

Otic and Ophthalmic Preparations

Key Terms

| | |
|-----------------------------|-----------------------|
| <i>cycloplegia</i> | <i>mydriatic</i> |
| <i>intraocular pressure</i> | <i>myopia</i> |
| <i>miosis</i> | <i>ophthalmic</i> |
| <i>miotic</i> | <i>otic</i> |
| <i>mydriasis</i> | <i>superinfection</i> |

Chapter Objectives

On completion of this chapter, the student will:

- Discuss the general actions, uses, adverse reactions, contraindications, precautions, and interactions of otic and ophthalmic preparations.
- Discuss important preadministration and ongoing assessment activities the nurse should perform on a patient receiving otic and ophthalmic preparations.
- List some nursing diagnoses particular to a patient taking an otic or ophthalmic preparation.
- Discuss ways to promote an optimal response to therapy, how to administer the preparations, and important points to keep in mind when educating patients about the use of otic or ophthalmic preparations.

The eyes and ears are subject to various disorders, which range from mild to serious. Because the eyes and ears provide an interpretation of our outside environment, any disease or injury that has the potential for partial or total loss of function of these organs must be treated.

OTIC PREPARATIONS

ACTIONS

Various types of preparations are used for the treatment of **otic** (ear) disorders. Otic preparations can be divided into three categories: (1) antibiotics; (2) antibiotic and steroid combinations; and (3) miscellaneous preparations. The miscellaneous preparations usually contain one or more of the following ingredients:

- Benzocaine—a local anesthetic
- Phenylephrine—a vasoconstrictor decongestant
- Hydrocortisone, desonide—corticosteroids for anti-inflammatory and antipruritic effects
- Glycerin—an emollient and a solvent
- Antipyrine—an analgesic

- Acetic acid, boric acid, benzalkonium chloride, aluminum acetate, benzethonium chloride—provide antifungal or antibacterial action
- Carbamide peroxide—aids in removing earwax by softening and breaking up the wax

Examples of otic preparations are given in the Summary Drug Table: Otic Preparations.

USES

Otic preparations are instilled in the external auditory canal and may be used to relieve pain, treat infection and inflammation, and aid in the removal of earwax. When the patient has an inner ear infection, systemic antibiotic therapy is indicated.

ADVERSE REACTIONS

When otic drugs are applied topically, the amount of drug that enters the systemic circulation is not sufficient to produce adverse reactions. Prolonged use of otic

SUMMARY DRUG TABLE OTIC PREPARATIONS

| GENERIC COMBINATIONS | TRADE NAME* | USES | ADVERSE REACTIONS | DOSAGE RANGES |
|--|--|---|---|---|
| <i>Steroid and Antibiotic Combinations, Solutions</i> | | | | |
| 1% hydrocortisone, 5 mg neomycin sulfate, 10,000 units polymyxin B | Antibiotic Ear Solution, Antibiotic, Cortisporin Otic, Drotic, Ear-Eze, Otic-Care, Oticair, Otocort, Otosporin | Bacterial infections of the external auditory canal | Few; when used for prolonged periods there is a danger of a superinfection | 4 gtt instilled TID, QID |
| 0.5% hydrocortisone, 10,000 units polymyxin B | Otobiotic Otic | Same as hydrocortisone, above | Same as hydrocortisone, above | 4 gtt instilled TID, QID |
| <i>Steroid and Antibiotic Combinations, Suspensions</i> | | | | |
| 1% hydrocortisone, 5 mg neomycin sulfate, 10,000 units polymyxin B | AK-Spore, Antibiotic, Antibiotic Ear Suspension, Otocort, UAD Otic | Same as hydrocortisone, above | Same as hydrocortisone, above | 4 gtt instilled TID, QID |
| 1% hydrocortisone, 4.71 mg neomycin sulfate | Coly-Mycin S Otic | Same as hydrocortisone, above | Same as hydrocortisone, above | 4 gtt instilled TID, QID |
| 1% hydrocortisone, 3.3 mg neomycin sulfate | Cortisporin-TC Otic | Same as hydrocortisone, above | Same as hydrocortisone, above | 4 gtt instilled TID, QID |
| 2 mg ciprofloxacin, 10 mg hydrocortisone/mL | Cipro HC Otic | Same as hydrocortisone, above | Same as hydrocortisone, above | 4 gtt instilled TID, QID |
| <i>Otic Antibiotics</i> | | | | |
| Chloramphenicol | Chloromycetin Otic | Treatment of superficial infections involving the external auditory canal | Local irritation (itching, burning, angioneurotic edema, urticaria, vesicular and maculopapular dermatitis) | 2–3 gtt into the ear TID |
| <i>Select Miscellaneous Preparations</i> | | | | |
| 1% hydrocortisone, 2% acetic acid, 3% propylene glycol diacetate, 0.015% sodium acetate, 0.02% benzethonium chloride | Acetasol HC, VoSol HC Otic | Relieve pain, inflammation, and irritation in the external auditory canal | Local irritation, itching, burning | Insert wick, use 3–5 gtt q4–6h × 24 h; remove wick, instill 5 gtt TID, QID |
| 1% hydrocortisone, 1% pramoxine HCl, 0.1% chloroxylenol, 3% propylene glycol diacetate and benzalkonium chloride | Cortic | Same as hydrocortisone, above | Same as hydrocortisone, above | Insert saturated wick into the ear; leave in for 24 h, keeping moist with 3–5 gtt q4–6h; remove wick and instill 5 gtt TID, QID |

(continued)

SUMMARY DRUG TABLE OTIC PREPARATIONS (Continued)

| GENERIC COMBINATIONS | TRADE NAME* | USES | ADVERSE REACTIONS | DOSAGE RANGES |
|--|--|--|------------------------------------|---|
| 1% hydrocortisone, 2% acetic acid glacial, 3% propylene glycol diacetate, 0.02% benzethonium Cl, 0.015% sodium acetate, 0.2% citric acid | AA-HC Otic | Same as hydrocortisone, above | Same as hydrocortisone, above | Insert saturated wick into the ear; leave in for 24 h, keeping moist with 3–5 gtt q4–6h; remove wick and instill 5 gtt TID, QID |
| 1.4% benzocaine, 5.4% antipyrine glycerin | Allergen Ear Drops, Auralgan Otic, Auroto Otic, Ear Drops, Otocalm Ear | Same as hydrocortisone, above | Same as hydrocortisone, above | Fill ear canal with 2–4 gtt; insert saturated cotton pledget; repeat TID, QID or q1–2h |
| 20% benzocaine, 0.1% benzethonium chloride, 1% glycerin, PEG 300 | Americaine Otic, Otcain | Same as hydrocortisone, above | Same as hydrocortisone, above | Instill 4–5 gtt; insert cotton pledget; repeat every 1–2h |
| 10% triethanolamine polypeptide oleate-condensate, 0.5% chlorobutanol in propylene glycol | Cerumenex Drops | Aid in the removal of ear wax | Local irritation, itching, burning | Fill ear canal, insert cotton plug, allow to remain 15–30 min; flush ear |
| 1 mg chloroxylenol, 10 mg hydrocortisone, 10 mg/mL pramoxine HCl | Otomar-HC | Relieve pain and irritation in the external auditory canal | Local irritation, itching, burning | Instill 5 gtt into affected ear TID, QID |
| 2% acetic acid in aluminum acetate solution | Burow's Otic, Otic Domeboro, <i>generic</i> | Relieve pain and irritation in the external auditory canal | Local irritation, itching, burning | Insert saturated wick; keep moist for 24 h; instill 4–6 gtt every 2–3 h |

*The term *generic* indicates the drug is available in generic form.

preparations containing an antibiotic may result in a **superinfection** (an overgrowth of bacterial or fungal microorganisms not affected by the antibiotic being administered).

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

These drugs are contraindicated in patients with a known hypersensitivity to the drugs. The otic drugs are used with caution during pregnancy and lactation. The pregnancy category of these drugs is unknown when they are used as otic drugs. Otic drugs available in drop-per bottles may be dangerous if ingested by young children. Therefore, the drugs are stored safely out of the reach of children. Drugs to remove cerumen are not used if ear drainage, discharge, pain, or irritation is present; if the eardrum is perforated; or after ear surgery. Although rare, bone marrow hypoplasia including

aplastic anemia has been reported with local application of chloramphenicol. No significant interactions have been reported with use of the otic preparations.

NURSING PROCESS

● The Patient Receiving an Otic Preparation

ASSESSMENT

Preadministration Assessment

Before administration of an otic preparation, the primary health care provider examines the ear and external structures surrounding the ear and prescribes the drug indicated to treat the disorder. The nurse may be responsible for examining the outer structures of the ear, namely the earlobe and the skin around the ear. The nurse documents a description of any drainage or the presence of impacted cerumen.

Nursing Diagnoses Checklist

- ✓ **Risk for Infection** related to prolonged use of the anti-infective otic drug
- ✓ **Anxiety** related to ear pain or discomfort, changes in hearing, diagnosis, other factors
- ✓ **Risk for Ineffective Therapeutic Regimen Management** related to lack of knowledge of correct technique for instilling ear drug, therapeutic regimen

Ongoing Assessment

The nurse assesses the patient's response to therapy. For example, a decrease in pain or inflammation should occur. The nurse examines the outer ear and ear canal for any local redness or irritation that may indicate sensitivity to the drug.

NURSING DIAGNOSES

Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses applicable to these drugs are discussed in depth in Chapter 4.

PLANNING

The expected outcomes of the patient may include an optimal response to the drug, a reduction in anxiety, and an understanding of the application and use of an otic preparation.

IMPLEMENTATION

Promoting an Optimal Response to Therapy

Before instillation of otic preparations, the nurse holds the container in the hand for a few minutes to warm it to body temperature. Cold and warm (above body temperature) preparations may cause dizziness or other sensations after being instilled into the ear.

Nursing Alert

Only preparations labeled as otic are instilled in the ear. The nurse must check the label of the preparation carefully for the name of the drug and a statement indicating that the preparation is for otic use.

Special instructions for specific ear preparations are found in the Summary Drug Table: Otic Preparations. When instilling ear drops, the nurse has the patient lie on his or her side with the ear toward the ceiling. If the patient wishes to remain in an upright position, the head is tilted toward the untreated side with the ear toward the ceiling (Fig. 57-1). In the adult, the earlobe is pulled up and back. In children, the earlobe is pulled down and back. The nurse instills the prescribed number of drops into the ear canal. If the primary health



FIGURE 57-1. Instilling ear drops. With the head turned toward the unaffected side, the nurse pulls the cartilaginous portion of the outer ear (pinna) up and back in the adult pictured and instills the prescribed number of drops on the side of the auditory canal.

care provider has not ordered a soft cotton plug to be placed in the opening of the external ear canal, the patient is kept lying on the untreated side for 2 to 3 minutes. Once the patient is upright, the solution running out of the ear may be gently removed with gauze.

Drugs that loosen cerumen work by softening the dried earwax inside the ear canal. Cerumenex is available by prescription and is not allowed to stay in the ear canal more than 30 minutes before irrigation. When Cerumenex is administered, the ear canal is filled with the solution and a cotton plug is inserted. The drug is allowed to remain in the ear for 15 to 30 minutes, and then the ear is flushed with warm water using a soft rubber bulb ear syringe.

Managing Anxiety

Ear disorders may result in symptoms such as pain, a feeling of fullness in the ear, tinnitus, dizziness, or a change in hearing. Patients with an ear disorder or injury usually have great concern over the effect the problem will have on their hearing. The nurse reassures the patient that every effort is being made to treat the disorder and relieve the symptoms. Before instilling an otic solution, the nurse informs the patient that a feeling of fullness may be felt in the ear and that hearing in the treated ear may be impaired while the solution remains in the ear canal.

Educating the Patient and Family

The nurse gives the patient or a family member instructions or a demonstration of the instillation technique of an otic preparation. The following information may be given to the patient when an ear ointment or solution is prescribed:

- Wash the hands thoroughly before cleansing the area around the ear (when necessary) and instilling ear drops or ointment.

- Instill the prescribed number of drops or amount of ointment in the ear. Do not put the applicator or dropper tip in the ear.
- Immediately after use, replace the cap or dropper and refrigerate the solution if so stated on the label.
- If the drops are in a suspension form, shake well for 10 seconds before using.
- Keep the head tilted or lie on the untreated side for 2 to 3 minutes to allow the solution to remain in contact with the ear. Excess solution and solution running out of the ear can be wiped off with a tissue.
- Do not insert anything into the ear canal before or after applying the prescribed drug unless advised to do so by the primary health care provider. At times a soft cotton plug may be inserted into the affected ear.
- Complete a full course of treatment with the prescribed drug to achieve satisfactory results.
- Do not use nonprescription ear products during or after treatment unless such use has been approved by the primary health care provider.
- Temporary changes in hearing or a feeling of fullness in the ear may occur for a short time after the drug has been instilled.
- Notify the primary health care provider if symptoms do not improve or become worse.

DRUGS USED TO REMOVE CERUMEN

- Do not use if ear drainage, discharge, pain, or irritation occurs.
- Do not use for more than 4 days. If excessive cerumen remains, consult the primary health care provider.
- Any wax remaining after the treatment may be removed by gently flushing the ear with warm water using a soft rubber bulb ear syringe.
- If you become dizzy, consult a physician.

EVALUATION

- The therapeutic effect is achieved.
- Anxiety is reduced.
- The patient demonstrates the ability to instill an otic preparation in the ear.
- The patient verbalizes knowledge of and the importance of the therapeutic regimen.
- The patient and family demonstrate an understanding of the drug regimen.

OPHTHALMIC PREPARATIONS

Various types of preparations are used for the treatment of **ophthalmic** (eye) disorders such as glaucoma to lower the intraocular pressure (IOP), bacteria or viral infections of the eye, inflammatory conditions, and symptoms of allergy related to the eye.

DISPLAY 57-1 ● Glaucoma

The eye's lens, iris, and cornea are continuously bathed and nourished by a fluid called aqueous humor. As aqueous humor is produced, excess fluid normally flows out through a complex network of tissue called trabecular meshwork. An angle is formed where the trabeculum and iris meet. This forms a filtration angle that maintains the normal pressure within the eye by allowing excess aqueous humor to leave the anterior chamber of the eye. In chronic or open-angle glaucoma, the angle that permits the drainage of aqueous humor appears to be normal but does not function properly. In angle-closure glaucoma, the iris blocks the trabecular meshwork and limits the flow of aqueous humor from the anterior chamber of the eye. This limitation of outflow causes an accumulation of intraocular fluid, followed by increased IOP. Some individuals have an anatomical defect that causes the angle to be more narrow than normal, but do not have any symptoms and do not develop glaucoma under normal circumstances. However, certain situations, such as medication that causes dilation of the eye, fear, or pain, that cause the eye to dilate may precipitate an attack. The aim of treatment in glaucoma is to lower the IOP. For more information on glaucoma, see Chapter 24.

Glaucoma is a condition of the eye in which there is an increase in the IOP, causing progressive atrophy of the optic nerve with deterioration of vision and, if untreated, blindness. The higher the IOP, the greater the risk of optic nerve damage, visual loss, and blindness. There are two types of glaucoma: angle-closure glaucoma and open-angle, or chronic, glaucoma. Display 57-1 describes the two types of glaucoma.

Most of the drug classifications used to treat ophthalmic conditions have been discussed in previous chapters. The following sections provide a short summary of these classifications and their implications in ophthalmic use. When appropriate the student is referred to the specific chapter where additional information can be found. The Summary Drug Table: Select Ophthalmic Preparations provides examples of the drugs used to treat ophthalmic problems.

The incidence of adverse reactions associated with the ophthalmic drugs is usually small. Because small amounts of the ophthalmic preparation may be absorbed systemically, some of the adverse effects associated with systemic administration of the particular drug may be observed. Some ophthalmic preparations produce momentary stinging or burning on instillation.

ACTIONS AND USES

Alpha₂ Adrenergic Drugs

Brimonidine tartrate is an alpha₂-adrenergic receptor agonist used to lower IOP in patients with open-angle glaucoma or ocular hypertension. This drug acts to reduce aqueous humor production and increase the outflow of aqueous humor.

SUMMARY DRUG TABLE SELECT OPHTHALMIC PREPARATIONS

| GENERIC NAME | TRADE NAME* | USES | DOSAGE RANGES |
|--|---|---|--|
| Alpha₂ Adrenergic Agonist | | | |
| brimonidine tartrate <i>brih-moe'-nih-deen</i> | Alphagan | Lowering intraocular pressure (IOP) | 1 gtt in affected eye(s) TID |
| Sympathomimetics | | | |
| apraclonidine HCl <i>app-rah-kloe'-nih-deen</i> | Iopidine | 1% solution: control or prevention of postoperative elevations in IOP 5% solution: short-term therapy in patients receiving maximal medical therapy who require additional IOP reduction | 1% solution: 1 gtt in operative eye 1 h before surgery and 1 gtt immediately after surgery 5% solution: 1–2 gtt in the affected eye(s) TID |
| dipivefrin HCl (dipivalyl epinephrine) <i>die-pihv'-eh-frin</i> | Propine, AKPro, <i>generic</i> | IOP | 1 gtt into affected eye(s) every 12 h |
| epinephrine <i>epp-ih-neff-rin</i> | Epifrin, Glaucon Solution, <i>generic</i> | Open-angle (chronic simple glaucoma); may be used in combination with miotics, beta blockers, or carbonic anhydrase inhibitors | 1 drop into affected eye(s) QD, BID |
| Alpha-Adrenergic Blocking Drugs | | | |
| dapiprazole HCl <i>dap-ih-pray'-zole</i> | Rev-Eyes | After ophthalmic examination to reverse the diagnostic mydriasis | 2 gtt into the conjunctiva of each eye, followed 5 min later by an additional 2 gtt |
| Beta-Adrenergic Blocking Drugs | | | |
| betaxolol <i>bay-tax'-oh-lahl</i> | Betoptic, Betoptic S, <i>generic</i> | Elevated IOP | 1–2 gtt in the affected eye(s) BID |
| carteolol HCl <i>car'-tee-oh-lahl</i> | Ocupress, <i>generic</i> | Elevated IOP | 1 gtt in affected TID |
| levobetaxolol HCl <i>lee'-voe-beh-tax'-oh-lahl</i> | Betaxon | Elevated IOP | 1 gtt in affected eye(s) BID |
| levobunolol HCl <i>lee'-voe-byoo'-no-lahl</i> | AKBeta, Betagan Liquifilm, <i>generic</i> | Elevated IOP | 0.5% solution: 1–2 gtt in affected eye(s) QD 0.25% solution: 1–2 gtt in affected eye(s) BID |
| metipranolol HCl <i>meh-tih-pran'-oh-lahl</i> | OptiPranolol | Elevated IOP | 1–2 gtt in affected eye(s) BID |
| timolol <i>ti'-moe-lahl</i> | Betimol, Timoptic, Timoptic-XE, <i>generic</i> | Elevated IOP | 1 gtt in affected eye(s) QD, BID Gel: invert the closed container and shake once before each use; administer 1 gtt/day |
| Miotics, Direct Acting | | | |
| carbachol <i>car'-bah-kole</i> | Carboptic, Isopto Carbachol | Glaucoma | 1–2 gtt up to TID PRN |
| pilocarpine HCl <i>pie-low-car'-peen</i> | Adsorbocarpine, Akarpine, Isopto Carpine, Pilocar, Pilostat, <i>generic</i> | Glaucoma, pre- and postoperative intraocular tension | Solution: 1–2 gtt in affected eye(s) up to 6 times daily Gel: apply a 0.5-inch ribbon in the lower conjunctival sac of affected eye(s) once daily at HS |

(continued)

SUMMARY DRUG TABLE SELECT OPHTHALMIC PREPARATIONS (Continued)

| GENERIC NAME | TRADE NAME* | USES | DOSAGE RANGES |
|--|--|---|--|
| pilocarpine nitrate | Pilagan | Elevated IOP | 1–2 gtt in affected eye(s) 2–4 times daily |
| pilocarpine ocular therapeutic system | Ocusert Pilo-20, Ocusert Pilo-40 | Elevated IOP | See package insert |
| Miotics, Cholinesterase Inhibitors | | | |
| demecarium bromide <i>deh-meh-care'-ee-uhm broe'-mide</i> | Humorsol | Glaucoma and strabismus | 1–2 gtt/wk, up to 1–2 gtt/d |
| echothiophate iodide <i>eck-oh-thigh'-oh-fate eye-oh-dide</i> | Phospholine Iodide | Chronic open-angle glaucoma | 2 doses/d in the morning and at HS or one dose every other day |
| Carbonic Anhydrase inhibitors | | | |
| brinzolamide <i>brin-zoe'-lah-mide</i> | Azopt | Elevated IOP | 1 gtt in affected eye(s) TID |
| dorzolamide HCl <i>dore-zole-lah-mide</i> | TruSopt | Elevated IOP | 1 gtt in affected eye(s) TID |
| Prostaglandin Agonist | | | |
| latanoprost <i>lah-tan'-oh-prahst</i> | Xalatan | Elevated IOP | 1 gtt in affected eye(s) QD in the evening |
| travoprost | Travatan | Elevated IOP | 1 gtt in affected eye(s) QD in the evening |
| bimatoprost | Lumigan | Elevated IOP | 1 gtt in affected eye(s) QD in the evening |
| unoprostone isopropyl <i>yoo-noh-prost'-ohn</i> | Rescula | Elevated IOP | 1 gtt in affected eye(s) BID |
| Combinations Used, to Treat Glaucoma | | | |
| pilocarpine and epinephrine | E-Pilo-1, E-Pilo-2, E-Pilo-4, E-Pilo-6, P ₁ E ₁ , P ₄ E ₁ | Glaucoma | 1–2 gtt in the affected eye(s) 1–4 times daily |
| dorzolamide HCl and timolol maleate <i>dore-zole'-ah-mide</i> | Cosopt | Elevated IOP | 1 gtt into the affected eye(s) BID |
| Mast Cell Stabilizer | | | |
| nedocromil sodium <i>neh-doe-kroe'-mill</i> | Alocril | Allergic conjunctivitis | 1–2 gtt in each eye BID |
| pemirolast potassium <i>peh-mihr-oh'-last</i> | Alamast | Allergic conjunctivitis | 1–2 gtt in each eye QID |
| Nonsteroidal Anti-inflammatory Drugs | | | |
| diclofenac sodium <i>di-klo'-fen-ak</i> | Voltaren, <i>generic</i> | Postoperative inflammation after cataract surgery | 1 drop QID |
| flurbiprofen sodium <i>flure-bi'-pro-fen</i> | Ocufen, <i>generic</i> | Inhibition of intraoperative miosis | 1 gtt q 30 min beginning 2 h before surgery (total of 4 gtt) |
| ketorolac tromethamine <i>ke-tor'-o-lac</i> | Acular | Relief of ocular itching due to seasonal allergies | 1 drop QID |

SUMMARY DRUG TABLE SELECT OPHTHALMIC PREPARATIONS (Continued)

| GENERIC NAME | TRADE NAME* | USES | DOSAGE RANGES |
|--|--|---|--|
| Corticosteroids | | | |
| dexamethasone phosphate <i>dex-a-meth'-a-son-e</i> | AK-Dex, Maxidex, <i>generic</i> | Treatment of inflammatory conditions of the conjunctiva, lid, cornea, anterior segment of the eye | Solution: 1–2 gtt qh during the day and q2h at night, reduced to 1 gtt q4h when response noted, then 1 gtt TID–QID Ointment: thin coating in lower conjunctival sac 3–4 times/d |
| fluorometholone <i>flure-oh-meth'-oh-lone</i> | Flarex, Fluor-Op, <i>generic</i> | Treatment of inflammatory conditions of the conjunctiva, lid, cornea, anterior segment of the eye | Suspension: 1–2 gtt 2–4 times/d, may increase to 2 gtt q2h; ointment: thin coating in lower conjunctival sac 1–3 times/d (up to 1 application q4h) |
| loteprednol etabonate <i>low-teh'-pred'-nol ett-ab'-ohn-ate</i> | Alrex, Lotemex | Allergic conjunctivitis | 1–2 gtt QID |
| prednisolone <i>pred-niss'-oh-lone</i> | AK-Pred, Pred Forte, Pred Mild, <i>generic</i> | Treatment of inflammatory conditions of the conjunctiva, lid, cornea, anterior segment of the eye | 1–2 gtt qh during the day and q2h at night, reduced to 1 drop q4h, then 1 gtt TID or QID. Suspensions: 1–2 gtt 2–4 times daily |
| Antibiotics | | | |
| bacitracin <i>bass-i-tray'-sin</i> | AK-Tracin | Treatment of eye infections | See package insert |
| erythromycin <i>er-ith-roe-mye'-sin</i> | Ilotycin, <i>generic</i> | Treatment of eye infections | See package insert |
| gentamicin <i>jen-ta-mye'-sin</i> | Garamycin, <i>generic</i> | Treatment of eye infections | See package insert |
| tobramycin <i>toe-bra-mye'-sin</i> | Tobrex, <i>generic</i> | Treatment of eye infections | See package insert |
| Sulfonamides | | | |
| sodium sulfacetamide <i>sul-fa-see'-ta-mide</i> | AK-Sulf, <i>generic</i> | Treatment of conjunctivitis, corneal ulcer, other superficial eye infections | 1–2 gtt q1–3h |
| Silver | | | |
| silver nitrate <i>nye-trate</i> | <i>generic</i> | Prevention of ophthalmia neonatorum | 2 gtt of 1% solution in each eye |
| Antiviral Drugs | | | |
| idoxuridine <i>eye-dox-yoor'-i-deen</i> | Herplex | Treatment of herpes simplex keratitis | 1 gtt qh during the day and q2h at night |
| vidarabine <i>vye-dare'-a-been</i> | Vira-A | Treatment of herpes simplex keratitis and conjunctivitis | 0.5 inch of ointment into lower conjunctival sac 5 times/d at 3-h intervals |
| Antifungal Drugs | | | |
| natamycin <i>na-ta-mye'-sin</i> | Natacyn | Treatment of fungal infections of the eye | 1 gtt q1–2h |

(continued)

SUMMARY DRUG TABLE SELECT OPHTHALMIC PREPARATIONS (Continued)

| GENERIC NAME | TRADE NAME* | USES | DOSAGE RANGES |
|---|--|--|--|
| Vasoconstrictors/Mydriatics | | | |
| oxymetazoline hydrochloride <i>ox-i-met-az'-oh-leen</i> | Ocuclear, Visine L. R. | Relief of redness of eye due to minor irritation | 1–2 gtt q3–4h up to QID |
| phenylephrine hydrochloride <i>fen-ill-ef'-rin</i> | AK-Dilate 2.5%, Neo-Synephrine 10% | 0.12% for relief of redness of eye due to minor irritation; 2.5% and 10% treatment of uveitis, glaucoma; refraction procedures, before eye surgery | 0.12% 1–2 gtt up to 4 times/d; 2.5% and 10%, 1 gtt |
| tetrahydrozoline hydrochloride <i>tet-ra-hyd-drozz'-a-leen</i> | Murine Plus Eye Drops, Visine, <i>generic</i> | Relief of redness of eye due to minor irritation | 1–2 gtt up to 4 times/d |
| Cycloplegic/Mydriatics | | | |
| atropine sulfate <i>a'-troe-peen</i> | Isopto-Atropine, <i>generic</i> | Eye refraction, treatment of acute inflammatory conditions of iris, uveal tract | 1–2 gtt up to 4 times/d |
| homatropine hydrobromide <i>hoe-ma'-troe-peen</i> | Isopto Homatropine | Eye refraction, treatment of inflammatory conditions of uveal tract | 1–2 gtt q3–4h |
| Artificial Tears | | | |
| benzalkonium chloride <i>benz-al-koe'-nee-um</i> | Artificial Tears | Treatment of dry eyes | 1–2 gtt 3–4 times/d |
| glycerin, sodium chloride | Eye-Lube-A | Treatment of dry eyes | 1–2 gtt 3–4 times/d |

*The term *generic* indicates the drug is available in generic form.

Sympathomimetic Drugs

Sympathomimetics have alpha (α)- and beta (β)-adrenergic activity (see Chap. 22 for a detailed discussion of adrenergic drugs). These drugs lower the **intraocular pressure** (IOP) (the pressure within the eye) by increasing the outflow of aqueous humor in the eye and are used to treat glaucoma. Apraclonidine is used to control or prevent postoperative elevations in IOP. The Summary Drug Table: Select Ophthalmic Preparations provides additional information about these drugs.

Alpha-Adrenergic Blocking Drugs

Dapiprazole acts by blocking the α -adrenergic receptor in smooth muscle and produces miosis through an effect on the dilator muscle of the iris. The drug is used primarily after ophthalmic examinations to reverse the diagnostic **mydriasis** (dilation of the pupil).

Beta-Adrenergic Blocking Drugs

The β -adrenergic blocking drugs decrease the rate of production of aqueous humor and thereby lower the IOP. These drugs are used to treat glaucoma.

Miotics, Direct Acting

Miotics contract the pupil of the eye (miosis), resulting in an increase in the space through which the aqueous humor flows. This increased space and improved flow results in a decrease in the IOP. Miotics may be used in the treatment of glaucoma (see Chap. 22). The miotics were, for a number of years, the drug of choice for glaucoma. These drugs have lost that first choice treatment status to the β -adrenergic blocking drugs.

Miotics, Cholinesterase Inhibitors

The cholinesterase inhibitors are more potent and longer acting than the direct-acting miotics and are used

to treat open-angle glaucoma. When administered into the eye, these drugs produce intense **miosis** (constriction of the pupil) and muscle contractions, causing a decreased resistance to aqueous outflow.

Carbonic Anhydrase Inhibitors

Except for dorzolamide and brinzolamide, carbonic anhydrase inhibitors are administered systemically. Carbonic anhydrase is an enzyme found in many tissues of the body, including the eye. Inhibition of carbonic anhydrase in the eye decreases aqueous humor secretion, resulting in a decrease of IOP. These drugs are used in the treatment of elevated IOP seen in open-angle glaucoma.

Prostaglandin Agonists

The prostaglandin agonists are used to lower IOP in patients with open-angle glaucoma and ocular hypertension in patients who do not tolerate other IOP-lowering medications or have an insufficient response to these medications. These drugs act to lower IOP by increasing the outflow of aqueous humor through the trabecular meshwork.

Mast Cell Stabilizers

The mast cell stabilizers currently for ophthalmic use are nedocromil and pemirolast. These drugs are used for the prevention of eye itching caused by allergic conjunctivitis. The mast cell stabilizers act by inhibiting the antigen-induced release of inflammatory mediators (eg, histamine) from human mast cells.

Nonsteroidal Anti-inflammatory Drugs (NSAIDs)

The NSAIDs inhibit prostaglandin synthesis (see Chap. 18 for a discussion of the NSAIDs), thereby exerting anti-inflammatory action. These drugs are used to treat postoperative inflammation after cataract surgery (diclofenac), for the relief of itching of the eyes caused by seasonal allergies (ketorolac), and during eye surgery to prevent miosis (flurbiprofen).

Corticosteroids

These drugs possess anti-inflammatory activity and are used for inflammatory conditions, such as allergic conjunctivitis, keratitis, herpes zoster keratitis, and inflammation of the iris. Corticosteroids also may be used after injury to the cornea or after corneal transplants to prevent rejection.

Antibiotics and Sulfonamides

Antibiotics possess antibacterial activity and are used in the treatment of eye infections. Sulfonamides possess a bacteriostatic effect against a wide range of gram-positive and gram-negative microorganisms. They are used in the treatment of conjunctivitis, corneal ulcer, and other superficial infections of the eye. See the Summary Drug Table: Select Ophthalmic Preparations and Chapter 6 for additional information on the sulfonamides.

Silver

Silver possesses antibacterial activity against gram-positive and gram-negative microorganisms. Silver protein, mild, is occasionally used in the treatment of eye infections. Silver nitrate is occasionally used to prevent gonorrheal ophthalmia neonatorum (gonorrhea infection of the newborn's eyes). Ophthalmic tetracycline and erythromycin have largely replaced the use of silver nitrate in newborns.

Antiviral Drugs

Antiviral drugs interfere with viral reproduction by altering DNA synthesis. These drugs are used in the treatment of herpes simplex infections of the eye, treatment in immunocompromised patients with cytomegalovirus (CMV) retinitis, and for the prevention of CMV retinitis in patients undergoing transplant.

Antifungal Drugs

Natamycin is the only ophthalmic antifungal in use. This drug possesses antifungal activity against a variety of yeast and fungi.

Vasoconstrictors/Mydriatics

These drugs dilate the pupil (mydriasis), constrict superficial blood vessels of the sclera, and decrease the formation of aqueous humor. Depending on the specific drug and strength, these drugs may be used before eye surgery in the treatment of glaucoma, for relief of minor eye irritation, and to dilate the pupil for examination of the eye.

Cycloplegic Mydriatics

Cycloplegic mydriatics cause mydriasis and **cycloplegia** (paralysis of the ciliary muscle, resulting in an inability to focus the eye). These drugs (see Chap. 25) are used in the treatment of inflammatory conditions of the iris and uveal tract of the eye and for examination of the eye.

Artificial Tear Solutions

These products lubricate the eyes and are used for conditions such as dry eyes and eye irritation caused by inadequate tear production.

Inactive ingredients may be found in some preparations. Examples of these drugs include preservatives, antioxidants, which prevent deterioration of the product, and drugs that slow drainage of the drug from the eye into the tear duct. Examples of the types of eye preparations are found in the Summary Drug Table: Select Ophthalmic Preparations.

ADVERSE REACTIONS

Alpha₂-Adrenergic Drugs

Although side effects are usually mild, treatment with brimonidine tartrate includes oral dryness, ocular hyperemia, burning and stinging, headache, visual blurring, foreign body sensation, fatigue, drowsiness, ocular allergic reactions, and ocular pruritus.

Sympathomimetic Drugs

These drugs may cause transient local reactions such as burning and stinging, eye pain, brow ache, headache, allergic lip reactions, and ocular irritation. With prolonged use adrenochrome (a red pigment contained in epinephrine) deposits may occur in the conjunctiva and cornea. Although rare, systemic reactions may occur such as headache, palpitations, tachycardia, extrasystoles, cardiac arrhythmia, hypertension, and faintness. Dipivefrin appears to be better tolerated and has fewer adverse reactions than the other sympathomimetic drugs used to lower IOP.

Alpha-Adrenergic Blocking Drugs

The drug may cause burning in the eye, ptosis (drooping of the upper eyelid), lid edema, itching, corneal edema, browache, photophobia, dryness of the eye, tearing, and blurring of vision.

Beta-Adrenergic Blocking Drugs

Adverse reactions associated with the β -adrenergic blocking drugs include eye irritation, burning, tearing, conjunctivitis, decreased night vision, ptosis, abnormal corneal staining, and corneal sensitivity. Systemic reactions, although rare, include arrhythmias, palpitation, headache, nausea, and dizziness. (See Chap. 23 for additional systemic adverse reactions.)

Miotic, Direct Acting

The direct-acting miotics may cause stinging on instillation, transient burning, tearing, headache, browache, and decreased night vision. Systemic adverse reactions included hypotension, flushing, breathing difficulties, nausea, vomiting, diarrhea, cardiac arrhythmias, and frequent urge to urinate.

Miotics, Cholinesterase Inhibitors

Adverse reactions and systemic toxicity are more common in the cholinesterase inhibitor ophthalmic preparations than in the direct-acting miotics. Ophthalmic adverse reactions include the development of iris cysts, burning, lacrimation, lid muscle twitching, conjunctivitis and ciliary redness, browache, headache, activation of latent iritis or uveitis (an inner-eye inflammation), retinal detachment, and conjunctival thickening. Systemic adverse reactions include nausea, vomiting, abdominal cramps, diarrhea, urinary incontinence, fainting, salivation, difficulty breathing, and cardiac irregularities. Iris cysts may form, enlarge, and obstruct vision. The iris cyst usually shrinks upon discontinuation of use of the drug or after a reduction in strength of the drops or frequency of instillation.

Carbonic Anhydrase Inhibitors

Adverse reactions associated with use of the carbonic anhydrase inhibitors include ocular burning, stinging, or discomfort immediately after administration, bitter taste, ocular allergic reaction, blurred vision, tearing, dryness, dermatitis, foreign body sensation, ocular discomfort, photophobia, and headache.

Prostaglandin Agonists

Adverse reactions associated with the prostaglandin agonists include blurred vision, burning and stinging, foreign body sensation, itching, increased pigmentation of the iris, dry eye, excessive tearing, lid discomfort and pain, and photophobia.

Mast Cell Stabilizers

Although mild, the adverse reactions associated with the mast cell inhibitors include headache, rhinitis, unpleasant taste, asthma, and cold/flu symptoms. These drugs may also cause ocular burning or irritation, dry eye, eye redness, foreign body sensation, and ocular discomfort.

Nonsteroidal Anti-inflammatory Drugs

The most common adverse reactions associated with the NSAIDs include transient burning and stinging upon instillation and other minor ocular irritation.

Corticosteroids

Adverse reactions associated with administration of the corticosteroid ophthalmic preparations include elevated IOP with optic nerve damage, loss of visual acuity, cataract formation, delayed wound healing, secondary ocular infection, exacerbation of corneal infections, dry eyes, ptosis, blurred vision, discharge, ocular pain, foreign body sensation, and pruritus.

Antibiotics, Sulfonamides, and Silver

The antibiotic and sulfonamide ophthalmics are usually well tolerated, and few adverse reactions are seen. Occasional transient irritation, burning, itching, stinging, inflammation, or blurring of vision may occur. With prolonged or repeated use, a superinfection may occur.

Antiviral Drugs

The administration of the antiviral ophthalmics may cause occasional irritation, pain, pruritus, inflammation, or edema of the eyes or lids; allergic reactions; foreign body sensation; photophobia; and corneal clouding.

Antifungal Drugs

Adverse reactions are rare. Occasional local irritation to the eye may occur.

Vasoconstrictors/Mydriatics

Adverse reactions include transitory stinging on initial instillation, blurring of vision, mydriasis, increased redness, irritation, discomfort, and increased IOP. Systemic adverse reactions include headache, browache, palpitations, tachycardia, arrhythmias, hypertension, myocardial infarction, and stroke.

Cycloplegic Mydriatics

Local adverse reactions associated with administration of the cycloplegic mydriatics include increased IOP, transient stinging or burning, and irritation with prolonged use (eg, conjunctivitis, edema, exudates). Systemic adverse reactions include dryness of the mouth and skin, blurred vision, photophobia, corneal staining, tachycardia, headache, parasympathetic stimulation, and somnolence.

Artificial Tear Solutions

Adverse reactions are rare, but on occasion redness or irritation may occur.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Alpha₂-Adrenergic Drugs

The drug is contraindicated in patients with hypersensitivity to the drug or any component of the drug and in patients taking the monoamine oxidase inhibitors (MAOIs). Patients should wait at least 15 minutes after instilling brimonidine before inserting soft contact lenses because the preservative in the drug may be absorbed by soft contact lenses. The drug is used cautiously during pregnancy (Pregnancy Category B) and lactation and in patients with cardiovascular disease, depression, cerebral or coronary insufficiency, orthostatic hypotension, or Raynaud's phenomenon. When brimonidine is used with central nervous system (CNS) depressants such as alcohol, barbiturates, opiates, sedatives, or anesthetics, there is a risk for an additive CNS depressant effect. Use the drug cautiously in combination with the beta blockers, antihypertensive drugs, and cardiac glycosides because a synergistic effect may occur.

Sympathomimetic Drugs

These drugs are contraindicated in patients with hypersensitivity to the drug or any component of the drug. Epinephrine is contraindicated in patients with narrow angle glaucoma, or patients with a narrow angle, but no glaucoma, aphakia (absence of the crystalline lens of the eye). Epinephrine should not be used while wearing soft contact lenses (discoloration of the lenses may occur).

These drugs are used cautiously during pregnancy (epinephrine and apraclonidine, Pregnancy Category C; dipivefrin, Pregnancy Category B) and lactation and in patients with hypertension, diabetes, hyperthyroidism, heart disease, cerebral arteriosclerosis, or bronchial asthma. Some of these drugs contain sulfites that may cause allergic-like reactions (hives, wheezing, anaphylaxis) in patients with sulfite sensitivity. See Chapter 22 for information on interactions.

Alpha-Adrenergic Blocking Drugs

The drug is contraindicated in patients with hypersensitivity to the drug or any component of the drug, in conditions in which pupil constriction is not desirable, such as in acute iritis (inflammation of the iris), and in the treatment of IOP in open-angle glaucoma. This drug is used cautiously during pregnancy (Pregnancy Category B) and lactation. No significant drug interactions have been reported.

Beta-Adrenergic Blocking Drugs

The β -adrenergic blocking drugs are contraindicated in patients with bronchial asthma, obstructive pulmonary disease, sinus bradycardia, heart block, cardiac failure, or cardiogenic shock and in patients with hypersensitivity to the drug or any components of the drug. These drugs are Pregnancy Category C and are used cautiously during pregnancy and lactation and in patients with cardiovascular disease, diabetes (may mask the symptoms of hypoglycemia), and hyperthyroidism (may mask symptoms of hyperthyroidism). The patient taking β -adrenergic blocking drugs for ophthalmic reasons may experience increased or additive effects when the drugs are administered with the oral beta blockers. Co-administration of timolol maleate and calcium antagonists may cause hypotension, left ventricular failure, and condition disturbances within the heart. There is a potential additive hypotensive effect when the beta-blocking ophthalmic drugs are administered with the phenothiazines.

Miotic, Direct Acting

These drugs are contraindicated in patients with hypersensitivity to the drug or any component of the drug and in conditions where constriction is undesirable (eg, iritis, uveitis, and acute inflammatory disease of the anterior chamber). The drugs are used cautiously in patients with corneal abrasion, pregnancy (Pregnancy Category C), lactation, cardiac failure, bronchial asthma, peptic ulcer, hyperthyroidism, gastrointestinal spasm, urinary tract infection, Parkinson's disease, recent myocardial infarction, hypotension, or hypertension. These drugs are also used cautiously in patients with angle closure glaucoma because miotics can, occasionally, precipitate angle closure glaucoma by increasing the resistance to aqueous flow from posterior to anterior chamber. See Chapter 24 for information on interactions.

Miotics, Cholinesterase Inhibitors

The cholinesterase inhibitors are contraindicated in patients with hypersensitivity to the drug or any components of the drug. Some of these products contain sulfites, and patients with sulfite sensitivity may experience allergic-type reactions. The drugs are also contraindicated in patients with any active inflammatory disease of the eye and during pregnancy (demecarium, Pregnancy Category X; echothiophate iodine, Pregnancy Category C) and lactation. The cholinesterase inhibitors are used cautiously in patients with myasthenia gravis (may cause additive adverse effects), before and after surgery, and in patients with chronic angle-closure (narrow angle) glaucoma or those with narrow angles (may cause papillary block and increase the angle blockage). When the cholinesterase

inhibitors are administered with systemic anticholinesterase drugs, there is a risk for additive effects. Individuals, such as farmers, warehouse workers, or gardeners, working with carbamate/organophosphate insecticides or pesticides are at risk for systemic effects of the cholinesterase inhibitors from absorption of the pesticide or insecticide through the respiratory tract or the skin. Individuals working with pesticides or insecticides containing carbamate/organophosphate and taking a cholinesterase inhibitor should be advised to wear respiratory masks, change clothes frequently, and wash exposed clothes thoroughly.

Carbonic Anhydrase Inhibitors

Use of the carbonic anhydrase inhibitors is contraindicated in patients with hypersensitivity to the drug or any components of the drug and during pregnancy (Pregnancy Category C) and lactation. The drugs are used cautiously in patients with renal and hepatic impairment. When high doses of the salicylates are administered concurrently, toxic levels of the carbonic anhydrase inhibitors have been reported. See Chapter 46 for more information on interactions when administering the carbonic anhydrase inhibitors.

Prostaglandin Agonists

These drugs are contraindicated in patients with hypersensitivity to the drug or any component of the drug and during pregnancy (Pregnancy Category C). The drugs are used cautiously in lactating women and in patients with active intraocular inflammation, those wearing contact lenses (contact lenses must be removed and left out for at least 15 minutes after administration of the drug), and those with macular edema.

Mast Cell Stabilizers

These drugs are contraindicated in patients with a hypersensitivity to the drug or any component of the drug. The mast cell stabilizers are used cautiously in patients who wear contact lenses (preservative may be absorbed by the soft contact lenses) and during pregnancy (pemirolast, Pregnancy Category C; nedocromil, Pregnancy Category B) and lactation. There have been no significant drug-drug interactions associated with these drugs.

Nonsteroidal Anti-inflammatory Drugs

These drugs are contraindicated in individuals with known hypersensitivity to an individual drug or any components of the drug. The NSAID flurbiprofen is contraindicated in patients with herpes simplex keratitis. Diclofenac and ketorolac are contraindicated in patients who wear soft contact lenses (may cause ocular irritation).

The NSAIDs are used cautiously during pregnancy (Pregnancy Category C, flurbiprofen, ketorolac; Pregnancy Category B, diclofenac) and lactation. The NSAIDs are used cautiously in patients with bleeding tendencies. When used topically there is less risk of interactions with drugs or other substances. There is a possibility of a cross-sensitivity reaction when the NSAIDs are administered to patients allergic to the salicylates. The corticosteroids and the antibiotics are used cautiously in patients with sulfite sensitivity because an allergic-type reaction may result. Co-administration of idoxuridine with solutions containing boric acid may cause irritation. The sulfonamides are incompatible with silver nitrate.

Corticosteroids

The corticosteroid ophthalmic preparations are contraindicated in patients with acute superficial herpes simplex keratitis, fungal disease of the eye, or viral diseases of the eye, and after removal of a superficial corneal foreign body.

The corticosteroid ophthalmic preparations are used cautiously in patients with infectious conditions of the eye. These drugs are Pregnancy Category C drugs and are used cautiously during pregnancy and lactation. Prolonged use of the corticosteroids may result in elevated IOP and optic nerve damage.

Antibiotics and Sulfonamides

The antibiotic and sulfonamide ophthalmics are contraindicated in patients with a hypersensitivity to the drug or any component of the drug. These drugs are also contraindicated in patients with epithelial herpes simplex keratitis, varicella, mycobacterial infection of the eye, and fungal diseases of the eye. There are no significant precautions or interactions when the drugs are administered as directed by the primary health care provider.

Antiviral Drugs

These drugs are contraindicated in patients with hypersensitivity to the drug or any component of the drug. These drugs are used cautiously in immunocompromised patients and during pregnancy and lactation. Some of these solutions contain boric acid and may result in a precipitate that causes irritation.

Antifungal Drugs

Natamycin is contraindicated in patients with hypersensitivity to the drug or any component of the drug. The drug is a Pregnancy Category C drug and is used cautiously during pregnancy and lactation. If use of the drug for 7 to 10 days does not result in improvement, the infection may be attributable to another microorganism not susceptible to natamycin.

Vasoconstrictors/Mydriatics

These drugs are contraindicated in individuals with hypersensitivity to the drug or any component of the drug and in patients with narrow angle glaucoma or anatomically narrow angle and no glaucoma and in patients with a sulfite sensitivity (some of these products contain sulfite). The drugs are used cautiously in patients with hypertension, diabetes, hyperthyroidism, cardiovascular disease, and arteriosclerosis. Local anesthetics can increase absorption of topical drugs. Systemic adverse reactions may occur more frequently when these drugs are administered with the β -adrenergic blocking drugs. When the **mydriatics** (drugs that dilate the pupil) are administered with the MAOIs or as long as 21 days after MAOI administration, exaggerated adrenergic effects may occur.

Cycloplegic Mydriatics

These drugs are contraindicated in patients with hypersensitivity to the drug or any component of the drug and in patients with glaucoma. Some of these preparations contain sulfite, and individuals who are allergic to sulfites may exhibit allergic-like symptoms. The cycloplegic mydriatics are used cautiously in elderly patients and during pregnancy (Pregnancy Category C) and lactation. No significant interactions have been reported when the drugs are given topically.

Artificial Tear Solutions

Artificial tears are contraindicated in patients who are allergic to any component of the solution. No precautions or interactions have been reported.

Herbal Alert: Bilberry

Bilberry, also known as whortleberry, blueberry, trackleberry, and huckleberry, is a shrub with bluish flowers that appear in early spring and ripen in July and August. Although bilberry is given to improve capillary strength and flexibility and as an antioxidant, the most beneficial use appears to be in promoting healthy eyes. Bilberry is thought to increase production of the enzymes responsible for energy production in the eye and promote capillary blood flow in the eyes, hands, and feet. Bilberry extract has been shown to increase the flexibility of the cell walls of both red blood cells and endothelial cells, making the cells better able to stretch and squeeze through tighter spaces. By increasing the flexibility of the red blood cells, more oxygen reaches the tissues, including the retina of the eye. A component of bilberry also speeds the regeneration of rhodopsin (visual purple), which is a critical protein found in the rods of the eye.

Bilberry fruit is a safe food herb with no known adverse reactions or toxicity. There are no known contraindications to its use as directed. The dosage of standard extract is 160 to 320 mg a day.

NURSING PROCESS

● The Patient Receiving an Ophthalmic Preparation

ASSESSMENT

Preadministration Assessment

The primary health care provider examines the eye and external structures surrounding the eye and prescribes the drug indicated to treat the disorder. The nurse examines the eye for irritation, redness, and the presence of any exudate and carefully documents the findings in the patient's record. A purulent discharge is often found with infection of the eye. Pruritus (itching) is often present with allergic conditions of the eye. It is also important to determine if any visual impairment is present because this would indicate the need for assistance with ambulation and possibly activities of daily living.

Ongoing Assessment

During the ongoing assessment the nurse observes for a therapeutic drug effect and reports any increase in symptoms and the presence of any redness, irritation, or pain in the eye. Patients admitted for treatment of acute glaucoma should be assessed every 2 hours for relief of pain. Pain in the eye may indicate increased IOP.

NURSING DIAGNOSES

Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses applicable to these drugs are discussed in depth in Chapter 4.

PLANNING

The expected outcomes of the patient depend on the reason for administration but may include an optimal response to therapy, management of adverse reactions,



FIGURE 57-2. Instilling eye medication. While the patient looks upward, the nurse gently pulls the lower lid down and instills the correct number of drops into the lower conjunctival sac.

minimized anxiety, and an understanding of the application and use of an ophthalmic preparation.

IMPLEMENTATION

Promoting an Optimal Response to Therapy

Before instillation, ophthalmic solutions and ointments can be warmed in the hand for a few minutes. Ophthalmic ointments are applied to the eyelids or dropped into the lower conjunctival sac; ophthalmic solutions are dropped into the middle of the lower conjunctival sac (Fig. 57-2). When eye solutions are instilled, the nurse applies gentle pressure on the inner canthus to delay drainage of the drug down the tear duct. The primary health care provider is consulted regarding use of this technique before the first dose is instilled because this technique can be potentially dangerous in some eye conditions, such as recent eye surgery. When two eye drops are prescribed for use at the same time, the nurse waits at least 5 minutes before instilling the second drug. This help prevents dilution of the drug and loss of some therapeutic effect from tearing.

Some ophthalmic drugs produce blurring of vision, which can result in falls and other injuries. The nurse warns patients to exercise care when getting out of bed when the vision is impaired by these drugs. Patients using the pilocarpine ocular therapeutic system must have the system replaced every 7 days (see Chap. 24). The system is inserted at bedtime because **myopia** (nearsightedness) occurs for several hours after insertion.

When a patient is scheduled for eye surgery, it is most important that the eye drops ordered by the primary health care provider are instilled at the correct time. This is especially important when the purpose of the drug is to change the size of the pupil.

Nursing Diagnoses Checklist

- ✓ **Sensory-Perceptual Alteration: Impaired Vision** related to adverse drug effects or disease condition
- ✓ **Risk for Injury** related to adverse reactions to drug therapy (blurring of the vision)
- ✓ **Impaired Physical Mobility** related to visual impairment from drug therapy
- ✓ **Anxiety** related to eye pain or discomfort, diagnosis, other factors
- ✓ **Risk for Ineffective Regimen Management** related to lack of knowledge of technique of instilling an eye drug

Nursing Alert

Only preparations labeled as ophthalmic are instilled in the eye. The nurse must check the label of the preparation carefully for the name of the drug, the percentage of the preparation, and a statement indicating that the preparation is for ophthalmic use.

Monitoring and Managing Adverse Reactions

Although adverse reactions are rare, these drugs can cause visual impairment such as blurring of vision and local irritation and burning. These reactions are most often self-limiting and will resolve if the patient waits a few minutes. However, if visual impairment does not resolve itself or occurs as a consequence of an eye disorder, the nurse provides assistance with ambulation to prevent injury from falls. In addition, assistance with activities of daily living may also be needed. Visual impairment that does not clear within 30 minutes after therapy is reported to the primary health care provider.

Gerontologic Alert

Older adults, in particular, are at risk for exacerbation of existing disorders such as hypertension, tachycardia, or arrhythmias if systemic absorption of sympathomimetic ophthalmic drugs occurs.

Managing Anxiety

Eye injuries and some eye infections are very painful. Other eye conditions may result in discomfort or a loss of or change in vision. The patient with an eye disorder or injury usually has great concern about the effect the problem will have on his or her vision. The nurse reassures the patient that every effort is being made to treat the disorder.

Educating the Patient and Family

The patient or a family member will require instruction in the technique of instilling an ophthalmic preparation (see Home Care Checklist: Instilling an Ophthalmic Preparation). In addition, the nurse may give the following information to the patient and family member when an eye ointment or solution is prescribed:

- Eye preparations may cause a momentary stinging or burning sensation; this is normal.
- Temporary blurring of vision may occur. Avoid activities requiring visual acuity until vision returns to normal.
- If more than one topical ophthalmic drug is being used, administer the drugs at least 5 to 10 minutes apart or as directed by the physician.
- Complete a full course of treatment with the prescribed drug to achieve satisfactory results.
- Do not rub the eyes, and keep hands away from the eyes.

- Do not use nonprescription eye products during or after treatment unless such use has been approved by the primary health care provider.
- Some of these preparations cause sensitivity (photophobia) to light; to minimize this, wear sunglasses.
- Notify the primary health care provider if symptoms do not improve or if they worsen.
- Brimonidine—patients should wait at least 15 minutes after instilling brimonidine before inserting soft contact lenses.

PROSTAGLANDIN AGONISTS

- Remove contact lenses before administration and leave out at least 15 minutes before reinserting them.
- The color of the iris may change because of an increase of the brown pigment and cause different eye coloration. This may be more noticeable in patients with blue, green, or gray brown or other light-colored eyes.

EVALUATION

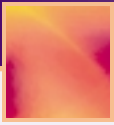
- The therapeutic effect is achieved.
- Adverse reactions are managed.
- Anxiety is reduced.
- The patient demonstrates the ability to instill an ophthalmic preparation in eye.
- The patient and family demonstrate an understanding of the drug regimen.
- The patient verbalizes knowledge of and the importance of the treatment regimen.

Critical Thinking Exercises

1. Prepare a teaching plan for a patient prescribed Cerumenex for removal of earwax.
2. Ms. Stone, age 76 years, has glaucoma and is prescribed timolol (Timoptic) eye drops. Your initial assessment reveals that she has severe arthritis and appears to have difficulty following instructions. Discuss any further investigations you feel are important to make before developing a teaching plan for this patient.
3. Mr. Caravel, age 38 years, is prescribed tobramycin ophthalmic (Tobrex) for bacterial conjunctivitis. Discuss preadministration assessments the nurse would perform before instilling the drug.

Review Questions
















1. What is the rationale for warming an otic solution that has been refrigerated before instilling the drops into the patient's ear?
 - A. The drug becomes thick when refrigerated, and warming liquefies the solution.
 - B. It helps to prevent dizziness on instillation.
 - C. A cold solution can significantly increase the patient's blood pressure.



Home Care Checklist

INSTILLING AN OPHTHALMIC PREPARATION

Because of shortened hospital stays and increases in the number of ambulatory surgeries for many eye problems, the patient may be required to instill eye drops or ointment at home. If the patient is unable to do so, a family member or friend may have to instill the preparation. The nurse uses the following guide to evaluate that the patient or caregiver can properly instill the eye drops or ointment:

-  Washes hands thoroughly before beginning.
-  Holds bottle (drops) or tube (ointment) in hand for a few minutes before using.
-  Cleanses the area around the eye of any secretions.
-  Squeezes the eye dropper bulb to release and then refill the dropper, squeezes the bottle to fill the drop chamber, or squeezes ointment to tip of the tube.
-  Tilts head slightly backward and toward the eye to be treated.
-  Pulls affected lower lid down.
-  Positions dropper, bottle, or tube over lower conjunctival sac.
-  Steadies hand by resting fingers against cheek or by resting base of hand on cheek.
-  Looks up at ceiling and squeezes dropper, bottle, or tube.
-  Drops ordered number of drops into the middle of lower conjunctival sac; instills prescribed amount of ointment to eyelid or lower conjunctival sac.
-  Closes eye briefly and gently and releases lower lid (does not squeeze eyes shut after instilling the drug).
-  Places finger on inner canthus to avoid absorption via the tear duct (when instilling drops and only if ordered).
-  Repeats procedure with other eye (if ordered).
-  If more than one type of ophthalmic preparation is being instilled, waits the recommended time interval before instilling the second drug (usually 5 minutes for drops and 10–15 minutes for ointment).
-  Replaces the cap of the eye preparation immediately after instilling the eye drops or ointment. Does not touch the tip of the dropper, bottle, or tube.

2. Which of the following adverse reactions would the nurse suspect in a patient receiving prolonged treatment with an antibiotic otic drug?
 - A. Congestive heart failure
 - B. Superinfection
 - C. Anemia
 - D. Hypersensitivity reactions
3. When administering an ophthalmic solution the drug is instilled into the _____.
 - A. inner canthus
 - B. upper conjunctival sac
 - C. lower conjunctival sac
 - D. upper canthus
4. Which of the following instructions would be included in a teaching plan for the patient prescribed an ophthalmic solution?
 - A. Squeeze the eyes tightly after the solution is instilled.
 - B. Immediately wipe the eye using pressure to squeeze out excess medication.
 - C. After the drug is instilled, remain upright with the head bent slightly forward for about 2 minutes.
 - D. A temporary stinging or burning may be felt at the time the drug is instilled.