarged adenoids (pharyngeal tonsils) and for the orifices of the eustachian tubes. The physician may spray the patient's throat with a topical anesthetic before the examination to prevent the gag reflex.

Throat specimens frequently are collected in the physician's office to assist in the diagnosis of strep throat infections. Strep throat is caused by the group A beta-hemolytic streptococcal bacteria, and if left untreated, it can cause serious complications. Throat cultures are collected by gently swabbing the back of the throat and the surfaces of the tonsils with a sterile swab. The mouth and tongue should be avoided to prevent contamination of the swab with the normal flora of the mouth (Procedure 37-8).

CLOSING COMMENTS

Patient Education

Patients with vision or hearing impairments face serious challenges. For these patients, the medical assistant must use good listening skills, appropriate nonverbal methods, and touch to communicate empathy and understanding. Teaching may have to be adapted to meet the special needs of these patients. A person with a vision loss benefits from large-print forms and handouts, increased levels of lighting, and verbal instructions rather than written ones to reinforce learning. For an individual with a hearing deficit, printed instructions, demonstrations of how to manage treatments, or even sign language interpretation should be available to ensure accurate communication. Including family members in the patient's treatment plan and offering referrals to appropriate community or professional resources may be very beneficial to a patient with sensory loss. Each patient must be assessed individually to determine the type of adaptation he or she needs.

An important part of patient education for patients receiving eye medications at home is stressing the need to maintain the sterility of the medication. Patients and/or family members must be taught how to apply the medication and prevent trauma to the
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PROCEDURE 37-6

Assist the Physician with Patient Care: Irrigate a Patient’s Ear

GOAL: To remove excessive or impacted cerumen from one or both of the patient’s ears.

EQUIPMENT and SUPPLIES

- Irrigating solution
- Basin for irrigating solution
- Bulb syringe or an approved otic irrigation device
- Gauze squares
- Otoscope
- Drainage basin
- Disposable drape with polylined barrier
- Cotton-tipped applicators
- Disposable gloves
- Patient’s record

PROCEDURAL STEPS

1. Sanitize your hands.
   **PURPOSE:** To ensure infection control.
2. Check the physician’s order and assemble the materials needed (Figure 1).
3. Check the label of the solution three times: (1) when you remove it from the shelf; (2) when you pour it; and (3) when you return it to the shelf.
   **PURPOSE:** To prevent a medication error.
4. Prepare the solution as ordered. The solution should be at body temperature to help loosen the cerumen.
   **PURPOSE:** Solutions at 100°F are most comfortable for the patient.
   Ask the patient whether the solution temperature is comfortable.
5. Greet the patient by name and explain the procedure.
6. Inspect the affected ear with an otoscope to locate the cerumen impaction.
7. Place the patient in a sitting position with the head tilted toward the affected ear. Place a water-absorbent towel over a polylined barrier on the patient’s shoulder, and the collecting basin on the towel at the base of the ear. The patient can assist you by holding the collecting basin in place (Figure 2).

   **PURPOSE:** To minimize the risk of getting the patient’s clothing wet and to direct the flow of water into the collecting basin.
8. Put on gloves and wipe any particles from the outside of the ear with gauze squares.
   **PURPOSE:** To prevent the introduction of foreign material into the ear canal.
9. Test to make sure the solution is warm; then fill the syringe and expel air.
   **PURPOSE:** Trapped air in the syringe increases the pressure of the irrigation, causing discomfort.
10. Straighten the external ear canal. For adults and children over age 3, gently pull the pinna of the ear up and back; for children younger than age 3, pull the earlobe down and back (Figure 3).
   **PURPOSE:** Straightening the canal allows the irrigating fluid to circulate through it.
11. Place the tip of the syringe into the meatus of the ear.
12. Gently direct the flow of the solution toward the roof of the canal.
   **PURPOSE:** This helps prevent injury to the tympanic membrane, aids in the removal of the embedded material, and provides the most comfort for the patient.
13. Refill the syringe with warm solution and continue until the material has been removed. Note the particles in the collecting basin to evaluate when the material has been successfully removed.
14. Dry the patient’s external ear with gauze squares and the visible ear canal gently with cotton-tipped applicators.
   **PURPOSE:** Inserting the applicator into the canal may cause serious trauma.
15. Inspect the ear with an otoscope to determine the results (Figure 4).
16. Place a clean, absorbent towel on the examination table and allow the patient to rest quietly with the head turned to the irrigated side while you wait for the physician to return to check the affected ear.
17. Clean the work area and return all equipment after it has been properly disinfected. Sanitize your hands.

**PURPOSE:** To ensure infection control.

18. Document the procedure in the patient’s record, including the date and time; the ear irrigated, using the appropriate abbreviations: AU (both ears), AD (right ear), AS (left ear); the type and amount of irrigating solution used; the characteristics of the material returned from the irrigation; the visibility of the tympanic membrane after irrigation; and any reactions by the patient.

**PURPOSE:** Procedures that are not recorded are considered not done.

**DOCUMENTATION EXERCISE**

You are ordered to perform an irrigation of both ears on Mrs. Ophelia Black because of impacted cerumen. Otoscopic examination before the irrigation revealed a large amount of dark brown ear wax in both ears. After irrigation, both tympanic membranes were visible, and Mrs. Black had no complaints of discomfort.

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**FIGURE 3**

**ADULT—PULL PINNA UP AND BACK**

**INFANT—PULL PINNA DOWN AND BACK**

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8/12/XX 10:15 AM AD and AS irrigated with 500 mL saline sol bilaterally. Large amount dark brown cerumen expelled; post-irrigation both TM’s visible and pearly grey. No complaints of discomfort.

Kim Tao, CMA
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PROCEDURE 37-7

Assist the Physician with Patient Care: Instill Medicated Ear Drops

GOAL: To instill the correct medication in the accurate dose directly into the external auditory canal.

EQUIPMENT and SUPPLIES
- Prescribed otic drops in dispenser bottle
- Cotton balls
- Disposable gloves
- Patient's record

PROCEDURAL STEPS

1. Sanitize your hands and gather the equipment and supplies.
   PURPOSE: To control infection and to reduce procedure time.
2. Check the medication label three times: (1) when you remove it from the shelf; (2) when you prepare it; and (3) when you return it to the shelf.
   PURPOSE: To prevent a medication error.
3. Greet the patient by name and explain the procedure.
4. Have the patient sit up and tilt head away from the affected ear or lie down on the side with the affected ear upward.
   PURPOSE: To expose the ear for treatment, allow gravity to help the medication flow into the canal, and ensure the patient's comfort.
5. Check the temperature of the medication bottle. If it feels cold, gently roll the bottle back and forth between your hands to warm the drops.
   PURPOSE: Cold medication may increase the pain level or cause symptoms of nausea and vertigo.
6. Hold the dropper firmly in your dominant hand. With the other hand, gently pull the pinna up and back if the patient is an adult or the ear lobe down and back if the patient is younger than 3 years old.
   PURPOSE: To straighten the ear canal and make it easier for the medication to reach the target tissue.
7. Place the tip of the dropper in the ear canal meatus and instill the medication drops along the side of the canal (Figure 1).
8. Instruct the patient to rest on the side opposite the affected ear and to remain in this position for approximately 3 minutes.
   PURPOSE: To help the medication reach the base of the canal and prevent it from immediately running out of the ear (Figure 2).
9. If instructed by the physician, place a moistened cotton ball into the ear canal.
   PURPOSE: To protect the ear canal and prevent medication from leaking out of the ear.
10. Clean the work area and sanitize your hands.
    PURPOSE: To ensure infection control.

11. Record the procedure in the patient's record using the appropriate abbreviations; include the date and time; name, dose, and strength of the medication; the ear treated; and any reactions by the patient.
    PURPOSE: Procedures that are not recorded are considered not done.

eye and contamination of the applicator. Patients receiving ear treatments also must understand how to instill the medication.

Legal and Ethical Issues

Diminished sight or hearing may render a patient seriously impaired. To prevent accidents and office injuries, always ask a sight- or hearing-impaired patient whether he or she requires assistance. When you escort the patient to an examination room, offer your arm and tell the patient the approximate distance you will be walking. If the patient is to have an examination that involves local anesthesia or eyedrops that dilate the pupil, be sure the patient has recovered and someone is available to take
PROCEDURE 37-8

Perform Patient Screening Using Established Protocols: Collect a Specimen for a Throat Culture

**GOAL:** To collect a throat culture using sterile technique either for immediate testing or for transportation to the laboratory.

**EQUIPMENT and SUPPLIES**
- Nonsterile gloves
- Face protection barrier (if the patient is coughing or if there is danger of splattering body fluids)
- Sterile swab
- Sterile tongue depressor
- Transport medium
- Biohazard waste container
- Laboratory requisition if sample is being sent out for examination
- Patient’s record

**PROCEDURAL STEPS**

1. Sanitize your hands.
   **PURPOSE:** To ensure infection control.
2. Gather the materials needed.
3. Put on gloves and face protection if needed.
   **PURPOSE:** To follow Standard Precautions.
4. Position the patient so that the light shines into the mouth.
   **PURPOSE:** To illuminate the area to be swabbed.
5. Remove the sterile swab from the sterile wrap with your dominant hand and grasp the sterile tongue depressor with your nondominant hand.
   **PURPOSE:** To achieve better control of the swabbing process.
6. Instruct the patient to open the mouth and say “Ah.” Depress the tongue with the depressor.
   **PURPOSE:** Saying “Ah” helps elevate the uvula and reduces the tendency to gag. The tongue is depressed so that you can see the back of the throat and prevent contamination of the sterile swab.
7. Swab the back of the throat between the tonsillar pillars, especially any reddened, patchy areas of the throat, white pus pockets, purulent areas, and the tonsils; take care not to touch any other areas in the mouth (Figure 1).
   **PURPOSE:** Pathogenic organisms are found in the back of the throat and on the tonsils.
8. Place the swab in the transport medium, label it, and send it to the laboratory (Figure 2). If direct slide testing is requested, return the labeled swab to the laboratory. (The rapid strep test procedure is described in Chapter 55.)
   **PURPOSE:** Transport medium prevents the swab from drying. Labeling immediately after collection prevents specimens from becoming mixed up.
9. Dispose of contaminated supplies in the biohazard waste container.
   **PURPOSE:** To prevent the spread of infection.
10. Disinfect the work area.
11. Remove your gloves and discard them in a biohazard waste container.
12. Sanitize your hands.
   **PURPOSE:** To ensure infection control.
13. Record the procedure in the patient’s record.
   **PURPOSE:** Procedures that are not recorded are considered not done.

**FIGURE 1**

- Uvula
- Palatine tonsil
- Swab held together
- Tongue blade

**FIGURE 2**

8/14/XX 8:35 AM Throat specimen collected via swab from tonsillar area. Sent to University Laboratories for strep testing.
Kym Tou, CMA (AAMA)
the patient home before allowing him or her to leave the office. Never assume that the patient is capable of leaving alone. If the patient insists on leaving before the designated recovery time, inform the physician and record the time and circumstances surrounding the event in the patient's medical record. This information should be signed and witnessed. The physician may want a refusal of care form signed by the patient and placed in the medical record.

**HIPAA Applications**

Regardless of the patient's disability, the ambulatory care center must follow the guidelines for Notice of Privacy Practices (NPP) established by the Health Insurance Portability and Accountability Act (HIPAA). The NPP is a form developed by the facility that outlines the patient's rights and the facility's legal responsibilities to safeguard the patient's protected health information. The facility must give the NPP to each new patient at the first office visit. To comply with HIPAA guidelines, the document must be in a language the patient easily understands. The staff is responsible for obtaining the patient's signature on the form that indicates the patient's agreement with the stipulations of the facility's privacy practice. An individual with a vision deficit may require a large-print form, or a staff member may need to read the document to the person and answer any questions. The staff also must make sure patients with hearing deficits understand the form before signing.

**SUMMARY OF SCENARIO**

After observing Kim and asking many questions, Amy is beginning to understand her special responsibilities in the ophthalmology and otolaryngology clinic. She recognizes the need to be familiar with the anatomy and physiology of both the eye and the ear as well as to be able to perform specialty-related skills, such as irrigations, medication instillations, and diagnostic procedures. Amy has become quite proficient at performing Snellen and Ishihara screening examinations and accurately documenting each. Kim has taught her to use the audiometer and assisted her with the first few screenings, so she is now ready to do hearing tests on her own.

Although she learned about eye and ear medications in her medical assistant program, Amy found that instilling these medications in an actual patient is different from working on mannequins and classmates. Kim has reinforced the skills she learned in her program, continually emphasizing infection control procedures and reinforcing patient education information. Amy realizes she needs to understand the pathologic conditions that can occur in the sensory organs so she will be able to assist the physician as needed and answer patients' questions.

After working with patients who have vision and hearing deficits, Amy understands the importance of adapting communication techniques to meet the needs of each patient. She has decided to take advantage of educational opportunities at the hospital and through her professional organization to continue to learn about this special area of practice.

**SUMMARY OF LEARNING OBJECTIVES**

1. Define, spell, and pronounce the terms listed in the vocabulary. Spelling and pronouncing medical terms correctly bolster the medical assistant's credibility. Knowing the definition of these terms promotes confidence in communication with patients and co-workers.
2. Apply critical thinking skills in performing the patient assessment and patient care. Completing the Critical Thinking Application exercises throughout the chapter can help the student medical assistant become more adept at critical analysis of real-life situations.
3. Explain the differences among an ophthalmologist, optometrist, and optician. An ophthalmologist is a medical doctor who specializes in the diagnosis and treatment of the eye; an optometrist can examine and treat visual defects; and an optician fills prescriptions for corrective lenses.
4. Identify the anatomic structures of the eye. The anatomy of the eye begins with the outer covering, the conjunctiva, and three layers of tissue: the sclera, choroid, and retina. The retina is where light rays are converted into nervous energy for interpretation by the brain.
5. Describe the process of vision. Vision begins with the passage of light through the cornea, where it is refracted. The light rays then pass through the aqueous humor and pupil into the lens. The ciliary muscle adjusts the curvature of the lens to again refract the light rays so that they pass into the retina, triggering the photoreceptor cells of the rods and cones. Light energy is converted into an electrical impulse that is sent through the optic nerve to the brain, where interpretation occurs.
6. Differentiate among the major types of refractive errors. Refractive errors include hyperopia, myopia, presbyopia, and astigmatism. All are caused by a problem with bending light so that it can be accurately focused on the retina. These conditions usually are caused by defects in the shape of the eyeball and can be corrected with glasses, contacts, or surgery.
7. Summarize typical disorders of the eye. Eye disorders can range from problems with eye movement, as in strabismus and nystagmus, to infections of the eye, including hordeolum, chalazions, keratitis, conjunctivitis, and blepharitis. Disorders of the eyeball include corneal abrasions, cataracts, glaucoma, and macular degeneration.
8. Define the various diagnostic procedures for the eye. Diagnostic procedures for the eye begin with a visual examination of the eye with an ophthalmoscope. Next, the eyelids are examined for abnormalities, and the pupils are tested for PERRLA. More advanced techniques include the use of a slit lamp to view the fine details of the eye and an
SUMMARY OF LEARNING OBJECTIVES—cont’d

- Exophthalmometer to measure the distance of the eyeball from the orbit. Distance visual acuity typically is assessed with a Snellen chart; near visual acuity is tested with a near-vision acuity chart. A patient can be tested for a color vision defect with the Ishihara test.

9. Perform a vision acuity test using the Snellen chart.
   Procedure 37-1 explains the Snellen evaluation.

10. Assess color acuity.
    Procedure 37-2 outlines the color acuity examination.

11. Explain the purpose of eye irrigations and the instillation of medication.
    Eye irrigations relieve inflammation, remove drainage, dilute chemicals, or wash away foreign bodies. Sterile technique and equipment must be used to prevent contamination. Medication may be instilled into the eye to treat an infection, soothe an eye irritation, anesthetize the eye, or dilate the pupils before examination or treatment.

12. Properly irrigate a patient’s eyes.
    Procedure 37-3 describes the method for eye irrigation.

13. Accurately instill eye medication.
    Procedure 37-4 explains how to administer eye medications.

14. Identify the structures and explain the functions of the external, middle, and inner ear.
    The external ear consists of the auricle, or pinna, and the external auditory canal, which transmits sound waves to the tympanic membrane. The middle ear is an air-filled cavity that contains the ossicles. The sound vibration passes through the tympanic membrane, causing the ossicles to vibrate. This bone-conducted vibration passes through the oval window into the inner ear. The organ of Corti in the cochlea of the inner ear converts sound waves into nervous energy, which is sent to the brain for interpretation. The semicircular canals in the inner ear maintain equilibrium.

15. Describe the conditions that can lead to hearing loss, including conductive, neurogenic, and congenital hearing losses.
    Conductive hearing loss is caused by a problem that originates in the external or middle ear and prevents sound vibrations from passing through the external auditory canal, limiting tympanic membrane vibrations or interfering with the passage of bone-conducted sound in the middle ear. A sensorineural hearing loss results from damage to the organ of Corti or the auditory nerve and prevents vibrations from being converted into nervous stimuli.

16. Define the major disorders of the ear, including otitis, impacted cerumen, and Ménière’s disease.
    Otitis externa is an inflammation of the auditory canal, and otitis media is an inflammation of the normally air-filled middle ear, resulting in the collection of serous or supplicative fluid behind the tympanic membrane. Impacted cerumen is a common cause of conductive hearing loss. Ménière’s disease is a chronic, progressive condition that affects the labyrinth and causes recurring attacks of vertigo, tinnitus, a sensation of pressure in the affected ear, and advancing hearing loss.

17. Explain the various otic diagnostic procedures.
    The ear examination begins with an otoscopic examination. It can include various tuning fork tests, to detect either conductive or sensorineural hearing deficits, as well as more advanced audiometric testing.

18. Use an audiometer to measure a patient’s hearing acuity accurately.
    Procedure 37-5 explains the audiometry examination.

19. Identify the purpose of ear irrigations and instillation of ear medication.
    Irrigation of the ear is performed to remove excessive or impacted cerumen, remove a foreign body, or treat the inflamed ear with an antiseptic solution. Medication is instilled into the ear to soften impacted cerumen, relieve pain, or treat an infectious pathogen.

20. Demonstrate ear irrigations.
    Procedure 37-6 describes how to perform an ear irrigation.

    Procedure 37-7 explains how to administer otic drugs.

22. Summarize the nose and throat examination.
    Examination of the nose and throat begins with inspection of the nasal cavity; this is followed by visual examination of the throat and the nasopharynx. Throat cultures may be done to determine whether a streptococcal infection is present. The anterior and posterior neck regions are palpated for abnormalities.

23. Perform a throat culture.
    Procedure 37-8 explains how to perform a throat culture.

24. Describe the effect of sensory loss on patient education.
    Patients with vision and hearing impairments face serious challenges and require individualized attention to meet their health education needs. Patients with vision loss may need large-print forms and handouts, increased levels of lighting, or verbal instructions rather than written ones. Individuals with hearing deficits may benefit from printed instructions, demonstrations on how to manage treatments, or sign language interpretation. Family members should be included in the patient's treatment plan, and referrals to appropriate community or professional resources may be very beneficial.

CONNECTIONS

- Study Guide Connection: Go to the Chapter 37 Study Guide. Read and complete the activities.
- Evolve Connection: Go to the Chapter 37 link at evolve.elsevier.com/kim to complete the Chapter Review and Chapter Quiz. Pursue other resources listed for this chapter to increase your knowledge of Assisting in Ophthalmology and Otolaryngology.