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MANAGEMENT AND TREATMENT OF RED EYES IN PRIMARY CARE

Introduction

Red eyes are a common complaint in primary care settings, with a plethora of causes and implications. Some etiologies are benign and self-limiting, while others are sight threatening and require urgent referral to an ophthalmologist. Therefore, it is important for primary care physicians to be able to carry out a diligent eye exam, recognize the signs and symptoms of different types of red eye presentations, to initiate appropriate management and treatment and to refer to ophthalmology when needed.[1–5]

What Can't Be Missed in Primary Care and What Are The Most Common Entities?

Usually, the eye becomes red (hyperemia, injection) because of increased blood flow in the vessels of the conjunctiva, episclera, and/or sclera (due to trauma, chemical burns, or immune reactions), because of infections (by bacteria, viruses, parasites, or fungi), or because of the long-term impact to the outer eye related

to systemic diseases (such as Sjögren's syndrome).[6]

The most common causes of red eyes in primary care are **conjunctivitis, dry eye syndrome, blepharitis, episcleritis, and subconjunctival hemorrhage.**[1,2] These conditions are usually benign and can be managed with topical medications, lubricants, and hygiene measures. However, some of these conditions may be recurrent or associated with systemic diseases, such as diabetes, rheumatoid arthritis, other autoimmune syndromes, or infections, and may require a referral to an eye care specialist for further investigation and treatment.[3]

The most serious causes of red eyes that require urgent referral to ophthalmology or hospital are **acute angle-closure glaucoma, hyphema, foreign bodies, corneal abrasions, or ulcers, scleritis, uveitis, endophthalmitis, orbital cellulitis, and open globe.**[7] These conditions can cause severe pain, vision loss, and permanent damage to the eye if not treated promptly. Therefore, it is essential for primary care physicians to be able to identify the red flags that indicate a potential emergency, such as:[7–9]

- Recent history of trauma or intraocular surgery
- Symptoms, such as **acute or subacute:**
    - Severe ocular/periocular/retro-orbital pain or headache
    - Nausea or vomiting
    - Decreased visual acuity or visual field loss
    - Photophobia
    - Constant tearing
    - Diplopia
- Signs, such as **acute or subacute:**
    - Proptosis or lid swelling
    - Large subconjunctival hemorrhage after trauma
    - Sectorial blue/purple hue of the sclera (scleritis)
    - Chemosis (swelling of the conjunctiva)
    - Corneal opacity, infiltrate, ulceration, abrasion, edema
    - Hypopyon or hyphema
    - Peaked iris or positive Seidel sign
    - Relative afferent pupillary defect
    - Foreign body in conjunctiva/sclera, cornea or inside the globe

Disease	Typical findings (in addition to red eye)	Management (class equivalent)
Angle closure	High IOP, shallow anterior chamber, corneal edema, pain, nausea or vomiting	Acetazolamide 500 mg PO or IV once, drops q15 min x 3 doses: Timolol 0.5%, brimonidine 0.1%, brinzolamide 1%, latanoprost 0.005%
Corneal abrasion, ulcer, or foreign body (FB)	Corneal opacity, infiltrate, epithelial loss, FB in cornea, fluorescein staining, tearing, photophobia	Moxifloxacin 0.5% gtts q1h Dendrites: also start valacyclovir 500 mg TID PO
Hyphema	Layered blood in anterior chamber, recent trauma, anterior chamber cells, photophobia	Prednisolone 1 % drops Q2H, cyclopentolate 1% gtts TID, dexamethasone 0.1% ung QHS
Uveitis	Anterior chamber cells, pain, photophobia	Prednisolone 1 % drops Q2H, cyclopentolate 1% gtts TID, dexamethasone 0.1% ung QHS
Scleritis or necrotizing scleritis	Severe deep pain boring to back of eye or head, pain on eye palpation, thinning of sclera (purple hue)	Ibuprofen 400-600 mg TID-QID PO x 5 days
Endophthalmitis	Hypopyon, pain, anterior chamber cells, recent surgery/eye trauma	Moxifloxacin 0.5% gtts q1h, moxifloxacin 400 mg PO or IV daily, with cefazolin 1g IV q8h
Orbital cellulitis	Diplopia, pain with EOM, eyelid edema, proptosis	CT orbits with contrast, treat with ceftriaxone IV and flagyl
Open globe	Peaked iris, subconjunctival hemorrhage, conjunctival edema, Seidel positive, recent Trauma	Eye shield, pain and nausea meds, do not attempt to pull FB out, do not place an eye patch

Table 1. Ocular emergencies, findings and early management; *courtesy of Jamie Bhamra, MD*

When in doubt about the nature and the extent of the pathology, it is safer to put a clear shield over the affected eye, without an eye patch, as putting any pressure on the globe can extrude intraocular contents. In an ideal world, patients coming for a possible open globe would have a protective shield placed over the eye as soon as they enter your office or hospital.[8]

Table 1 describes main findings of these ocular emergencies and initial management that a primary physician may start before sending the patient to an ophthalmologist on call the same day. Consider postponing antibiotics if an ophthalmologist will be seeing the patient quickly as cultures may be required. Be sure to verify about allergies to medications.[7,8,10–12]

Understanding The Common Ophthalmologic Pathologies Seen In Primary Care Clinics, Their Treatment and Referral Timing

The following sections will provide brief description of common ophthalmologic pathologies that present as red eyes, along with their clinical features, diagnosis, management, and referral criteria.

In general, severe worsening, or persistent symptoms (including decreased vision) not responding to treatment, as well as uncertain diagnosis or management should trigger an ophthalmology referral for the following clinical entities.

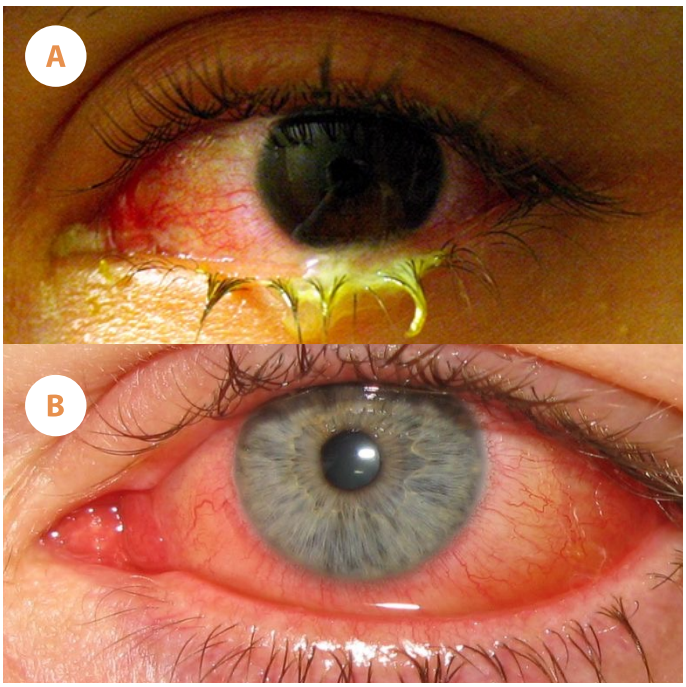


Figure 1: (A) A left eye with bacterial conjunctivitis. (B) A left eye with viral conjunctivitis. Note the lack of any significant purulent discharge in the viral case; *A: From CNX OpenStax, CC BY 4.0; B: From Marco Mayer, CC BY-SA 4.0.*

Conjunctivitis

Conjunctivitis is inflammation of the conjunctiva, a thin membrane covering the white part (sclera) of the eye and the inner surface of the eyelids. It can be caused by various agents, such as bacteria, viruses, allergens, or irritants.[13]

Main symptoms of conjunctivitis are redness, discharge, tearing, itching, burning, and foreign body sensation.[8]

Management of conjunctivitis depends on the type and severity of the condition. Bacterial conjunctivitis (*Figure 1A*) are usually swabbed to confirm the responsible organism (i.e., *Staphylococcus aureus, Staphylococcus epidermidis, Haemophilus influenzae, Streptococcus pneumoniae*, or *Moraxella catarrhalis*), and they are treated empirically with commonly available topical antibiotics. Gonococcal (superacute) or Chlamydial (chronic) conjunctivitis are considered and treated as sexually transmitted infections requiring reporting. Viral conjunctivitis (*Figure 1B*), from common cold viruses, are usually self-limiting and do not require specific treatment, but the following is recommended: isolation for up to 2 weeks or until symptoms resolve, frequent hand hygiene, wiping down frequently used surfaces and avoiding touching the eyes, sharing towels and pillowcases. Herpetic viruses (VZV, HSV1, HSV2) may need oral (or topical) antivirals, such as acyclovir or valacyclovir. Steroid and/or antibiotic topical regimens are typically not recommended in viral conjunctivitis. Allergic conjunctivitis are treated with cool compresses, chilled artificial tears, topical (and oral, if severe) antihistamines, antihistamines/mast cell stabilizer combinations, or corticosteroids (if severe), such as olopatadine, ketotifen, or loteprednol, for 2 to 4 weeks. Vasoconstrictors are never recommended in conjunctivitis.[8,14,15]

In addition to the above general referral criteria cited above, patients with conjunctivitis should be immediately

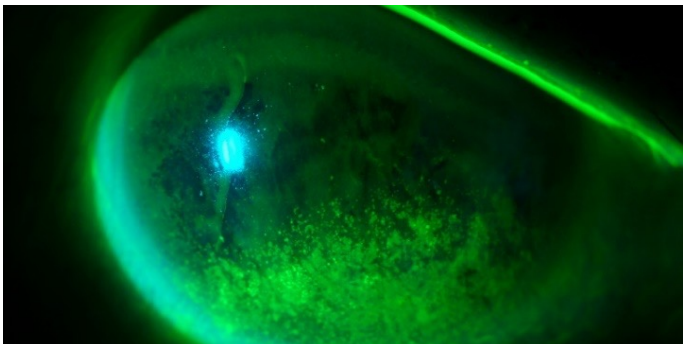


Figure 2: A cornea with punctate epithelial erosions (PEEs). These represent areas of epithelial cell loss and therefore stain positively with fluorescein. PEEs are evidence of ocular surface dryness. The distribution of the PEEs helps determine the underlying etiology. Inferior PEE, as seen above, can be secondary to exposure, chronic blepharitis, or trichiasis. This patient underwent multiple eyelid surgeries resulting in exposure keratopathy; *from Stefani Karakas, CC BY-NC-ND 3.0.*

referred for:[8,9]

- Suspected Gonococcal, herpes simplex (HSV) or zoster (VZV) infection
- Pre-existing ocular disease or immunocompromise
- Neonatal conjunctivitis.

Dry Eye Syndrome

Dry eye syndrome is a condition resulting from insufficient or poor-quality tears failing to lubricate and protect the ocular surface.[16] Two major forms are described (evaporative and aqueous-deficient) which can be caused by numerous factors, such as aging, hormonal changes, loss of tear film producing glands, increased focussed work (e.g., screens, books, driving), medications, systemic diseases, environmental conditions, or eyelid abnormalities (*Figure 2*).[17] The main symptoms of dry eye syndrome, which are usually worse at the end of the day, are tiredness, redness, burning, grittiness, foreign body sensation (sometimes sudden), tearing, light sensitivity, fluctuating, and decreased vision.[8]

General principles of treatment are to address underlying cause(s), supplement the tear film, prevent tear film loss, and protect the ocular surface. Treatments commonly used for dry eye syndrome include, primarily, eyelid hygiene, warm compresses, eyelids massages and frequent blinking (especially during focussed work). Artificial tears are helpful for acute symptoms and should be preservative-free if used more than QID.[9,18]

In addition to the above general referral criteria cited above, patients with dry eyes should be referred for:

- Suspected systemic disease association (e.g., Sjogren's syndrome)
- Continuous discomfort
- Exacerbation of symptoms.

Blepharitis

Blepharitis is inflammation of the eyelid margins and can be classified as anterior, posterior, or mixed.[19]

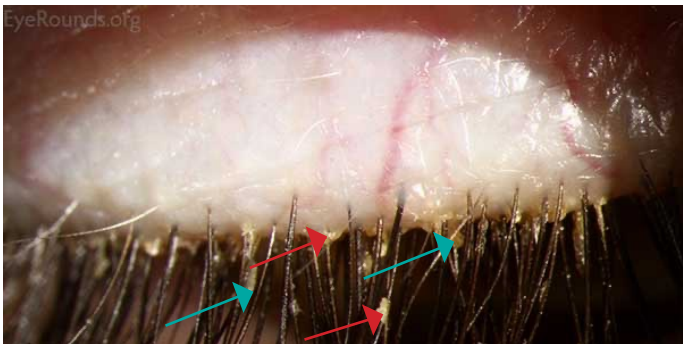


Figure 3: An upper lid with anterior blepharitis. Eyelid scaling or scurf (red arrows), typical of seborrheic blepharitis, have an oily or greasy consistency. Eyelash sleeves (green arrows), referred to as cylindrical dandruff, are typical of demodicosis. From Cindy Montague, CC BY-NC-ND 3.0. Arrows added for clarity

Anterior blepharitis affects primarily the base of the eyelashes and is caused by bacterial (staphylococcal) infections or seborrheic dermatitis (which can be accompanied by Demodex folliculitis – *Figure 3*). Posterior blepharitis, which primarily affects meibomian glands, is mainly caused by meibomian gland dysfunction.[9] Main symptoms of blepharitis, which are present upon awakening (in contrast to dry eyes – see above), are redness, scaling, crusting, itching, and burning of eyelids.[8]

Treatment of blepharitis aims to reduce bacterial load, remove the scales and crusts, improve meibomian gland function, and control inflammation and symptomatology. Commonly treatments for blepharitis include eyelid and eyelash cleansing, warm compresses (5-10 min) QD-BID and artificial tears QID. If signs and symptoms prevail, consider topical antibiotics (apply erythromycin ointment nightly on lashes) for 2 weeks, and next oral antibiotics (Doxycycline 100 mg BID) for 4-6 weeks.[20]

In addition to the above general referral criteria cited above, patients with blepharitis should be referred for:

- Complications, such as a chalazion or hordeolum not responding to conservative measures
- Eyelid malposition
- Suspected malignancy or other eyelid lesions
- Vascularization or marginal infiltrates of the cornea.

Subconjunctival Hemorrhage

Subconjunctival hemorrhage is bleeding collecting under the conjunctiva (*Figure 4*). It may be caused by numerous

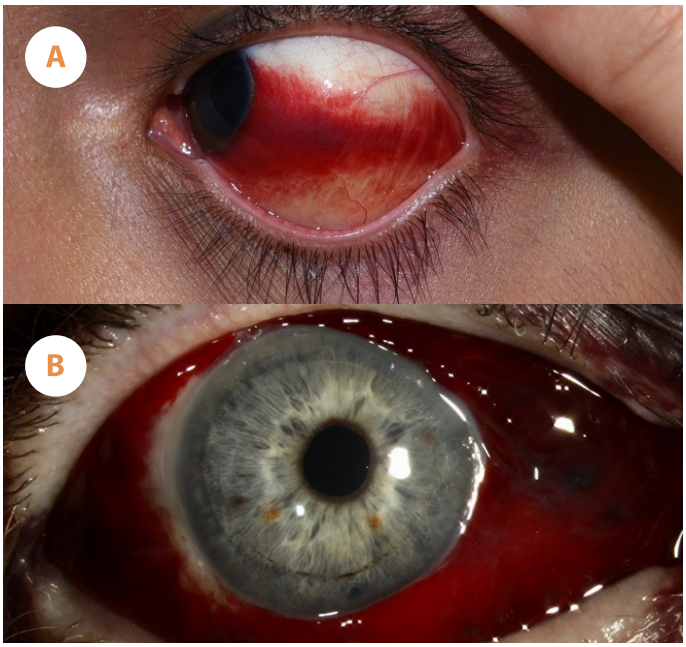


Figure 4: Subconjunctival haemorrhages can present as (A) small and localised or (B) large and diffuse. The amount and distribution of blood do not typically affect the management, which will be conservative and supportive; A: From Audrey C. Ko, MD, CC BY-NC-ND 3.0; B: From Toni Venckus, CC BY-NC-ND 3.0.

factors, such as trauma, coughing, sneezing, straining, hypertension, bleeding disorders, or use of anticoagulant medications.[21–23] The main sign of subconjunctival hemorrhage is a bright red patch on the white part of the eye, usually painless and not affecting vision. Mild tenderness may occur and resolves in 1-2 days.

Management of subconjunctival hemorrhage is conservative and supportive, as the condition is self-limited and usually does not require specific treatment. Treatments commonly used for subconjunctival hemorrhage include artificial tears, cold compresses, and sometimes analgesics, to relieve discomfort and to prevent dryness, exposure, and irritation. Subconjunctival hemorrhage usually resolves within 1 to 2 weeks, as blood is gradually absorbed by the body. Stopping blood thinners for this condition is not usually recommended or necessary.[8]

In addition to the above general referral criteria cited above, patients with subconjunctival hemorrhage should be referred for:

• Suspicion or recent history of ocular or orbital trauma.

Episcleritis

Episcleritis is a condition causing inflammation and redness of episclera, which is most superficial layer of the sclera, beneath the conjunctiva (*Figure 5A*). It usually affects one eye, sometimes both, may present with a discrete inflamed nodule, and occurs in a sectoral or diffuse pattern. Episcleritis is mild and often goes away on its own without treatment but tends to recur. It can cause discomfort, tearing, and sensitivity to light. It is sometimes associated with ocular surface problems or autoimmune disorders, such as rheumatoid arthritis, lupus, or Crohn's disease.[24] Episcleritis must be carefully distinguished from scleritis (*Figure 5B*), a more severe inflammation of deeper layers of the sclera leading to possible permanent eye damage if not treated promptly.[24] Scleritis presents with a high level of deep, boring pain and severe tenderness, even to light touch. Additionally, since scleral vascular dilation lies deeper, eye redness does not go away after instillation of phenylephrine drops and these dilated vessels are not mobile with a cotton tip. [8,9]

Episcleritis is treated with chilled artificial tears, cold compresses, and anti-inflammatory drugs, such

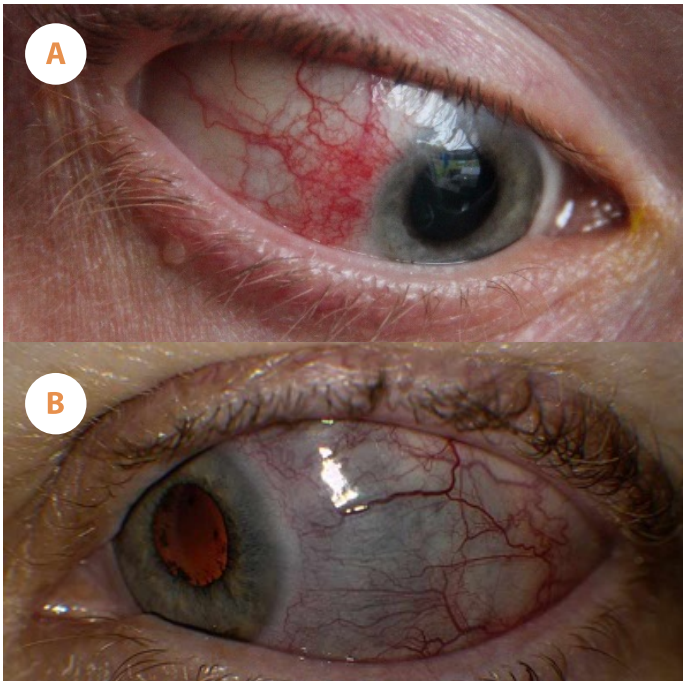


Figure 5: (A) Right eye with sectoral episcleritis. Episcleral inflammation is superficial and will typically blanch with the application of topical phenylephrine 2.5%. (B) A left eye with scleritis in a patient with rheumatoid arthritis. In contrast to episcleritis, scleral inflammation lies deeper and typically presents with a violaceous hue under natural light, which suggest thinning of the sclera; *A: From Asagan, CC BY-SA 3.0; B: From Cindy Montague, CC BY-NC-ND 3.0.*

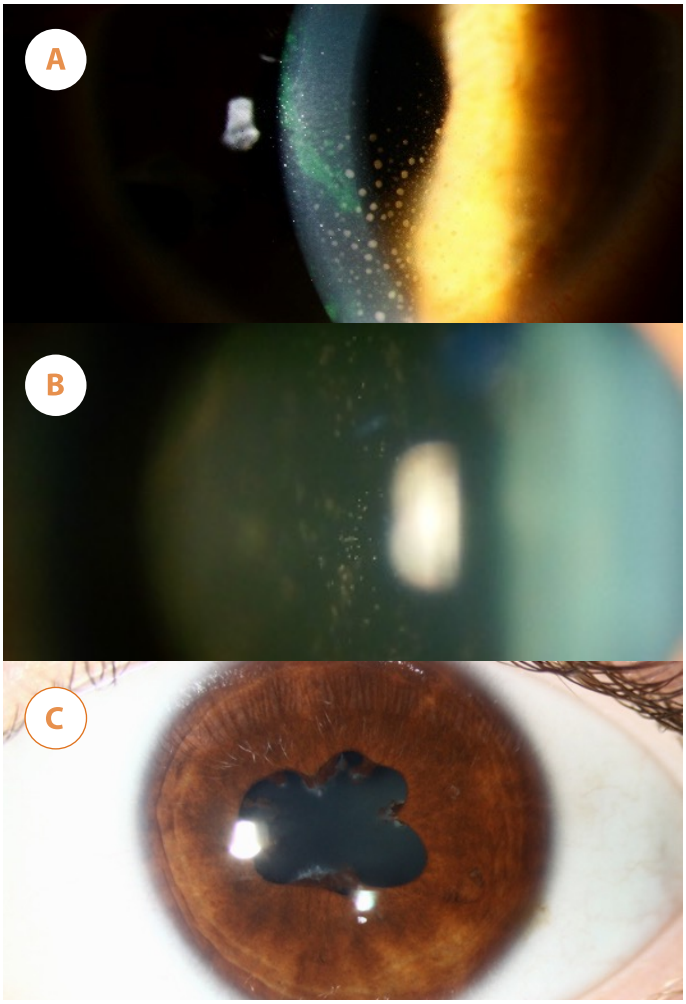


Figure 6: Three typical findings in anterior uveitis, from front to back: (A) keratic precipitates on the corneal endothelium, (B) white blood cells in the anterior chamber and (C) irregular, poorly reactive pupil due to posterior adhesion (synechiae) of the iris to the lens capsule.; *A: From Stefani Karakas, CC BY-NC-ND 3.0; B: From Imrankabirhossain, CC BY-SA 4.0; C: From Toni Venckus, CC BY-NC-ND 3.0.*

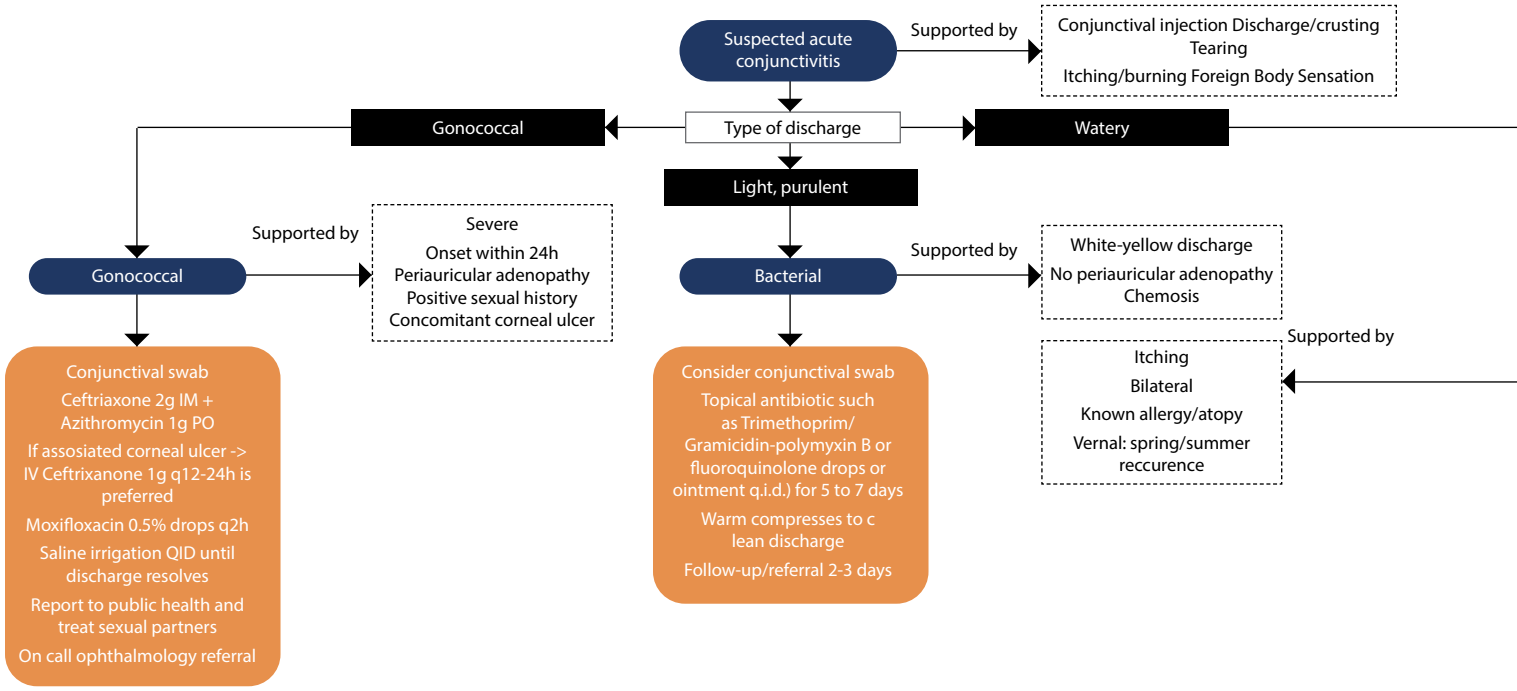


Figure 1. Algorithm for the management of conjunctivitis; *courtesy of Jamie Bhamra, MD*

as ibuprofen (400-600 mg TID-QID PO x 5 days) or corticosteroid eye drops (Fluoromethalone 0.1% gtts 4-6 x / day). Episcleritis usually resolves within 1-2 weeks, but it may recur. [8]

In addition to the above general referral criteria cited above, patients with episcleritis should be referred for:

- Recurrent or bilateral episcleritis
- Suspected scleritis
- Evidence of systemic disease or infection

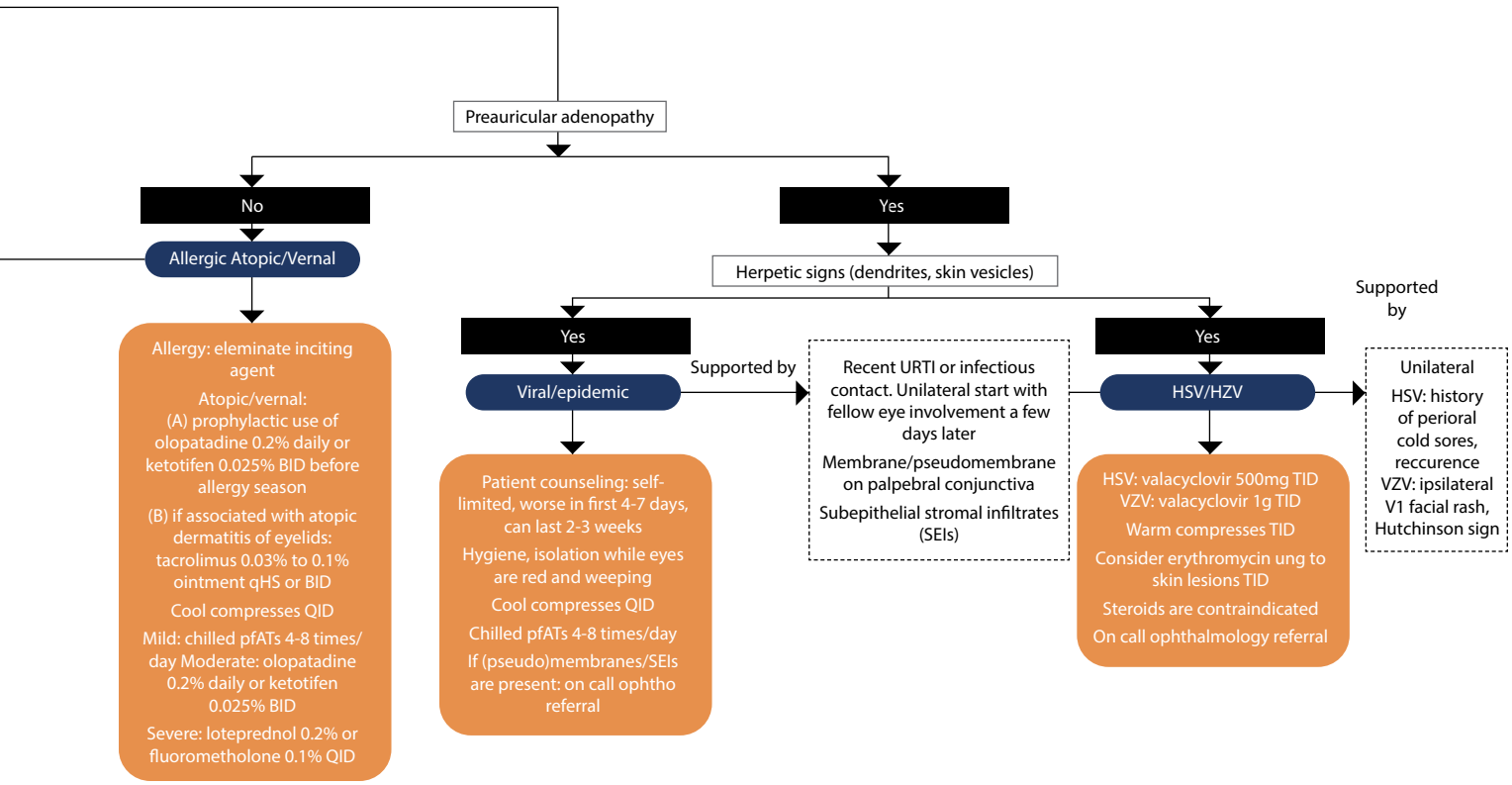
Uveitis

Uveitis describes a group of inflammatory conditions affecting the uvea, the "middle layer" of the eye composed of the iris (anterior), the ciliary body (intermediate), and the choroid (posterior). Etiologies of uveitis may be infectious or non-infectious. Infectious uveitis is caused by various microorganisms, such as bacteria, viruses, fungi, parasites, or protozoa, invading the eye directly or spread from a systemic infection. Non-infectious uveitis is associated with various systemic or ocular conditions, such as autoimmune diseases, neoplastic processes, trauma or surgery. In many cases, the cause of uveitis is unknown (idiopathic uveitis).[25]

Symptoms of uveitis vary on type and location of the inflammation and include eye pain and photophobia (worse in anterior uveitis, yet minimal in intermediate or posterior uveitis), blurred vision (mild to moderate in anterior uveitis, usually more severe in posterior uveitis), and floaters (clumps of vitreous cells in intermediate or posterior uveitis). Anterior uveitis, also called iritis, is more prevalent and usually causes more eye redness.[8]

Anterior chamber cells or white deposits on the corneal endothelium (keratic precipitates [KPs]) on slit lamp examination are almost pathognomonic for anterior uveitis (*Figure 6*). If a slit lamp is not available, detailed medical history and careful review of systems are necessary to find symptoms associated with systemic, immune-mediated diseases. These symptoms include fevers, chills, fatigue, malaise, cough, dyspnea, arthritis, diarrhea, blood in stool/urine, skin rashes, and oral/genital ulcers.[8] Sometimes, KPs may be viewed with direct illumination from a penlight or through a red reflex with by a direct ophthalmoscope. Irregular, poorly reactive pupils are also clues of possible anterior uveitic processes. Another helpful sign is consensual photophobia: in patients with unilateral uveitis, shining a bright light in the unaffected eye will induce pain in the affected eye.[7]

Uveitis can cause significant ocular morbidity and vision loss, especially when not diagnosed and treated promptly. Primary care providers should focus on identifying the condition, initiating first-line therapy, and



immediately referring to an eye specialist on call. More urgent considerations should be made for delayed or inadequate treatment, frequent recurrences or chronicity, involvement of both eyes, intermediate, posterior or panuveitis, association with systemic diseases or ocular comorbidities, and development of complications such as cataract, glaucoma, or retinal detachment.[25]

Conclusions

Red eyes are a common and challenging problem in primary care settings requiring careful, systematic, and comprehensive approach for accurate diagnosis and treatment. The primary care physician can become very familiar with common and serious ophthalmologic conditions presenting with red eyes. Moreover, primary care providers can be well suited to determine when a patient with a red eye requires the prompt attention of an eye specialist on call. We strive that, by using key points discussed above, our primary care colleagues feel better equipped and comfortable in providing optimized care for patients with common and emergency red eye presentations.

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Financial Disclosures:

None declared.

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