After reading this chapter, you will be able to:
1. Describe age-related changes that affect vision.
2. Identify risk factors that can affect visual wellness.
3. Describe three pathologic conditions that cause vision impairments in older adults.
4. Discuss the functional consequences that affect visual wellness.
5. Conduct a nursing assessment of vision.
6. Identify environmental modifications and other interventions to facilitate visual wellness in older adults.

Because important daily activities—including communicating, enjoying visual images, and maneuvering in the environment—are highly dependent on eyesight, visual impairments can profoundly affect a person’s safety, functioning, and quality of life. In older adults, age-related changes combine with risk factors to affect visual wellness. Fortunately, nurses have an array of interventions to assist older adults in maintaining optimal visual function. This chapter addresses functional consequences affecting vision in older adults and the impact of these changes on their vision. In addition, the chapter focuses on the role of the nurse in assessing vision and helping older adults to achieve visual wellness.

Visual function depends on a sequence of processes, beginning with the perception of an external stimulus and ending with the processing of neural impulses in the cerebral cortex. Age-related changes affect all of the structures involved in visual function and alter visual perception for the older adult. In the absence of disease processes, these gradual changes have only a subtle impact on the daily activities of the older person. Unless compensatory actions are taken, however, age-related vision changes can interfere with the older person’s quality of life and influence the enjoyment and safe performance of many activities.
Eye Appearance and Tear Ducts

Age-related changes in the tear ducts and the appearance of the eye and eyelids usually do not affect vision, but they are likely to affect visual wellness by causing anxiety and discomfort. Nurses can promote wellness by teaching older adults about comfort measures to relieve bothersome symptoms, as discussed later in this chapter.

As the eye ages, lipids accumulate in the outer part of the cornea, and a yellow or gray-white ring develops between the iris and the sclera. This phenomenon, termed **arcus senilis**, is the most common age-related corneal change and can be observed in most eyes by the age of 80 years in men and 90 in women (Yanoff, 2004). Other changes in the eye’s appearance include diminished corneal translucency, yellowing of the sclera, and fading of the pigment in the iris.
Diversity Note

In whites and younger men, but not in African Americans, arcus senilis may be a sign of hyperlipidemia and increased risk for cardiovascular disease (Yanoff, 2004; Morrow et al., 2005).

Changes in the eyelids and surrounding skin include loss of orbital fat, development of wrinkles, decreased elasticity of the eyelid muscles, and accumulation of dark pigment around the eyes. These changes contribute to the overall appearance of sunken eyes, called enophthalmos. Loss of orbital fat and muscle elasticity can progress to the point of causing a lid fold and impairing vision. This condition, termed blepharochalasis, can be surgically treated. Relaxation of the lower lid muscles to an extreme degree results in the age-related conditions of ectropion or entropion. In ectropion, the lower lid falls away from the conjunctiva, blocking the flow of tears through the lower punctum and decreasing lubrication of the conjunctiva. In entropion, the lower lid becomes inverted and the eyelashes irritate the cornea, eventually leading to infection.

Age-related diminution in tear production leads to dry eye syndrome and complaints of dryness, burning, or photosensitivity. Subsequent irritation and rubbing of the cornea can lead to infections. Contrary to what might be expected, dry eye syndrome can cause excessive tearing because the lack of normal lubricating tears stimulates the production of reflex tears.

The Eye

Age-related changes in the eye itself also affect visual wellness. Specific structures of the eye that change with age include the cornea, lens, iris and pupil, ciliary body, vitreous, and retina (Fig. 17-1).

The cornea is a translucent covering over the eye that refracts light rays and provides 65% to 75% of the focusing power of the eye. As the eye ages, the cornea becomes opaque and yellow, interfering with the passage of light, especially ultraviolet rays, to the retina. Other corneal changes, such as the accumulation of lipid deposits, can cause an increased scattering of light rays and have a blurring effect on vision. In addition, age-related changes in the curvature of the cornea influence the refractive ability.

The lens consists of concentric and avascular layers of clear, crystalline protein. The lens has no blood supply, so it depends on the aqueous humor for metabolic and support functions. The transparent lens fibers are continually forming new layers without shedding old layers. As new layers form peripherally, the old layers are compressed inward toward the center, where they eventually become absorbed into the nucleus. This process gradually increases the size and density of the lens, causing a tripling of its mass by 70 years of age. Thus, the lens gradually becomes stiffer, denser, and more opaque.

Because of these age-related changes, the lens moves forward in the eye and is less responsive to the ciliary muscle. These changes also interfere with the transmission of light rays, diffusing the rays that pass through the lens and reducing the amount of light reaching the retina. These changes do not affect all wavelengths equally; rather, the most detrimental effect occurs with the shorter blue and violet wavelengths.

The iris is a pigmented sphincter muscle that dilates and contracts to control pupillary size and regulate the amount of light reaching the retina. With increasing age, the iris becomes more sclerotic and rigid, reducing the size of the pupil and interfering with its ability to respond to changes in light. The pupillary size begins to diminish during the third decade and levels off during the seventh decade. This condition, called pupillary miosis, significantly interferes with
light reaching the retina, and is most pronounced in low levels of light (Schieber, 2006).

The **ciliary body** is a mass of muscles, connective tissue, and blood vessels surrounding the lens. These muscles regulate the passage of light rays through the lens by changing the shape of the lens. The ciliary body is responsible for accommodation, a process that controls one’s ability to focus on near objects. In addition, the ciliary body produces aqueous fluid. Beginning in the fourth decade, the ciliary body gradually atrophies, and muscle cells are replaced with connective tissue. By the sixth decade, the ciliary body is smaller, stiffer, and less functional. With advanced age, diminished secretion of aqueous humor interferes with nourishment and cleansing of the lens and cornea.

The **vitreous** is a clear, gelatinous mass that forms the inner substance and maintains the spherical shape of the eye. During the fifth decade, this gelatinous substance begins to shrink and the proportion of liquid increases. These age-related changes can cause the vitreous body to pull away from the retina, resulting in symptoms such as floaters, blurred vision, distorted images, or light flashes. In addition, these changes can cause light to scatter more diffusely through the vitreous, reducing the amount of light reaching the retina.

The process of transforming visual stimuli into neural impulses begins in the rods and cones, which are pigment-producing photoreceptor cells in the **retina**. Rods do not perceive colors, but they are responsible for vision under low light. Cones require high levels of light to function effectively, and they are responsible for **color perception** and **acuity**, which is the ability to detect details and discern objects. Rods are distributed throughout the peripheral retina and cones are concentrated in the central and most sensitive part of the macula, called the **fovea**. Age-related changes affect the photoreceptor cells, with rod density beginning to diminish during the fourth decade and the loss of cones occurring at a slower pace (Schieber, 2006). The loss of cones occurs primarily in the periphery of the retina, with only a minimal loss in the fovea. Although the number of rods declines in the central retina, the remaining rods increase in size and maintain their ability to capture light. Additional age-related changes in retinal structures include accumulation of lipofuscin and thinning and sclerosis of the blood vessels and pigment epithelium.

**The Retinal–Neural Pathway**

Photoreceptor cells converge in the ganglion cells of the optic nerve. Neurosensory information is passed from the optic nerve, through the thalamus, to the visual cortex. Although some researchers report an age-related loss of these neurons, more recent studies suggest that quantity is maintained but functional efficiency diminishes (Schieber, 2006). Age-related central nervous system changes that affect cognitive function also interfere with visual function in older adults.

**EFFECTS OF AGE-RELATED CHANGES ON VISION**

All adults, regardless of race, sex, ethnicity, or socioeconomic status, notice some changes in their visual abilities by their fifth decade because age-related vision changes are an early biomarker of aging. Even the rare person who has 20/20 visual acuity at the age of 90 years experiences subtle changes in overall vision. However, despite the universal prevalence of age-related vision changes, most older adults can perform their usual activities by using low-vision aids and modifying their environment. Visual impairment, which is defined as vision loss that cannot be corrected by eyeglasses or contact lenses alone, ranges from mild impairment to blindness. Mild visual impairments are caused by normal age-related changes, but they are significantly exacerbated by environmental conditions such as glare and poor lighting. Compensatory interventions for the effects of age-related vision changes are quite effective for promoting visual wellness. For example, people who use reading glasses and bright but nonglaring light to improve their ability to read are compensating for mild visual impairment. These mild visual impairments are discussed in the following sections, and consequences of more significant visual impairments are discussed in the section that follows, Pathologic Conditions Affecting Vision.

**Loss of Accommodation**

**Presbyopia** is the loss of accommodation, which is the ability to focus clearly and quickly on objects at various distances. Presbyopia is an initial and universal age-related vision change, which begins in early adulthood and affects all humans to some degree by their mid-50s (Croft & Kaufman, 2006). This vision change is caused by degenerative changes in the lens and the ciliary body. Functionally, accommodative changes gradually extend the near point of vision, which is the closest point at which a small object can be seen clearly. A typical example of the effects of presbyopia is the need to hold reading materials farther from the eye to focus clearly on the print.

**Diminished Acuity**

Visual acuity is customarily assessed using a Snellen chart, and it is measured against a normal value of 20/20. Visual acuity is best around the age of 30 years, after which it gradually declines with increasing age. Diminished acuity results from age-related ocular changes, including decreased pupillary size, scatter of light in the cornea and lens, opacification of the lens and vitreous, and loss of photoreceptor cells in the retina. These changes interfere with the passage of light to the retina, causing a threefold reduction in retinal illumination between the ages of 20 and 60 years.

Acuity is also influenced by extracochlear factors, such as the size and movement of an object and the amount of
light reflected off an object. Low or poor illumination compounds the effects of age-related ocular changes, particularly on visual acuity. Visual acuity is more impaired for moving objects than for stationary objects, and it becomes more impaired with increasing speed of the object. This combination of age-related changes and external factors hinders the older person’s ability to see moving objects and to perform tasks in low illumination. Consequently, older people require a relatively greater degree of illumination and may experience a marked decline in night driving competence.

**Delayed Dark and Light Adaptation**

The ability to respond to dim light, called **dark adaptation**, begins to decline around 20 years of age and diminishes more markedly after the age of 60 years. This decline is associated with decreased retinal illumination as well as age-related changes in the retina and retinal–neural pathways. The functional impact of these changes is that the older adult requires more time to adapt to dim lighting when moving from a brighter to a darker environment. For instance, when entering a darkened movie theater, an older person needs extra time to adapt to the changes in lighting before proceeding to a seat.

Age-related changes in the lens and pupil interfere with the response to bright lights because they reduce the amount of light reaching the retina. In practical terms, this means that an older person responds more slowly to lights such as car headlights and requires more time to recover from exposure to glare and bright lights.

**Increased Glare Sensitivity**

**Glare** occurs when scattered light in the optic media reduces the clarity of visual images. Glare is experienced when light is reflected from shiny surfaces, when the light is excessively bright or inappropriately focused, or when bright light originates from several sources at once. Glare is classified according to three types: veiling, dazzling, and scotomatic. **Veiling glare** is caused by the scattering of light over the retinal surface and results in diminished contrast of the viewed object. Veiling glare occurs, for example, when bright fluorescent lights in a grocery store reflect on the clear plastic covering over food products in a white case. **Dazzling glare**, which is caused by bright visual displays, interferes with the ability to discern details. Glass-covered directories in brightly lit shopping malls produces a dazzling glare that interferes with a person’s ability to read the words in the directory, particularly if there is poor contrast between the letters and the background. **Scotomatic glare** is a blinding glare caused by loss of retinal sensitivity and overstimulation of retinal pigments during exposure to bright lights. For example, sunshine can create scotomatic glare, especially at sunrise or sunset.

Beginning in the fifth decade, age-related changes increase a person’s sensitivity to glare and the time required to recover from glare. Glare sensitivity is influenced primarily by opacification of the lens; however, it also is affected by age-related changes in the pupil and vitreous. Functionally, these changes can significantly affect the person’s ability to read signs, see objects, drive at night, and maneuver safely in bright environments. In many modern buildings and shopping malls, the bright lights, large windows, and highly reflective floors generate glare that can lead to accidents and inaccurate perceptions.

**Reduced Visual Field**

A **visual field** is an oval-shaped area encompassing the total view that people perceive while looking at a fixed point straight ahead. The scope of the visual field narrows slightly between the ages of 40 and 50 years and then declines steadily. Functionally, the visual field is important when people engage in tasks that require a broad perception of the environment and moving objects. Walking in crowded places and driving a vehicle are examples of activities that depend on the field of vision.

**Diminished Depth Perception**

**Depth perception** is the visual skill responsible for locating objects in three-dimensional space, judging differences in the depth of objects, and observing relationships among objects in space. Functionally, depth perception enables people to use objects effectively and to maneuver safely in the environment. As with many other visual skills, depth perception depends on interactions between ocular and extraocular factors. **Stereopsis**, or the disparity between retinal images that is caused by the separation of the two eyes, is the primary ocular characteristic that affects depth perception. Extraocular factors that influence depth perception include prior perceptual experiences of the observer; movement of the observer’s head or body; and characteristics of the object, such as size, height, distance, texture, brightness, and shading. Depth perception declines with increasing age, and this can contribute to falls and tripping because of miscalculations about the distance and height of objects.

**Altered Color Vision**

Pigments in the retinal cones absorb light in the red, blue, or yellow ranges of the spectrum. As with many other visual functions, color perception is influenced by the type and quantity of light waves reaching the retina. Consequently, any age-related changes that interfere with retinal illumination—including lens opacification, pupillary miosis, retinal or retinal–neural changes—can interfere with accurate color perception. Opacification and yellowing of the lens interferes most directly with shorter wavelengths, causing an altered perception of blues, greens, and violets. Low levels
of illumination and other environmental factors also interfere with color perception.

Functionally, altered color perception is manifested as a relative darkening of blue objects and a yellowed perception of white light. Accurate color perception is not essential in all daily activities, but it is important, for instance, in differentiating between medications that are similar in color or tone, especially those in the blue-green and yellow-white ranges. In addition, altered color perception can interfere with the detection of spoiled food.

**Diminished Critical Flicker Fusion**

**Critical flicker fusion** is the point at which an intermittent light source is perceived as a continuous, rather than flashing, light. The ability to perceive flashing lights accurately is a function of the retinal receptors and is influenced by extracellular factors, such as the size, color, and luminance of the object. Age-related changes in the retina and retinal–neural pathway, as well as changes that decrease retinal illumination, interfere with critical flicker fusion. Low levels of illumination further exacerbate the effects of these changes. Functionally, diminished critical flicker fusion distorts the perception of a flashing light, making it appear to be a continuous light. Thus, diminished critical flicker fusion can interfere with the discernment of emergency vehicles and road construction lights, especially at night.

**Slower Visual Information Processing**

Age-related changes of the retinal–neural pathway affect the accuracy and efficiency of visual information processing. Thus, older adults generally need more time to process visual information, but the effects are minimal or negligible when tasks are familiar. Table 17-1 summarizes age-related vision changes and their effects on vision.

### Table 17-1: Age-Related Changes Affecting Vision

<table>
<thead>
<tr>
<th>Change</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance and Comfort</strong></td>
<td></td>
</tr>
<tr>
<td>• Decreased elasticity of the eyelid muscles</td>
<td>Potential for ectropion, entropion, blepharochalasis</td>
</tr>
<tr>
<td>• Enophthalmos</td>
<td>Potential for dry eye syndrome</td>
</tr>
<tr>
<td><strong>Structures</strong></td>
<td></td>
</tr>
<tr>
<td>• Yellowing and increased opacity of cornea</td>
<td>Presbyopia: diminished ability to focus on near objects</td>
</tr>
<tr>
<td>• Changes in the corneal curvature</td>
<td>Diminished accommodation</td>
</tr>
<tr>
<td>• Increase in lens size and density</td>
<td>Diminished acuity</td>
</tr>
<tr>
<td>• Sclerosis and rigidity of the iris</td>
<td>Increased sensitivity to glare</td>
</tr>
<tr>
<td>• Decrease in pupillary size</td>
<td>Narrowing of the visual field</td>
</tr>
<tr>
<td>• Atrophy of the ciliary muscle</td>
<td>Diminished depth perception</td>
</tr>
<tr>
<td>• Shrinkage of gelatinous substance in the vitreous</td>
<td>Altered color perception</td>
</tr>
<tr>
<td>• Atrophy of photoreceptor cells</td>
<td>Distorted perception of flashing lights</td>
</tr>
<tr>
<td>• Thinning and sclerosis of retinal blood vessels</td>
<td>Slower processing of visual information</td>
</tr>
</tbody>
</table>

**Wellness Opportunity**

Poor lighting and exposure to sunlight are risk factors that can readily be addressed through simple self-care practices.

Chronic conditions can adversely affect visual function in a variety of ways. Vision impairments commonly occur in people with Alzheimer’s or Parkinson’s disease, even during the early stages. People with diabetes are at increased risk of development of cataracts, glaucoma, and diabetic retinopathy. People with hypertension or hypercholesterolemia are at higher risk for age-related macular degeneration (AMD). Malnutrition has been associated with cataract development, and vitamin A deficiency has been associated with dry eyes from reduced tear production.

Medications that are associated with adverse effects on vision include aspirin, haloperidol, nonsteroidal anti-inflammatory agents, tricyclic antidepressants, digitalis, anticholinergics, phenothiazines, isoniazid, tamoxifen, amiodarone, sildenafil, and oral or inhaled corticosteroids. Cataracts are common in people with glaucoma because of the anticholinesterase drugs used in glaucoma treatment. Medications that can cause or contribute to dry eyes include estrogen, diuretics, antihistamines, anticholinergics, phenothiazines, beta-blockers, and anti-parkinson agents. Systemic anticoagulants can precipitate intraocular hemorrhage in people with preexisting macular degeneration.

**RISK FACTORS THAT AFFECT VISUAL WELLNESS**

Lifestyle and environmental factors—including both immediate and long-term conditions—exacerbate age-related vision changes and interfere with visual wellness. For example, long-term exposure to ultraviolet light (i.e., sunlight) is associated with the development of cataracts and loss of photoreceptor cells, particularly the cones. Furthermore, older adults are more vulnerable to eye damage from sunlight because age-related changes alter the protective response to harmful ultraviolet light. Warmer environmental temperatures are associated with an earlier age of onset for presbyopia (i.e., loss of near vision). Dry eyes can be caused by environmental conditions such as wind, sunlight, low humidity, and cigarette smoke. Other environmental influences on visual wellness include glare, dim lighting, and poor color contrast. Cigarette smoking is a lifestyle factor that increases the risk for cataracts and macular degeneration.
Mrs. F. is 60 years old and has used “readers” (reading glasses) for 15 years, but has never needed glasses for anything other than reading and sewing. She recently noticed that she has trouble reading the glass-enclosed directory at the shopping mall. She works in an office building with an atrium that has skylights, and she has trouble reading the signs on the doors.

**THINKING POINTS**

- What age-related factors contribute to the vision changes that Mrs. F. notices?
- What environmental factors are likely to contribute to Mrs. F.’s difficulty when she is in the shopping mall or at work?
- When Mrs. F. is in her home environment, what tasks might be more difficult because of age-related vision changes?

**PATHOLOGIC CONDITIONS AFFECTING VISION**

Chronic conditions that interfere with visual wellness occur very commonly in older adults, so nurses have important roles in detecting and managing these conditions. Health promotion interventions are particularly important with conditions like glaucoma because interventions can prevent vision impairment. However, this condition is often undiagnosed so the interventions are not implemented in a timely manner. Among older adults, the three most common pathologic eye conditions are cataracts, AMD, and glaucoma (Fig. 17-2, Table 17-2).

**Cataracts**

Cataracts are the leading and most reversible cause of visual impairment in older adults. About one fourth of noninstitutionalized people 70 years of age and older reported that they...
and double images

- Dimmed or blurred vision
- Distorted or double images

Distorted or double images

- Dimmed or blurred vision
- Distorted or double images

the following vision changes:

- Frequent changes in corrective lenses
- An increased sensitivity to glare
- A need for more light when reading
- The perception of a “film” over the eye
- A diminished ability to discern contrast
- The perception of halos around bright lights
- Distorted or diminished color perception (e.g., blue appears dulled, and red, yellow, and orange appear brighter)

Cataracts cannot be treated with medication, but in the early stages they are managed by the prescription of stronger eyeglasses or contact lenses. When visual acuity declines to about 20/50 and cataracts affect the person’s safety or quality of life, cataract surgery is usually recommended. When surgery is required for both eyes, the procedure is usually done on one eye at a time, with the second surgery being done after the first one heals completely. An optometrist or ophthalmologist can diagnose cataracts, but only an ophthalmologist can perform cataract surgery, which is the most commonly performed operation in the United States today. Because of many recent advances in surgical techniques, cataract surgery is simpler than it used to be and currently has a 99% success rate (Slusher, 2005).

Surgeons typically remove the affected lens through a process called phacoemulsification, in which they break up the clouded lens with ultrasound waves and then aspirate the tiny particles with a suction device. After the cataract is removed, the surgeon implants an intraocular lens. The surgical procedure is done with local anesthesia, takes less than 1 hour, and has a very low rate of complications. If the person needed corrective lenses before the surgery, the surgeon can insert an intraocular lens that mimics the natural focus.
ing ability of the eye and results in improved vision with little or no need for additional correction. Although there is a high rate of satisfaction with this type of intraocular lens, patients commonly report continued difficulty with glare and halos (Slusher, 2005).

Nurses have an important role in dispelling myths that might interfere with older adults obtaining surgical treatment for cataracts. For example, older adults might think that cataract surgery is riskier or more complicated than it actually is because they are familiar with experiences of older friends or relatives who had cataract surgery many years ago. Nurses can emphasize that significant progress has been made in techniques for cataract surgery in recent years and that there are many benefits, especially when the vision impairment interferes with safety and quality of life. Wellness outcomes after cataract surgery include significant improvements in visual and cognitive function as well as emotional and general well-being (Gray et al., 2006).

Diversity Note

Among Medicare recipients, African Americans are only 60% as likely as whites to undergo cataract surgery (Wilson & Eezzuduemhoi, 2005).

Although nurses need not be thoroughly familiar with the surgical techniques, they can emphasize that the techniques used today are much simpler and have an extremely high success rate. Moreover, nurses can encourage older adults to seek reliable information and periodic evaluations from eye care professionals, rather than simply tolerating a loss of vision due to cataracts. Nurses also can emphasize that studies indicate that cataract surgery can significantly improve safety, functioning, and quality of life (Foss et al., 2006).

Wellness Opportunity

Nurses promote responsible decision making by encouraging older adults and their caregivers to explore risks and benefits of cataract surgery.

Age-Related Macular Degeneration

Age-related macular degeneration (AMD) is the leading cause of severe vision loss in older adults in the United States and other developed countries. AMD, in various stages, affects 18% of people between the ages of 70 and 74 years, and 47% of people 85 years of age and older. In younger adults, the prevalence of AMD does not differ significantly by sex or race, but in people 70 years and older, AMD affects women more than men and non-Hispanic whites more than African Americans. AMD is associated with the risk factors summarized in Table 17-2.

Early in the disease, deposits of yellow byproducts of retinal pigment, called drusen, build up in the macula, which is the area in the middle of the retina where visual acuity is best. As the disease progresses, it is classified either as dry type, which accounts for 80% to 90% of cases, or wet (exudative) type. In the dry type, damage is caused by death of the photoreceptors, which is seen on fundoscopy as tiny areas of atrophy of the retinal pigment epithelium. The dry type of AMD usually progresses slowly and does not cause total blindness; however, if the wet type develops, visual loss can be rapid and severe. In the wet type, the damage is caused by the formation of new blood vessels in the choroid, a process called choroidal neovascularization, followed by hemorrhage into the subretinal space.

In the early stage of AMD, the person experiences blurred vision and has difficulty reading, especially in dim light. Like most other eye conditions, AMD occurs in both eyes, but it can appear initially in only one eye and its course may differ in each eye. As AMD progresses, it affects central vision and significantly interferes with activities such as reading, driving, watching television, recognizing people, and performing many other self-care activities (see Fig. 17-2). The primary treatment goal for patients with either type of AMD is to reduce the risk of further vision loss.

Laser photocoagulation and photodynamic therapy are two interventions that are effective in treating the choroidal neovascularization that occurs in the wet type of AMD. Not all people with the wet form meet the medical criteria for these two treatments, however. Another disadvantage of these treatments is that only a small percentage of patients experience significant long-term effects. Some progress is being made with regard to biologic or pharmacologic agents that halt the disease process, so nurses can encourage anyone with AMD to obtain information about clinical trials and new developments through reliable sources such as the National Eye Institute and other organizations listed in the Educational Resources section.

Nurses often serve in support roles by encouraging older adults to participate in vision rehabilitation programs so they can learn the most effective ways of compensating for declining vision. People with AMD are usually taught to test their eyes daily using the Amsler grid (Fig. 17-3) so they will be aware of sudden changes. In long-term care settings and for older adults with memory problems, nurses may have to provide daily reminders or assistance with carrying out this task. Nurses also need to encourage people with AMD to receive ongoing evaluation by eye care practitioners to detect treatable aspects of this disease.

Wellness Opportunity

Nurses holistically address needs of people with AMD by encouraging them to explore support groups and educational services associated with a Sight Center.

Glaucoma

The term glaucoma refers to a group of eye diseases in which the ganglion cells of the optic nerve are damaged by an abnormal build-up of aqueous humor in the eye. Aqueous
humor is a clear fluid that is produced in the anterior chamber of the eye and normally maintains eye pressure between 10 and 20 mm Hg. If the fluid cannot flow out of the anterior chamber of the eye through the channel between the iris and the cornea, it accumulates and pushes the optic nerve into a cupped or concave shape. The resulting damage to the optic nerve causes a loss of peripheral vision. If left untreated, the damage can progress to blindness. About 8% of noninstitutionalized older adults have glaucoma, with a much higher prevalence among African Americans (15%) than whites (7%) (Desai et al., 2001). Glaucoma is the second leading cause of blindness in the United States, and the leading cause of irreversible blindness in African Americans.

**Diversity Note**

African Americans have an earlier age of onset of glaucoma than do whites.

Chronic (open-angle) glaucoma, which accounts for as much as 90% of cases of glaucoma in the United States, occurs when the drainage canals become clogged. This condition has an insidious onset and affects vision when the optic nerve becomes damaged. Early signs include increased intraocular pressure, poor vision in dim lighting, and increased sensitivity to glare. If the condition progresses, manifestations include headaches, “tired eyes,” impaired peripheral vision, a fixed and dilated pupil, the perception of halos around lights, and frequent changes in the prescription for corrective lenses. Chronic glaucoma usually occurs in both eyes, but can begin in only one eye and does not necessarily progress at the same rate in both eyes. Because chronic glaucoma progresses slowly and causes little or no visual impairment in the early stage, annual assessments of intraocular pressure are necessary to detect the condition before visual impairments occur. Chronic glaucoma is most commonly managed with medications, but surgical treatment options include argon laser surgery and other types of eye surgery. Medication management commonly includes one or more of the following types of eye drops: miotics, prostaglandins, beta-blockers, adrenergic agonists, and carbonic anhydrase inhibitors.

Normal-tension glaucoma is another type of glaucoma that occurs in older adults. With this type of glaucoma, the intraocular pressure is within the normal range, but the optic nerve is damaged and the visual field is narrowed (see Figure 17-3).
Acute (closed-angle) glaucoma is caused by a sudden complete blockage of the flow of aqueous humor. This condition has an abrupt onset in one or both eyes and should be considered a medical emergency. People with acute glaucoma present with increased intraocular pressure, severe eye pain, clouded or blurred vision, dilation of the pupil, and nausea and vomiting. This condition can be precipitated by medications that cause pupil dilation, such as anticholinergics. Immediate treatment with medications is usually effective for acute attacks, but surgical intervention is often needed.

Health education for older adults with glaucoma focuses on the importance of adhering to ongoing medication routines and regularly being evaluated by their eye care practitioner. If older adults with glaucoma are admitted for institutional care, nurses need to ensure that prescribed eye drops are administered as ordered. In home care situations, nurses may need to develop a plan for administering eye drops on a daily or more frequent basis. If an older adult has memory problems, establishing a routine for administering eye drops can be quite challenging. Many times, complicated eye drop regimens can be simplified by working with the eye care practitioner to decrease the number of eye drops that are necessary or to prescribe a longer-acting medication that can be administered less frequently.

**Wellness Opportunity**

Nurses promote self-care by teaching people with glaucoma to be aware of prescription and over-the-counter medications that can exacerbate glaucoma.

**Mrs. F.** is now 72 years old and has been retired for several years. You are the nurse at her local senior center and she makes an appointment to see you. Mrs. F.’s medical history indicates that she has smoked a pack of cigarettes a day for 40 years and has been taking medications for hypertension and arthritis for 5 years. During a recent medical checkup, her doctor said he thought she had early cataracts, but he told Mrs. F. that he felt it was too early to do anything about them. She has never had an eye examination, other than what her regular doctor does periodically. When asked about her symptoms, Mrs. F. tells you that she sometimes feels like there is a film over her eyes and she has trouble seeing when she is outside on sunny days. Mrs. F. says that she never liked wearing sunglasses and hopes she won’t have to start wearing them now. She has recently purchased stronger reading glasses, and these help a little with reading and sewing.

**THINKING POINTS**

- **What factors likely contributed to the development of Mrs. F.’s cataracts?**
- **When Mrs. F. is driving during the day, what difficulties might she notice because of vision changes? Because of environmental conditions?**
- **When Mrs. F. is driving at night, what difficulties might she notice because of vision changes? Because of environmental conditions?**
- **When Mrs. F. is in her home, what changes in visual abilities might she notice because of cataracts?**

**FUNCTIONAL CONSEQUENCES AFFECTING VISUAL WELLNESS**

The most serious visual impairments that affect older adults are associated with pathologic conditions, such as cataracts, glaucoma, or AMD, all of which are increasingly likely to occur with advanced age. Visual impairments are categorized as “functional” when acuity is 20/50 or worse, as “low vision” when it is between 20/70 and 20/200, and as “blindness” when it is 20/400 or worse. People 65 years of age and older account for 30% of all visually impaired people in the United States, and for almost 37% of all visits to physicians’ offices for eye care. Trouble seeing, even with corrective lenses, affects 14% of people between the ages of 70 and 74 years and 32% of those 85 years and older (Desai et al., 2001). The following sections describe the functional consequences that are associated with the types of visual impairments that are most likely to occur in older adults.

**Diversity Note**

African Americans and Hispanic Americans have a higher prevalence of blindness and visual impairment than do whites.

**Effects on Safety and Function**

Because visual impairments are associated with many aspects of safety and functioning, people who are visually impaired are likely to be more dependent in their activities of daily living. Age-related vision changes most directly influence the following activities:

- Getting outside
- Driving a vehicle
- Shopping for groceries
- Going up and down stairs
- Getting in and out of bed or a chair
- Maneuvering safely in dark or unfamiliar environments
- Seeing markings on clocks, radios, thermostats, appliances, and televisions
- Reading newspapers, directories, small-print signs and posters, and labels on food items and medication containers
Most of these activities are affected by alterations in several visual skills. In addition, the ability to perform these activities is influenced significantly by glare, lighting, and other environmental factors.

Visual impairments threaten safe functioning because they can affect gait, balance, and postural stability. They also increase the risk of falls, fractures, and other serious injury secondary to falling. Lord and Dayhew (2001), in a 1-year study of 156 community-living people between the ages of 63 and 90 years, found that impaired vision is an important and independent risk factor for falls. Age-related vision changes that increase the risk for falls include diminished acuity, reduced visual field, diminished depth perception, impaired contrast sensitivity, and increased sensitivity to glare. In addition, delayed processing of visual information can interfere with the quick responses necessary for avoiding falls.

The negative impact of visual impairments can exacerbate the effects of other functional impairments. For example, people who have Parkinson’s or Alzheimer’s disease are more likely to experience visual hallucinations if they also have decreased visual acuity (Matsui et al., 2006). Similarly, impaired vision is likely to exacerbate the effects of postural instability and increase the risk for falls.

Effects on Quality of Life

Age-related vision changes develop gradually and often go unnoticed for many years. As the changes progress and interfere with usual activities, older adults may withdraw from activities rather than acknowledge a vision problem or adjust to the changes. In a study of the impact of sensory impairment on older African-American men and women, visual impairments were associated with a lower level of psychological well-being even after other factors such as functional limitations were controlled for (Bazargan et al., 2001). Rovner and Casten (2002) found a high incidence of depression in older adults with AMD, with the level of depression increasing in relation to decreased participation in valued activities. In addition, depression contributed to excess disability by exacerbating visual limitations beyond what would be explained independently by the severity of visual loss (Rovner & Casten, 2002).

Of course, a person’s usual lifestyle influences the extent of any psychosocial impact related to vision changes. If the preferred leisure activities require good visual skills, the older adult is likely to become bored and even depressed when vision changes interfere with endeavors such as reading, sewing, or needlework. Similarly, when artistic pursuits and entertainment events are important activities, diminished visual function can interfere with the person’s quality of life. By contrast, the effect of vision impairment on lifestyle might be minimal for people who prefer music or other activities that are less dependent on visual skills.

One’s living environment and support systems are other determinants of the psychosocial consequences of vision changes. Good visual skills are more important for people who live alone or who provide care for others than they are for people who live with, or have frequent contact with, others who have good vision. Also, if visually impaired people can modify their living environment to compensate for the impairments, the psychosocial consequences will be minimized. By contrast, people who live in institutional settings may experience relatively greater negative consequences because of their inability to alter environmental conditions.

Some older adults who notice declines in their vision develop fears that negatively affect their quality of life. For example, people may mistakenly fear going blind if they think they have a serious and progressive disease when, in reality, they have a treatable condition. Fear of blindness may be based on myths, inaccurate information, or the experiences of friends who have serious visual impairments. Negative or hopeless attitudes about vision changes can deter the older person from acknowledging the problem or seeking help. Fear of falling is another source of anxiety associated with impaired vision. Inaccurate depth perception can lead to frequent bumping into objects, and the older adult may feel insecure and unsafe, even in familiar environments. If the person has experienced falls or tripping, or knows someone who suffered a fracture as a result of falling, the fears may be magnified.

Effects on Driving

Vision changes can significantly affect driving skills and exert a profound impact on older adults, their families, and society. Because driving is associated with considerable safety and independence concerns for drivers and their families—and because unsafe drivers place others at risk—there has been intense and increasing interest in the effects of vision changes on the driving skills of older adults. Visual dimensions that influence driving abilities are near vision, visual search, dynamic vision, light sensitivity, and visual processing speed. Consequences of visual impairment with regard to driving include the following:

- Slower dark and light adaptation creates problems when driving in and out of tunnels and when driving at night on streets with variable lighting.
- Decreased peripheral vision interferes with the wide visual field that is important for avoiding collisions.
- Decreased acuity interferes with the perception of moving objects, especially fast-moving vehicles.
- Diminished accommodation and acuity create problems when the older adult tries to read dashboard indicators after focusing on the road.
• Glare interferes with the perception of objects and is heightened by rainy, snowy, or sunny conditions.
• Bright sunlight shortly after sunrise or before sunset can significantly interfere with the perception of red and green traffic lights because of increased sensitivity to glare.
• If the car has tinted windows, the diminished illumination further interferes with visual skills.

Wellness Opportunity
Nurses need to be aware of the far-reaching implications of the ability to drive not only on safety of the individual and others, but on independence and quality of life.

NURSING ASSESSMENT OF VISION

Nursing assessment of vision is aimed at identifying
• Factors that interfere with visual wellness
• Vision problems
• The impact of vision changes on safety, independence, or quality of life
• Opportunities for promoting visual wellness
• Barriers to implementing interventions

Nursing assessment of visual function is not a substitute for an examination by an eye care specialist. Whereas the purpose of an examination by an eye care specialist is to detect and initiate appropriate treatment of vision problems, the goal of the nursing assessment is to assist the older adult in minimizing the negative consequences of vision changes. Nursing assessment also aims at identifying modifiable risk factors that can be addressed through health promotion. Nurses assess visual abilities by interviewing the older adult (or caregivers of dependent older adults), by observing the older adult’s ability to perform activities of daily living, and by testing the older adult’s visual skills.

Interviewing About Vision Changes

Nursing use interview questions to elicit the following information: past and present risk factors for vision impairment, the person’s awareness of any vision changes, the impact of these changes on daily activities and quality of life, and the person's attitudes about interventions (Box 17-1). The interview begins with direct questions about the person’s awareness of any changes in vision. If the person acknowledges a visual impairment, the nurse elicits additional details about the onset and progression of vision changes. Nurses also ask about symptoms that cause discomfort or that indicate the possible presence of disease processes.

Nurses then ask about the impact of vision changes on the person’s usual or desired activities. If the person has acknowledged vision changes, nurses can ask specific questions about how these changes have influenced usual activities. If the person is not aware of vision changes, the nurse inquires about any difficulties performing complex activities, such as driving, shopping, and meal preparation.

Questions to Assess Awareness and Presence of Vision Impairment
- Have you noticed any changes in your vision during the past few years?
- Do you experience any uncomfortable symptoms, such as dry eyes?
- Do you have difficulty managing any of your usual activities because you have trouble seeing? (For instance, ask about the following: sewing, reading, driving, grooming, hobbies, preparing meals, watching television, managing money, writing letters, using the telephone, using dials on appliances, shopping for groceries, and going up and down stairs.)
- Have you ever tripped or fallen because you had trouble seeing?
- Have you stopped doing any activities because of vision problems? (For example, have you stopped driving at night because of difficulty seeing?)
- Are there things you would do if you could see better?

Questions to Ask if Vision Loss Is Acknowledged
- When did you first notice a loss of vision or a change in your ability to see?
- Have the changes been gradual, or did you notice sudden changes at any particular time?

- How would you describe the changes in your ability to see?
- Have you noticed pain, blurred vision, burning or itching, halos around lights, intolerance to bright light, a difference between day and night vision, or spots or flashing lights in front of your eyes?
- What kind of medical evaluation and care, if any, have you had for this problem?

Questions to Identify Opportunities for Education About Disease Prevention and Health Promotion
- When was the last time you had your eyes checked?
- Where do you go for eye care?
- Have you ever had your eyes checked for cataracts, glaucoma, and other eye conditions?
- What do you think about going for regular checkups for glaucoma and other eye problems?

Questions to Identify Risk Factors for Vision Loss
- When you spend time outdoors in the sun, do you use sunglasses or a hat to protect your eyes from bright light?
- Do you smoke cigarettes?
- Do you have a history of diabetes or hypertension?
- What medications do you take? (Refer to Table 17-2 to identify medications that may increase the risk for vision loss.)
Questions about leisure interests are incorporated into the interview to obtain information about the psychosocial consequences of vision impairments. Although the older adult may not associate lifestyle changes with vision impairments, questions about changes in hobbies and leisure activities can help the nurse identify the need for interventions to improve visual wellness. Because poor vision increases the risk for falls, especially tripping-related falls, nurses ask about a history of tripping, falling, and near-falling.

**Wellness Opportunity**
Nurses assess the impact of vision changes on the person’s relationships with other people as one aspect of quality of life.

**Identifying Opportunities for Health Promotion**
Nurses identify opportunities for health promotion by asking about the person’s usual eye care practices and about factors that can interfere with visual wellness. Information about the source, frequency, and dates of the person’s eye examinations is particularly useful for planning health promotion interventions that address the early detection of eye disease. Nurses also listen for indicators of myths or misunderstandings that should be addressed through health education. If the person has cataracts, glaucoma, or another chronic condition affecting vision, the nurse asks questions to ascertain the person’s self-care practices and attitude toward eye examinations and disease management. If a visual impairment has been denied, the nurse assesses attitudes about early detection of treatable conditions.

Last, identification of modifiable risk factors provides an opportunity for health education. For example, it is especially important to ask about cigarette smoking if the person has cataracts, AMD, or a family history of AMD. If the older person is likely to spend time outdoors in sunny climates, the nurse asks about exposure to sunlight. Placing this question toward the end of the interview sets the stage for health education about protective measures, such as the use of sunglasses.

**Wellness Opportunity**
Nurses pave the way for teaching about self-care by assessing attitudes about preventive and protective activities, such as obtaining eye examinations and wearing sunglasses.

**Observing Cues to Visual Function**
Reliable information about a person’s visual function can be obtained simply by being observant. For example, nurses can observe for any abnormalities of the eyelids, such as serious lid lag, that might interfere with visual wellness. Nurses can detect other, more subtle, indications that visual function is impaired by observing the person’s appearance and ability to perform daily activities. Finally, when possible, nurses observe older adults in their usual environments for a more accurate assessment of conditions that can affect visual wellness.

Nurses consider their observations in relation to the person’s usual patterns of activities and personal care. For example, observation of spots and soiled marks on clothing would be interpreted differently for someone known to be meticulous about his or her appearance than for someone who had never showed much concern about this. When assessing older people who are not in their usual environment, the nurse should note any circumstances that might influence their visual performance, either positively or negatively. An example of a positive influence might be the presence of good lighting and color contrast. Some negative influences, such as glare from fluorescent lights reflecting on highly polished floors, are more likely to exist in an institutional setting than a home setting. Assessment of the person’s visual performance outside the home setting also must take into account the influences of factors such as illness, medication effects, psychological stress, unfamiliar environments, and unavailability of corrective lenses. These influences are of particular concern in institutional settings and are likely to have a negative impact on the older person’s performance of daily activities. In these settings, nurses can ask the older person and caregivers for information about the person’s abilities in the home setting. Suggestions for observing behavioral and environmental cues related to visual function are listed in Box 17-2.

**Using Standard Vision Tests**
Nurses assess peripheral vision and acuity for near and distant objects by using both formal and informal tests. Some tests, such as checking distance vision with the Snellen chart, assessing visual fields with the confrontation test, and evaluating near vision by asking the person to read small-print text, require minimal equipment. Nursing assessment of these three parameters provides information about visual functions that often are affected by age-related changes and that influence the safe performance of daily activities. These tests are not a substitute for a complete eye examination, but they provide information that is useful for planning care and identifying the need for further evaluation.

For accurate assessment of visual skills, place a light source above the person’s head to provide good lighting while avoiding shadows. If the person normally wears corrective lenses, make sure that they are clean and in place. Test each eye separately, using an appropriate eye cover; avoid using a hand as a cover.

Nurses can assess near acuity by asking the person to read a newspaper or other printed material of various type sizes. Another method is to ask the person to read a line or two of a form that needs to be signed and then observe the person’s ability to find the signature line. Nurses can create additional opportunities for assessing acuity by providing
Using the Snellen Chart to Assess Distance Acuity

- Position the chart 20 feet away from the person, at eye level.
- If space does not permit a 20-foot distance, the distance between the person and the chart should be either 15 or 10 feet, with final measurements adjusted for distance. Alternatively, a scaled-down Snellen card can be used, if available.
- If the person usually wears corrective lenses, test the corrected vision.
- Ask the person to start reciting the letters in the line that can be read most easily; then ask him or her to read as many letters as possible in the lines directly below that line.
- Document the findings for each eye by noting the figure at the end of the last line on which at least half of the letters were read correctly.
- The upper figure denotes the distance of the person from the chart, whereas the lower figure denotes the distance from the chart at which a person with normal vision would be able to read the line. (That is, a vision measurement of 20/50 indicates that the person being tested can see things at a distance of 20 feet that a person with normal vision would be able to see at a distance of 50 feet.)
- Normal Snellen chart test results for older adults are as follows:
  - A corrected vision of 20/20 is considered to be normal.
  - If a distance of 10 feet is used, the corrected vision should be 10/10.
  - The average corrected vision for older adults ranges from 20/20 to 20/50.

Performing the Confrontation Test to Assess Peripheral Vision

- Sit directly across from the older person, about 2 feet away.
- Cover your left eye and have the examinee cover his or her right eye.
- Instruct the examinee to focus on your right eye while you focus on the examinee’s left eye.
- Fully extend your right arm midway between you and the examinee.
- Slowly move your right hand, with the fingers wiggling, from the outer periphery toward the center, testing visual fields from top to bottom.
- While maintaining continuous eye contact, ask the examinee to report the point at which your fingers are visualized.
- Repeat these steps, covering your right eye and the examinee’s left eye and using your left arm.
- Normal confrontation test results for older adults: your wiggling fingers should be seen simultaneously by both you and the older person in all quadrants.
THINKING POINTS

• Which questions from Box 17-1 would you ask Mrs. F. at this time?
• What sort of information might you be able to glean from behavioral or environmental cues about Mrs. F’s ability to see (see Box 17-2)?
• Would assessing Mrs. F.’s vision using vision screening tests be appropriate (see Box 17-3)? If so, which tests would you perform?
• What health promotion education would you give Mrs. F. at this time?

NURSING DIAGNOSIS

Based on the nursing assessment, the nurse might identify an actual vision impairment or risk factors for impaired vision. An appropriate nursing diagnosis for an older adult with impaired vision would be Disturbed Sensory Perception: Visual. This is defined as a “state in which the individual/group experiences or is at risk of experiencing a change in the amount, pattern, or interpretation of incoming stimuli” (Carpenito-Moyet, 2006, p. 439). Related factors that commonly affect older adults include age-related vision changes (e.g., presbyopia), sensory organ alterations (e.g., glaucoma), and environmental factors (e.g., glare, dim lighting, or poor color contrast). The care plan at the end of this chapter is based on a nursing diagnosis of Disturbed Sensory Perception: Visual related to age-related changes, sensory organ alterations, and environmental factors. Other nursing diagnoses might be addressed if the visual impairment interferes with the older adult’s safety, quality of life, or performance of activities of daily living. Possible diagnoses to address these functional consequences include Anxiety, Ineffective Coping, Self-Care Deficit, Risk for Injury, Impaired Social Interaction, Readiness for Enhanced Coping, and Readiness for Enhanced Self-Care.

Wellness Opportunity

The wellness nursing diagnosis of Readiness for Enhanced Knowledge: Improved Vision would be applicable for older adults who are willing to explore interventions that improve their visual abilities.

PLANNING FOR WELLNESS OUTCOMES

When older adults experience vision impairments or have risk factors that affect visual functioning, nurses identify wellness outcomes as an essential part of the planning process. The Nursing Outcomes Classification (NOC) that most directly relates to interventions to improve vision for older adults is Vision Compensation Behavior, defined as “personal actions to compensate for visual impairment” (Johnson et al., 2006, p. 638). Another pertinent NOC is Sensory Function: Vision, defined as “extent to which visual images are correctly sensed” (Johnson et al., 2006, p. 636). In addition, nurses can use any of the following NOCs to describe the effectiveness of interventions to improve vision: Coping, Adaptation to Physical Disability, Self-Care: Activities of Daily Living, Stress Level, Knowledge: Personal Safety, Fall Prevention Behavior, and Risk Control: Visual Impairment. Specific interventions to achieve these outcomes are discussed in the following section.

Wellness Opportunity

Quality of Life is a wellness outcome that is achieved through nursing interventions that improve visual function.

Health promotion goals are long term and focus on maintaining vision at an optimal level. For example, one goal might be for an older adult to obtain evaluation of vision problems. Nurses in institutional settings address these goals through a discharge plan that includes information about local resources for further evaluation. Also, the discharge plan might include suggestions for obtaining educational materials from a local sight center or the resources listed at the end of this chapter.

NURSING INTERVENTIONS FOR VISUAL WELLNESS

Nurses promote visual wellness through interventions directed toward preventing vision loss, promoting comfort
measures for dry eyes, and implementing or teaching about methods to foster optimal visual function. Interventions to achieve these goals are discussed in detail in the following sections. The following pertinent Nursing Interventions Classification (NIC) terminology may be applicable to care plans: Communication Enhancement; Visual Deficit, Coping Enhancement, Eye Care, Environmental Management, Environmental Management: Safety, Health Education, Health Screening, Health System Guidance, Risk Identification, and Fall Prevention.

Health Promotion for Visual Wellness

Prevention strategies focus on health education about reducing or eliminating risk factors that can cause visual impairments (Box 17-4). Because prolonged exposure to ultraviolet light (especially UV-B) can lead to visual impairment, nurses should teach older adults about the importance of protecting their eyes from sunlight. Broad-brimmed hats and close-fitting sunglasses with UV-B–absorbing lenses have the long-range effect of protecting the eyes from harmful rays; they also have the immediate benefit of screening out sun glare that can interfere with visual function. Nurses can teach older adults, as well as their caregivers, about the benefits of these simple measures. Another modifiable risk factor for eye disease is smoking. People who have a diagnosis or family history of AMD should be taught about the relationship between smoking and AMD and encouraged to quit smoking. Strategies for encouraging older adults to quit smoking are discussed in Chapter 21. To reduce the risk for eye disease, people should be encouraged to include foods that are high in antioxidants in their daily diet. Box 17-4 provides additional details about nutritional considerations.

Because most eye diseases progress very slowly, disease prevention must also focus on regular vision examinations to detect the leading causes of visual impairment: cataracts, AMD, glaucoma, and diabetic retinopathy. Three objectives of Healthy People 2010 are directed toward the early detection of cataracts, glaucoma, and diabetic eye disease; this is the first time vision objectives have been included in Healthy People initiatives (USDHHS, 2000). Nurses play an important role in achieving these objectives when they educate older adults and their caregivers about the importance of early detection of glaucoma and about treatments available for cataracts, glaucoma, and other eye disorders.

**Box 17-4 Health Promotion Teaching About Vision**

Nurses can educate the older adult in the following areas:

**Prevention and Early Detection of Disease**
- The damaging effects of UV light and how to minimize exposure (broad-brimmed hats, close-fitting sunglasses with UV-absorbing lenses)
- The importance of annual eye examinations, including screening for glaucoma, cataracts, and retinal disease
- Eye care practitioners and what they do (see Box 17-5)
- The importance of managing diabetes and hypertension
- Smoking cessation
- The importance of timely evaluation of any changes in vision

**Nutritional Considerations**
- Include foods high in antioxidants (fruits and vegetables) and B-complex vitamins daily.
- Vitamins A, C, and E may have a protective role in preventing cataracts.
- People who have AMD may benefit from a daily supplement containing the following antioxidants and minerals: 500 mg vitamin C, 400 IU vitamin E, 15 mg beta-carotene, 80 mg zinc oxide, and 2 mg cupric oxide (copper).

**Compensating for Visual Impairments**
- Referrals for vision rehabilitation if appropriate
- Bright, nonglare lighting and environmental modifications (see Boxes 17-6 and 17-7)
- Low-vision aids (see Boxes 17-8 and 17-9)

It is recommended that people 35 years of age and older undergo biannual measurements of intraocular pressure to screen for glaucoma, and that people 65 years and older undergo such measurements annually. Annual dilated eye examinations are recommended for people with diabetes. Nurses can encourage older adults to take advantage of vision screening tests that might be available in the community through nonprofit organizations such as the Lions Club International. Even in the absence of disease conditions, annual eye examinations are important for identifying people who would benefit from changes in eyeglasses. Munoz and colleagues (2000) studied Americans between the ages of 65 and 84 years and found that one third of the subjects with impaired vision improved to an acuity of 20/40 with refraction. In this same study, more than half of the subjects with visual impairment or blindness had conditions that were treatable or potentially preventable with interventions.

In providing health education, it may be helpful to review the differences between opticians, optometrists, and ophthalmologists with the client (Box 17-5). Educational materials describing the scope of services of these eye care providers are distributed by some of the organizations listed in the Educational Resources section at the end of this chapter. The older adult may also benefit from the many educational brochures that are available on the subjects...
of eye diseases, common vision problems, age-related eye changes, and low-vision aids. Nurses can use these publications to supplement and reinforce the health education components of their care plans. Local sight centers, or the organizations listed in the Educational Resources section at the end of this chapter, provide these materials at little or no cost, and some brochures are available in Spanish and other languages. In addition, much of the information can be obtained and printed directly from these organizations' websites. The National Association for the Visually Handicapped (NA VH) is an excellent resource for information about interventions for older adults with visual impairments. In contrast to publications from organizations that focus primarily on blindness, materials from the NA VH are written more generally on blindness, materials from the NA VH are written
differently in their languages. In addition, much of the information can be obtained at the end of this chapter, provide these materials at little or no cost, and some brochures are available in Spanish and other languages. In addition, much of the information can be obtained and printed directly from these organizations' websites. The National Association for the Visually Handicapped (NA VH) is an excellent resource for information about interventions for older adults with visual impairments. In contrast to publications from organizations that focus primarily on blindness, materials from the NA VH are written differently in their languages. In addition, much of the information can be obtained and printed directly from these organizations’ websites. The National Association for the Visually Handicapped (NA VH) is an excellent resource for information about interventions for older adults with visual impairments. In contrast to publications from organizations that focus primarily on blindness, materials from the NA VH are written differently in their languages. In addition, much of the information can be obtained and printed directly from these organizations’ websites. The National Association for the Visually Handicapped (NA VH) is an excellent resource for information about interventions for older adults with visual impairments. In contrast to publications from organizations that focus primarily on blindness, materials from the NA VH are written differently in their languages. In addition, much of the information can be obtained and printed directly from these organizations’ websites. The National Association for the Visually Handicapped (NA VH) is an excellent resource for information about interventions for older adults with visual impairments. In contrast to publications from organizations that focus primarily on blindness, materials from the NA VH are written differently in their languages.
tion in retinal illumination, proper lighting is the single most important intervention that improves an older adult’s vision. Increased illumination is one of the easiest and least costly modifications that can be made in any setting (Box 17-6). Both the quality and quantity of light are important when providing illumination for optimal visual performance. For example, selection of broad-spectrum fluorescent lights and daylight-simulating lamps may be particularly beneficial in compensating for age-related vision changes.

Another important consideration in adapting the environment for optimal visual function is color contrast. Appliances and other items, such as ovens, irons, radios, thermostats, and televisions, may be difficult to use because of poor color contrast around the control mechanisms. Modifications can easily be made to improve the older person’s ability to use these items safely and accurately. For example, two dots of red nail polish can be used to mark a designated and commonly used temperature setting, and the older adult can be instructed to turn the dial above or below the matching dots for higher or lower settings.

Architectural designs and institutional constraints may limit the extent of environmental adaptations that nurses can implement, especially in institutional settings. In most settings, however, nurses can improve the visual abilities of older adults by using appropriate colors to enhance contrast, by using curtains to control light and glare, and by placing chairs in positions that enhance illumination and avoid glare. Nurses have many opportunities to teach older adults and their caregivers about the environmental modifications that are most effective for optimal visual function. Box 17-7 summarizes some environmental adaptations that can be used to compensate for deficits in visual skills and improve safety. All older adults can benefit from these environmental modifications, even in the absence of diagnosed eye disorders, because they are effective ways of improving vision for all people.

### Box 17-6
**Considerations for Optimal Illumination**

- Older adults need at least three times as much light as younger people do.
- Older adults function best in environments with bright, broad-spectrum, nonglaring, indirect sources of light.
- Place sources of illumination 1 to 2 feet away from the object to be viewed.
- Flickering light, such as that generated by a single fluorescent tube, will cause fatigue and decreased visual performance.
- Light bulbs should be kept clean.
- Replace light bulbs when they become dim, rather than waiting for them to burn out.
- The amount of light decreases fourfold when the distance is doubled.
- Increased illumination has a greater positive effect on impaired vision than it does on normal vision.
- A gradual decrease in illumination from foreground to background is better than sharp contrasts in lighting.
- Moderate overhead lighting can be used to enhance brighter foreground lighting and prevent sharp contrasts.
- To reduce glare from reading material, place the light source to the left side of right-handed readers and to the right side of left-handed readers.
- Avoid glossy paper for reading materials.

### Box 17-7
**Environmental Adaptations for Improving Visual Performance**

**Illumination, Glare Control, and Dark/Light Adaptation**

- Position a 60- or 75-watt soft-white light bulb above and close to the head of the older person.
- Use a clear plastic shower curtain, rather than solid colors or printed curtains, for the tub or shower.
- Use light-colored, sheer curtains to eliminate glare from windows.
- Place nightlights in hallways and bathrooms, or keep a high-intensity flashlight at the bedside.
- Use illuminated light switches.
- Provide good lighting in stairways and hallways.
- Use illuminated or magnified mirrors.

**Color Contrast**

- Use brightly colored tape or paint on the edges of stairs, especially on the top and bottom steps.
- Use light-colored and dark-colored cutting boards to contrast with dark and light foods.
- Use contrasting, rather than matching, colors for china, placemats, and napkins.
- Use a toilet seat that contrasts with the bathroom walls and floor. Use colored bars of soap on white sinks and tubs.
- Use utensils with brightly colored handles.

- Place pillows of contrasting colors on stuffed furniture.
- Use decorative or lighted plates over light switches and wall sockets; avoid light switch plates that blend in with the wallpaper or paint.
- Place decorative items of contrasting colors, such as plants and ceramics, on tables to provide clues to depth, especially on light-colored furniture that is in a room with light-colored walls.
- Use brightly colored grooming utensils, such as combs, brushes, and razors.
- Use pens with black ink rather than blue ink.

**General Adaptive Measures and Environmental Modifications**

- Do not rearrange furniture without informing or showing the older person.
- Advise older adults to pause in doorways when going from light to dark rooms (or vice versa) to allow time for their eyes to adjust to the light change.
- Teach older people to use their feet and hands as probes to feel for curbs, steps, edges of chairs, and the like.
- When walking with an older person, stop when necessary to allow a change in focus from near to far and from light to dark.
Low-Vision Aids

People with visual impairments can improve their safety and quality of life through the use of low-vision aids that improve focus, contrast, magnification, or illumination (Box 17-8). Low-vision aids are most beneficial when used in conjunction with environmental modifications. For example, magnifiers are most effective when combined with measures that improve illumination and control glare. Reading glasses and other optical aids that magnify an image for visual tasks are available with or without a prescription. Nonoptical aids are devices that enhance contrast, reduce glare, improve lighting, or enlarge the image. Printed and Internet catalogues with illustrations of low-vision aids are available through many organizations (see the Educational Resources section). Also, local sight centers are good sources of low-vision aids, as well as training related to their use.

Although special low-vision aids must be ordered through catalogues or obtained at sight centers, everyday items, if used advantageously, can serve as low-vision aids. An example of a low-vision aid that may be available to nurses is a photocopy machine that can be used to convert regular-print materials into large-print materials. Likewise, household lamps, placed in the correct position and equipped with the right wattage bulb, can also serve as low-vision aids. Light-house International (listed in the Educational Resources section) provides educational materials that illustrate examples of effective color contrast and effective ways of making text legible. These free materials, which can be obtained through the mail or from the Internet, can be used as guides for developing more readable printed materials for signage, health education, and other purposes.

Nurses can teach about the appropriate use of low-vision aids so the most effective outcomes are achieved. For example, if people understand that halving the distance of a light source increases illumination by fourfold, they are more likely to place lights in the most effective positions. As an illustration of this principle, a light bulb that is 1 foot away from someone will provide four times as much illumination as one that is 2 feet away. Nurses can use Boxes 17-6 and 17-9 to teach about effective use of lights and magnification. Local sight centers provide detailed training in the use of low-vision aids, and the NA VH publishes a helpful guide regarding their use.

Healthy People 2010 objective 28-10 is to “increase the use of vision rehabilitation services and adaptive devices by people with visual impairments” (USDHHS, 2000).

Wellness Opportunity

Nurses help meet objectives of Healthy People 2010 by facilitating referrals to local vision rehabilitation services and encouraging older adults and their families to use these resources.

Maintaining and Improving Quality of Life

As discussed earlier, the psychosocial consequences of impaired vision can be quite significant for older adults.
Many of the interventions that help older adults compensate for visual deficits and function at their highest level also will improve their quality of life and address the psychosocial consequences of impaired vision. For example, the use of appropriate reading glasses and good environmental lighting may enable the older adult to read books, newspapers, and magazines. Subsequently, their quality of life may improve because they experience satisfying social interactions and increased intellectual stimulation. Nurses also encourage participation in support and educational groups because these interventions serve an important role in improving quality of life for people with significant or progressive vision loss.

Mrs. F. is now 81 years old. She had cataract surgery and an intraocular lens implant in her left eye when she was 76 years old, and in her right eye when she was 77. Her vision was good until a year ago, when she developed macular degeneration. She knows this condition will be progressive, but she continues to drive and live alone. Her current medical conditions are arthritis, hypertension, and coronary artery disease. She quit smoking several years ago after she was hospitalized for coronary artery disease. You are the nurse at the senior center where Mrs. F. comes for lunch several times a week. During an appointment with you, Mrs. F. confides that she is terrified of becoming totally blind and of losing her independence. Her grandmother went blind several years before she died and she had to go to a long-term care facility.

THINKING POINTS

- Which nursing diagnosis or diagnoses would you apply to Mrs. F. at this time?
- Which information in Boxes 17-4 through 17-9 might be appropriate for Mrs. F.?
- What health promotion advice would you give?
- Would you suggest any referrals for information or community resources?
- What interventions would address Mrs. F.'s fear of becoming blind and losing her independence?

EVALUATING EFFECTIVENESS OF NURSING INTERVENTIONS

Nurses observe compensatory behaviors of visually impaired older adults to evaluate the effectiveness of interventions for Disturbed Sensory Perception: Visual. The following are indicators of successful interventions:

- Use of corrective lenses and low-vision aids to achieve best possible visual function
- Adaptations of the environment for safety and improved visual function (e.g., bright, nonglare lighting, good color contrast)
- Expressed feelings of safety in relation to visual function
- Maximum independence in activities such as dressing, personal care, using appliances, and managing medications
- Expressed feelings of minimal negative impact on quality of life.

Nurses evaluate the effectiveness of interventions to improve independence by assessing and reassessing the older adult’s abilities before and after interventions. When interventions address the psychosocial impact of visual impairment, nurses observe the extent to which the person’s quality of life and ability to participate in enjoyable activities is improved. For example, better lighting and the use of a large-print Reader’s Digest may enable someone to enjoy reading again.

Nurses evaluate the effectiveness of health education interventions according to the person’s expressed intent to follow through with the recommended referral or course of action. In home, community, and long-term care settings, nurses may be able to facilitate referrals for vision screening or other vision care services. In these settings, nurses evaluate the effectiveness of interventions based on feedback from the older adults or their caregivers about the actual use of suggested resources.

Mrs. F. is now 86 years old and is recovering from a recent fractured hip, which occurred when she fell while getting out of bed to go to the bathroom at night. After a brief hospitalization for surgical repair of the fractured hip and a 2-week period of skilled rehabilitation, Mrs. F. was referred to a home care agency for therapy, assessment, monitoring of her medical status, and evaluation of her ability to manage at home.

In addition to AMD, Mrs. F.’s current medical diagnoses include arthritis, hypertension, coronary artery disease, and congestive heart failure. Mrs. F.’s medical conditions had been stable for several years, but during her hospitalization for the fractured hip she was started on oxygen and her medications were changed. Current medications are furosemide, 40 mg daily; digoxin, 0.125 mg daily; and enalapril, 10 mg twice daily. A 2-g sodium diet has been prescribed, and she has been discharged with an order for oxygen per nasal cannula at a rate of 2 L/minute as needed.

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Before her accident, despite the visual limitations from macular degeneration, Mrs. F. had lived alone in her own home, but her daughter has become increasingly concerned about her mother’s safety. Now Mrs. F.’s daughter is convinced that her mother should not remain in her own home but should instead move to an assisted-living facility. Mrs. F. is adamant in her desire to stay in her own home and says the only reason she fell and broke her hip was because she was rushing to get to the bathroom. She says she has learned a lesson and will not hurry when she gets up at night. Furthermore, she says, she gave up driving to satisfy her daughter last year—now she’s to give up her home, too? Mrs. F.’s daughter is staying with her mother for a couple of weeks until her mother regains her mobility to the point of independence. The daughter hopes that in the interim, she will be able to convince her mother to move to an assisted-living facility. You are the home care nurse working with Mrs. F. in her home.

**NURSING ASSESSMENT**

During your initial nursing assessment, you determine that Mrs. F. is motivated to regain her mobility and manage her medical conditions, but she has difficulty reading small-print instructions because of poor vision. When you review Mrs. F.’s medications with her, you observe that she cannot read the labels on the bottles. You also observe that Mrs. F. keeps her medications on the shelf above the kitchen counter, where the lighting is very dim. When you review the proper use of the oxygen, you note that she has difficulty seeing the markings on the flowmeter. Her daughter has been helping her with these regimens, but Mrs. F. hopes to perform these activities independently so she can remain in her own home.

Mrs. F. tells you that she is not concerned about falling because she walks slowly and carefully when she gets up during the night to go to the bathroom. She now uses a walker and says she feels safe. Her daughter expresses concern about her mother managing the oxygen and the walker when going to the bathroom. Mrs. F. uses the oxygen when she sleeps and her daughter is skeptical about her ability to get to the bathroom without rushing.

You observe that the hallway between the bedroom and bathroom is dark, and that the bedroom has an overhead light, but no bedside lamp. The bathroom has a narrow doorway and the toilet is at the other side of the sink. You assess the home for safety and determine that the pathways are clear and there is good lighting on the stairway and in the living areas. You identify no additional risks (e.g., throw rugs) to Mrs. F.’s safe mobility, but you do have concerns about Mrs. F.’s ability to navigate safely to the toilet with a walker.

When questioned about her vision problems, Mrs. F. gives her history of successful cataract surgery and a diagnosis of AMD at the age of 80 years. She sees her ophthalmologist every year, and he has told her that her vision will get worse and that nothing can be done about it. He had mentioned that the local sight center provides some rehabilitation services for people with low vision but he told her that those services are mostly for “younger blind people.” Also, she is concerned that the sight center will suggest she purchase items that cost a lot of money, which she wouldn’t be able to afford anyway. She says her daughter got her a subscription for the large-print *Reader’s Digest*, which she enjoys, and that she’s not interested in reading the newspaper because she watches the news on television. She has an appointment to see her eye doctor next month.

**NURSING DIAGNOSIS**

In addition to the nursing diagnoses related to Mrs. F.’s medical condition, you identify a nursing diagnosis of Disturbed Sensory Perception: Visual, related to age-related changes, sensory organ alterations, and environmental factors. Supporting evidence for this diagnosis can be found in Mrs. F.’s inability to read labels, instructions, or the flowmeter markings, and the environmental factors that contribute to unsafe mobility. The nursing

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diagnoses of Anxiety, Self-Care Deficit, and Risk for Injury might also be applicable. The diagnosis of Disturbed Sensory Perception: Visual, however, addresses the source of Mrs. F’s anxiety, risk for injury, and inability to perform her instrumental activities of daily living, and therefore is probably the most comprehensive diagnosis. Also, this diagnosis prompts you to include a long-term goal of encouraging further evaluation and management of the visual impairments.

### NURSING CARE PLAN FOR MRS. F.

<table>
<thead>
<tr>
<th>Expected Outcome</th>
<th>Nursing Interventions</th>
<th>Nursing Evaluation</th>
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| Mrs. F. will manage her medication regimen accurately and independently. | • Print simplified medication instructions on large index cards using black felt-tip marker.  
• Use colored dots to match pill bottles with instruction cards.  
• Establish a medication management system using pill organizer boxes with markings that are bold and have good color contrast.  
• Teach Mrs. F. how to fill the pill boxes weekly, using the index cards you prepared for her.  
• Suggest that Mrs. F. fill the pill boxes at the kitchen table during daylight hours while using overhead light. | • Mrs. F. will demonstrate that she can accurately fill the pill boxes.  
• Mrs. F. will take her medications correctly.  
• Mrs. F.’s daughter will observe that her mother follows the prescribed regimen. |
| Mrs. F. will self-administer oxygen as needed. | • Use a copy machine to enlarge the small-print instructions for the oxygen equipment.  
• Place a colored dot at the 2-L mark on the flowmeter.  
• Keep the oxygen tank in a well-lit location and suggest using a flashlight to help illuminate the flowmeter setting. | • Mrs. F. will demonstrate the safe and independent operation of the oxygen equipment.  
• Mrs. F.’s daughter will observe that her mother administers her oxygen correctly. |
| Mrs. F. will be able to use a commode safely and independently. | • Ask Mrs. F. to use a bedside commode during the night; emphasize the importance of preventing another fall.  
• Work with physical and occupational therapists to (1) evaluate the feasibility of installing grab bars or other devices that will assist Mrs. F. in safely using the toilet; (2) identify a safe way for Mrs. F. to use the bathroom during the daytime; (3) teach Mrs. F. to transfer between the bed and commode for nighttime use; (4) teach her to empty the bedside commode.  
• Place a lamp on the nightstand and make sure that Mrs. F. can turn it on easily while in bed. Teach Mrs. F. to turn the bedside lamp on and sit at the edge of the bed for a few minutes before getting up at night. | • Mrs. F. will demonstrate that she safely uses the bathroom during the day and a bedside commode at night.  
• Mrs. F. will be able to empty the commode independently.  
• Mrs. F. will have no further falls in the bathroom. |
| Mrs. F. will compensate as much as possible for her progressive visual loss. | • Educate Mrs. F. and her daughter about the services provided at the local sight center for people with low vision; emphasize that these services address the needs of older adults and people with recent and progressive visual loss. The services are for anyone with low vision, and there are many low-vision aids available to improve the visual function of people with macular degeneration.  
• Suggest that Mrs. F. ask her eye doctor for a referral to the sight center when she sees him next month.  
• Include Mrs. F.’s daughter in the discussion about these services, and ask her to assist with following through once a referral is obtained. | • Mrs. F. will make and keep an appointment for an initial evaluation at the sight center.  
• Mrs. F. will use low-vision aids to improve visual function. |

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CHAPTER HIGHLIGHTS

Age-Related Changes That Affect Vision (Table 17-1)
- Changes in appearance include arcus senilis, loss of orbital fat, diminished elasticity of eyelid muscles
- Diminished tear production
- Degenerative changes affect all structures of the eye, the retinal–neural pathway, and the visual cortex of the brain

Effects of Age-Related Changes on Vision
- Diminished ability to focus clearly on objects at various distances
- Diminished ability to detect details and discern objects
- Slower adaptive response to changes in lighting
- Increased sensitivity to glare
- Narrowed visual field
- Diminished depth perception
- Altered color perception so objects look darker and whites appear more yellowed
- Diminished ability to perceive flashing lights
- Slower processing of visual information

Risks Factors That Affect Visual Wellness
- Environmental factors: glare, sunlight, poor lighting, low humidity
- Lifestyle factors: poor nutrition, cigarette smoking
- Chronic conditions: diabetes, hypertension, Alzheimer’s or Parkinson’s disease
- Adverse medication effects: estrogen, corticosteroids, anticholinergics, beta-blockers, antiparkinson agents

Pathologic Conditions Affecting Vision (Figs. 17-2 and 17-3, Table 17-2)
- Cataracts
- AMD
- Glaucoma

Functional Consequences Affecting Visual Wellness
- Presbyopia (diminished ability to focus on near objects)
- Need for three to five times more light than previously
- Difficulty with night driving
- Increased risk for unsafe mobility
- Increased difficulty in performing usual activities

Nursing Assessment of Vision (Fig. 17-4, Boxes 17-1 through 17-3)
- Vision screening tests
- Risk factors that affect vision

- Influence of vision changes on performance of activities of daily living
- Attitudes about eye examinations and preventive measures
- Attitudes regarding use of low-vision aids

Nursing Diagnosis
- Readiness for Enhanced Knowledge: Improved Vision
- Disturbed Sensory Perception: Visual
- Additional diagnoses that address the functional consequences of visual impairment include: Anxiety, Ineffective Coping, Self-Care Deficit, Risk for Injury, Impaired Social Interaction, Readiness for Enhanced Coping, and Readiness for Enhanced Self-Care

Planning for Wellness Outcomes
- Improved visual function
- Increased safety
- Improved independence in activities of daily living
- Improved quality of life

Nursing Interventions for Visual Wellness (Boxes 17-4 through 17-9)
- Prevention and detection of eye disease
- Comfort measures for dry eyes
- Environmental modifications (e.g., optimal illumination)
- Low-vision aids

Evaluating Effectiveness of Nursing Interventions
- Use of corrective lenses and other aids that improve vision
- Environmental adaptations for optimal safety and visual function
- Improved independence in daily activities
- Expressed feelings of improved quality of life in relation to visual function

CRITICAL THINKING EXERCISES

1. Describe presbyopia and explain the functional consequences of this condition in the everyday life of an older adult.
2. What environmental factors are likely to interfere with the visual function of older adults?
3. Describe the specific effects of glaucoma, cataracts, or AMD on one’s ability to see a television program.
4. How would you assess the visual abilities of an older adult?
5. Explain the differences between opticians, optometrists, and ophthalmologists.
6. List at least 10 adaptations that might be implemented to improve the visual function of older adults.

Educational Resources

American Academy of Ophthalmology
www.eyenet.org
American Foundation for the Blind
www.afb.org
American Optometric Association
www.aoanet.org
Canadian National Institute for the Blind
www.cnib.ca
The Glaucoma Foundation
www.glaucoma-foundation.org
Lighthouse International
www.lighthouse.org
Lions Clubs International
www.lionsclubs.org
National Association for Visually Handicapped (NAVH)
www.navh.org
National Eye Institute (NEI)
www.nei.nih.gov
Prevent Blindness America
www.preventblindness.org

References


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