

From The Medical Letter on Drugs and Therapeutics

Drugs for Some Common Eye Disorders

The December 2, 2019, issue of *The Medical Letter* had a comprehensive review of drugs used for common eye disorders. Medications used to treat glaucoma and age-related macular degeneration were covered



Audio

and dry eye disease. Please see the original *Medical Letter* article for complete coverage of these topics.

Bacterial Conjunctivitis

In the US, the most common bacterial pathogen associated with acute conjunctivitis in adults is *Staphylococcus aureus*. *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis* are common pathogens in children. Ophthalmic administration of antibacterials is much less likely to cause adverse effects than systemic administration.

Ophthalmic Antibacterials

Ophthalmic formulations of antibacterial drugs achieve high concentrations on the surface of the eye and can be effective in treating surface ocular infections, even when the organisms are reported to be resistant in vitro. Sulfacetamide is not highly effective, can be sensitizing, and rarely has caused Stevens-Johnson syndrome. Neomycin causes sensitization and other local adverse reactions in about 5-10% of patients. Bacitracin and erythromycin are not active against the gram-negative organisms that cause a small percentage of acute conjunctival infections in adults. Polymyxin B is only active against gram-negative organisms. Trimethoprim has a broad spectrum of activity, often including methicillin-resistant staphylococci. Ophthalmic azithromycin has activity primarily against gram-positive microbes, but also against *H influenzae*. A single oral dose of azithromycin is effective for treatment of *Chlamydia trachomatis* and gonococcal conjunctivitis. All fluoroquinolones are active against most bacteria associated with conjunctivitis. *S aureus* and some anaerobes that are resistant in vitro to older fluoro-

quinolones such as ciprofloxacin and ofloxacin may be susceptible to moxifloxacin, gatifloxacin, and besifloxacin.

Choice of Ophthalmic Drugs

Erythromycin ophthalmic ointment or trimethoprim/polymyxin B ophthalmic solution would be a reasonable choice for first-line treatment of acute bacterial conjunctivitis; alternatives include bacitracin or bacitracin/polymyxin B ointment, azithromycin, or a topical fluoroquinolone (Table 1). In contact lens wearers, who have a higher incidence of pseudomonal infection, a topical fluoroquinolone is preferred.

Dry Eye Disease

Altered tear-film homeostasis (eg, altered composition, reduced production, rapid evaporation) and ocular surface inflammation lead to discomfort and blurred vision in patients with dry eye disease. Precipitating factors include poor eyelid function, environmental factors, inflammatory conditions such as Sjögren's syndrome, and use of some ocular or systemic drugs such as antihistamines, retinoids, and selective serotonin reuptake inhibitors (SSRIs). Dry eye disease is most prevalent in females and older adults.

Artificial Tears

Many artificial tear preparations are available; they are usually administered every 4-6 hours, but can be used as often as hourly, depending on symptoms. They usually contain some form of cellulose to lubricate the eye, may contain polyethylene glycol or polyvinyl alcohol to prevent evaporation, and may include a preservative. Preservatives may be irritating and can aggravate ocular surface disease; preservative-free formulations are available. Ophthalmic ointments are usually used at night, but can be used during the day in severe cases. Lacrisert is a daily insert that gradually releases hydroxypropylcellulose after placement into the inferior conjunctival sac; it is FDA-approved for treatment of moderate to severe dry eye syndromes (Table 2).

Table 1. Some Ophthalmic Antimicrobials for Bacterial Conjunctivitis

Drug	Some Formulations	Some Available Sizes	Usual Dosage	Cost ^a
Fluoroquinolones				
Besifloxacin—Besivance (Bausch + Lomb)	0.6% susp	5 mL	1 drop q 8 h × 7 d ^{b,c}	\$169.40
Ciprofloxacin—generic	0.3% soln	2.5, 5, 10 mL	1-2 drops q 2 h × 2 d, then	9.80
Ciloxan (Alcon)	0.3% soln	5 mL	1-2 drops q 4 h × 5 d ^c	120.90
	0.3% oint	3.5 g	0.5 inch q 8 h × 3 d, then 0.5 inch q 12 h × 5 d ^c	214.40
Gatifloxacin—generic	0.5% soln	2.5 mL	1 drop q 2 h (max 8 doses) × 1 d, then 1 drop q 6-12 h × 6 d ^c	94.50
Zymaxid (Allergan)	0.5% soln	2.5 mL		175.00
Levofloxacin—generic	0.5% soln	5 mL	1-2 drops q 2 h (max 8 doses) × 2 d, then 1-2 drops q 4 h (max 4 doses) × 5 d ^c	79.50
Moxifloxacin—generic	0.5% soln	3 mL	1 drop q 8 h × 7 d	82.50
Vigamox (Alcon)	0.5% soln	3 mL		174.10
Moxeza (Alcon) ^d	0.5% soln	3 mL	1 drop q 12 h × 7 d	169.70
Ofloxacin—generic	0.3% soln	5, 10 mL	1-2 drops q 2-4 h × 2 d, then	53.00
Ocuflox (Allergan)	0.3% soln	5 mL	1-2 drops q 6 h × 5 d	118.20

(continued)

Table 1. Some Ophthalmic Antimicrobials for Bacterial Conjunctivitis (continued)

Drug	Some Formulations	Some Available Sizes	Usual Dosage	Cost ^a
Other Single Agents				
Azithromycin—Azasite (Inspire)	1% soln	2.5 mL	1 drop q 12 h × 2 d, then 1 drop once/d × 5 d	206.20
Erythromycin—generic	0.5% oint	1, 3.5 g	0.5 inch q 6 h × 5-7 d	8.40
Gentamicin—generic	0.3% soln	5 mL	1-2 drops q 4 h × 7 d	17.70
Gentak (Akorn)	0.3% oint	3.5 g	0.5 inch q 8-12 h × 7 d	28.40
Sulfacetamide sodium—generic	10% oint	3.5 g	0.5 inch q 3-4 h × 7-10 d ^e	54.90
	10% soln	5, 15 mL	1-2 drops q 2-3 h × 7-10 d ^e	31.30
Bleph-10 (Allergan)	10% soln	5 mL		133.00
Tobramycin—generic	0.3% soln	5 mL	1-2 drops q 4 h × 7 d ^f	13.20
Tobrex (Alcon)	0.3% soln	5 mL		102.10
	0.3% oint	3.5 g	0.5 inch q 8-12 h × 7 d ^f	214.40
Combinations				
Polymyxin B/bacitracin—generic	ointment	3.5 g	0.5 inch q 3-4 h × 7-10 d	22.90
Polymyxin B/neomycin/bacitracin—generic	ointment	3.5 g	0.5 inch q 3-4 h × 7-10 d	40.30
Polymyxin B/neomycin/gramicidin—generic	soln	10 mL	1-2 drops q 4 h × 7-10 d	51.00
Polymyxin B/trimethoprim—generic	soln	10 mL	1 drop q 3 h (max 6 doses) × 7-10 d	10.60
Polytrim (Allergan)	soln	10 mL		76.10

Abbreviations: oint, ointment; soln, solution; susp, suspension.

^a Wholesale acquisition cost (WAC) for the smallest size tube or bottle available. WAC = wholesaler acquisition cost or manufacturer's published price to wholesalers; WAC represents a published catalog or list price and may not represent an actual transactional price. Source: AnalySource[®] Monthly. November 5, 2019. Reprinted with permission by First Databank, Inc. All rights reserved. ©2019. www.fdbhealth.com/policies/drug-pricing-policy.

^b Doses should be 4-12 hours apart.

^c While awake.

^d Contains the same active agent as Vigamox, but has a different vehicle (xanthum gum).

^e Dosage may be tapered by increasing time interval between doses as the condition responds.

^f For mild to moderate infections. For severe infections, dosage is 2 drops/h or 0.5 inch q 3-4 hours until improvement; dosage should be reduced prior to discontinuation.

Table 2. Some Prescription Products for Dry Eye Disease

Drug	Formulation	Usual Adult Dosage	Cost ^a
Cyclosporine ophthalmic emulsion—Restasis (Allergan)	0.05% unit-dose vials; multi-dose bottles	1 drop in each eye q 12 h ^{b,c}	\$557.70
	ophthalmic solution—Cequa (Sun)	1 drop in each eye q 12 h ^c	507.00
Lifitegrast ophthalmic solution—Xiidra (Shire)	5% single-use containers	1 drop in each eye q 12 h ^c	522.20

^a Approximate WAC for 30 days' treatment. WAC = wholesaler acquisition cost or manufacturer's published price to wholesalers; WAC represents a published catalog or list price and may not represent an actual transactional price. Source: AnalySource[®] Monthly. November 5, 2019. Reprinted with permission by First Databank, Inc. All rights reserved. ©2019. www.fdbhealth.com/policies/drug-pricing-policy.

^b Before use, the unit-dose vial should be inverted repeatedly until a uniform, white, opaque emulsion forms.

^c Contact lenses should be removed before instillation, but may be replaced 15 minutes after administration.

Topical Cyclosporine

A 0.05% emulsion of cyclosporine (Restasis) is FDA-approved for treatment of dry eye disease. Its mechanism of action is unknown, but is thought to involve immunomodulatory or anti-inflammatory effects. It has been effective in moderate to moderately severe tear dysfunction, producing statistically significant improvement in Schirmer tear test results and other measures of dryness and has been safe, but may take 4-6 weeks to achieve results. Serum cyclosporine concentrations have been undetectable or negligible, and no systemic or topical toxicity has been reported. Transient burning and stinging can occur in the treated eye; addition of topical corticosteroids in the first month may

be helpful. A 0.09% cyclosporine solution (Cequa) recently FDA-approved for this indication appears to be similar in efficacy, but comparative trials are lacking. Artificial tears available over the counter cost much less than either cyclosporine formulation and should be tried first.

Lifitegrast

A 5% ophthalmic solution of lifitegrast (Xiidra), a lymphocyte function-associated antigen-1 (LFA-1) antagonist, is FDA-approved for treatment of dry eye disease. Lifitegrast is thought to reduce ocular surface inflammation. It appears to be safe and at least modestly effective, but how it compares to other products remains to be determined.

ARTICLE INFORMATION

Once a month, *The Medical Letter* provides a previously published article to *JAMA* to be republished.

Previous Publication: The entire article and reference list were published in *The Medical Letter on Drugs and Therapeutics*. December 2, 2019;61 (1586):187-194. It is reprinted here with permission from ©The Medical Letter Inc.

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