

PREFERRED PRACTICE PATTERN®



Conjunctivitis

Secretary for Quality of Care
Anne L. Coleman, MD, PhD

Academy Staff

Nicholas P. Emptage, MAE
Nancy Collins, RN, MPH
Doris Mizuri
Jessica Ravetto
Flora C. Lum, MD

Medical Editor: Susan Garratt
Design: Socorro Soberano

Approved by: Board of Trustees
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CORNEA/EXTERNAL DISEASE PREFERRED PRACTICE PATTERN® DEVELOPMENT PROCESS AND PARTICIPANTS

The **Cornea/External Disease Preferred Practice Pattern® Panel** members wrote the Conjunctivitis Preferred Practice Pattern® guidelines (“PPP”). The PPP Panel members discussed and reviewed successive drafts of the document, meeting in person twice and conducting other review by e-mail discussion, to develop a consensus over the final version of the document.

Cornea/External Disease Preferred Practice Pattern Panel 2012–2013

Robert S. Feder, MD, Co-chair
 Stephen D. McLeod, MD, Co-chair
 Esen K. Akpek, MD, Cornea Society Representative
 Steven P. Dunn, MD
 Francisco J. Garcia-Ferrer, MD
 Amy Lin, MD
 Francis S. Mah, MD
 Audrey R. Talley-Rostov, MD
 Divya M. Varu, MD
 David C. Musch, PhD, MPH, Methodologist

The **Preferred Practice Patterns Committee** members reviewed and discussed the document during a meeting in March 2013. The document was edited in response to the discussion and comments.

Preferred Practice Patterns Committee 2013

Stephen D. McLeod, MD, Chair
 David F. Chang, MD
 Robert S. Feder, MD
 Timothy W. Olsen, MD
 Bruce E. Prum, Jr., MD
 C. Gail Summers, MD
 David C. Musch, PhD, MPH, Methodologist

The Conjunctivitis PPP was then sent for review to additional internal and external groups and individuals in June 2013. All those returning comments were required to provide disclosure of relevant relationships with industry to have their comments considered. Members of the Cornea/External Disease Preferred Practice Pattern Panel reviewed and discussed these comments and determined revisions to the document.

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 Asia Cornea Society
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 Ocular Microbiology and Immunology Group
 Carol L. Karp, MD
 David B. Glasser, MD



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In compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies (available at www.cmss.org/codeforinteractions.aspx), relevant relationships with industry are listed. The Academy has Relationship with Industry Procedures to comply with the Code (available at <http://one.aao.org/CE/PracticeGuidelines/PPP.aspx>). A majority (70%) of the members of the Cornea/External Disease Preferred Practice Pattern Panel 2012-2013 had no financial relationship to disclose.

Cornea/External Disease Preferred Practice Pattern Panel 2012–2013

Esen K. Akpek, MD: No financial relationships to disclose

Steven P. Dunn, MD: No financial relationships to disclose

Robert S. Feder, MD: No financial relationships to disclose

Francisco J. Garcia-Ferrer: No financial relationships to disclose

Amy Lin, MD: No financial relationships to disclose

Francis S. Mah, MD: Alcon Laboratories, Inc. – Consultant/Advisor; Allergan, Inc. – Consultant/Advisor, Lecture fees; ForeSight – Consultant/Advisor; Ista Pharmaceuticals – Consultant/Advisor; Nicox – Consultant/Advisor; Omeros – Consultant/Advisor

Stephen D. McLeod, MD: No financial relationships to disclose

David C. Musch, PhD, MPH: Abbott Laboratories – Consultant fees (member of Independent Data Monitoring Committee); ClinReg Consulting Services, Inc. – Consultant/Advisor

Audrey R. Talley-Rostov, MD: Addition Technology – Lecture fees; Allergan, Inc. – Lecture fees

Divya M. Varu, MD: No financial relationships to disclose

Preferred Practice Patterns Committee 2013

David F. Chang, MD: Abbott Medical Optics – Consultant/Advisor; Allergan, Inc. – Lecture fees; SLACK, Inc. – Patent/Royalty

Robert S. Feder, MD: No financial relationships to disclose

Stephen D. McLeod, MD: No financial relationships to disclose

David C. Musch, PhD, MPH: Abbott Laboratories – Consultant fees (member of Independent Data Monitoring Committee); ClinReg Consulting Services, Inc. – Consultant/Advisor

Timothy W. Olsen, MD: A Tissue Support Structure – Patents/Royalty; Scleral Depressor – Patents/Royalty

Bruce E. Prum, Jr., MD: Pfizer Ophthalmics – Lecture fees

C. Gail Summers, MD: No financial relationships to disclose

Secretary for Quality of Care

Anne L. Coleman, MD, PhD: Allergan, Inc. – Consultant/Advisor; Pfizer Ophthalmics – Consultant/Advisor

Academy Staff

Nicholas P. Emptage, MAE: No financial relationships to disclose

Nancy Collins, RN, MPH: No financial relationships to disclose

Susan Garratt, Medical Editor: No financial relationships to disclose

Flora C. Lum, MD: No financial relationships to disclose

Doris Mizuri: No financial relationships to disclose

Jessica Ravetto: No financial relationships to disclose

The disclosures of relevant relationships to industry of other reviewers of the document from January to August 2013 are available online at www.aao.org/ppp.



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OBJECTIVES OF PREFERRED PRACTICE PATTERN® GUIDELINES

As a service to its members and the public, the American Academy of Ophthalmology has developed a series of Preferred Practice Pattern® guidelines that **identify characteristics and components of quality eye care**. Appendix 1 describes the core criteria of quality eye care.

The Preferred Practice Pattern® guidelines are based on the best available scientific data as interpreted by panels of knowledgeable health professionals. In some instances, such as when results of carefully conducted clinical trials are available, the data are particularly persuasive and provide clear guidance. In other instances, the panels have to rely on their collective judgment and evaluation of available evidence.

These documents provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these PPPs will not ensure a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients' needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.

Preferred Practice Pattern® guidelines are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.

References to certain drugs, instruments, and other products are made for illustrative purposes only and are not intended to constitute an endorsement of such. Such material may include information on applications that are not considered community standard, that reflect indications not included in approved U.S. Food and Drug Administration (FDA) labeling, or that are approved for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use, and to use them with appropriate patient consent in compliance with applicable law.

Innovation in medicine is essential to ensure the future health of the American public, and the Academy encourages the development of new diagnostic and therapeutic methods that will improve eye care. It is essential to recognize that true medical excellence is achieved only when the patients' needs are the foremost consideration.

All Preferred Practice Pattern® guidelines are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly. To ensure that all PPPs are current, each is valid for 5 years from the "approved by" date unless superseded by a revision. Preferred Practice Pattern guidelines are funded by the Academy without commercial support. Authors and reviewers of PPPs are volunteers and do not receive any financial compensation for their contributions to the documents. The PPPs are externally reviewed by experts and stakeholders, including consumer representatives, before publication. The PPPs are developed in compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies. The Academy has Relationship with Industry Procedures (available at <http://one.aao.org/CE/PracticeGuidelines/PPP.aspx>) to comply with the Code.

Appendix 2 contains the International Statistical Classification of Diseases and Related Health Problems (ICD) codes for the disease entities that this PPP covers. The intended users of the Conjunctivitis PPP are ophthalmologists.



METHODS AND KEY TO RATINGS

Preferred Practice Pattern® guidelines should be clinically relevant and specific enough to provide useful information to practitioners. Where evidence exists to support a recommendation for care, the recommendation should be given an explicit rating that shows the strength of evidence. To accomplish these aims, methods from the Scottish Intercollegiate Guideline Network¹ (SIGN) and the Grading of Recommendations Assessment, Development and Evaluation² (GRADE) group are used. GRADE is a systematic approach to grading the strength of the total body of evidence that is available to support recommendations on a specific clinical management issue. Organizations that have adopted GRADE include SIGN, the World Health Organization, the Agency for Healthcare Research and Policy, and the American College of Physicians.³

- ◆ All studies used to form a recommendation for care are graded for strength of evidence individually, and that grade is listed with the study citation.
- ◆ To rate individual studies, a scale based on SIGN¹ is used. The definitions and levels of evidence to rate individual studies are as follows:

I++	High-quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias
I+	Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
I-	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
II++	High-quality systematic reviews of case-control or cohort studies High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
II+	Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
II-	Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
III	Nonanalytic studies (e.g., case reports, case series)

- ◆ Recommendations for care are formed based on the body of the evidence. The body of evidence quality ratings are defined by GRADE² as follows:

Good quality	Further research is very unlikely to change our confidence in the estimate of effect
Moderate quality	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Insufficient quality	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate Any estimate of effect is very uncertain

- ◆ Key recommendations for care are defined by GRADE² as follows:

Strong recommendation	Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not
Discretionary recommendation	Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

- ◆ The Highlighted Findings and Recommendations for Care section lists points determined by the PPP panel to be of particular importance to vision and quality of life outcomes.
- ◆ All recommendations for care in this PPP were rated using the system described above. To locate ratings for specific recommendations, see Appendix 3 for additional information.
- ◆ Literature searches to update the PPP were undertaken in June 2012 and January 2013 in PubMed and the Cochrane Library. Complete details of the literature search are available at www.aao.org/ppp.



HIGHLIGHTED FINDINGS AND RECOMMENDATIONS FOR CARE

Conjunctivitis has been cited as one of the most frequent causes of patient self-referral.⁴ Conjunctivitis infrequently causes permanent visual loss or structural damage, but the economic impact of the disease in terms of lost work time, cost of medical visits, diagnostic testing, and medication is considerable.^{5,6}

Chronic and/or recalcitrant conjunctivitis may be indicative of an underlying malignancy, such as sebaceous or squamous cell carcinoma.

The ophthalmologist plays a critical role in breaking the chain of transmission of epidemic adenoviral conjunctivitis, primarily by educating the patient and family about proper hygiene. Infected individuals should be counseled to wash hands frequently and use separate towels, and to avoid close contact with others during the period of contagion.

Wiping with 70% alcohol may not be effective in eliminating adenovirus from tonometer tips.⁷ Surfaces should be disinfected with an EPA-registered hospital disinfectant in accordance with the label's use directions and safety precautions.

Treatment of conjunctivitis is ideally directed at the root cause. Indiscriminate use of topical antibiotics or corticosteroids should be avoided, because antibiotics can induce toxicity and corticosteroids can potentially prolong adenoviral infections and worsen herpes simplex virus infections. Viral conjunctivitis will not respond to anti-bacterial agents, and mild bacterial conjunctivitis is likely to be self-limited. Moreover, the choice of topical antibiotic agent for treatment of bacterial conjunctivitis is empiric, as no evidence exists demonstrating the superiority of any particular agent.

In adults, conjunctivitis caused by ocular mucous membrane pemphigoid (OMMP), graft-versus-host disease (GVHD), gonococcus, and chlamydia is important to detect early because it is necessary to treat the concomitant systemic disorder. Diagnosis of superior limbic keratoconjunctivitis (SLK) may lead to further investigations that reveal a thyroid disorder. Early detection of conjunctivitis associated with neoplasms may be lifesaving.



INTRODUCTION

DISEASE DEFINITION

Conjunctivitis is an inflammation that affects the conjunctiva primarily.

PATIENT POPULATION

The patient population includes individuals of all ages who present with symptoms and signs suggestive of conjunctivitis, such as red eye or discharge.

CLINICAL OBJECTIVES

- ◆ Establish the diagnosis of conjunctivitis, differentiating it from other causes of red eye
- ◆ Identify the cause(s) of conjunctivitis
- ◆ Establish appropriate therapy
- ◆ Relieve discomfort and pain
- ◆ Prevent complications
- ◆ Prevent the spread of communicable diseases
- ◆ Educate and engage the patient and referring healthcare providers in the management of this disease



BACKGROUND

Conjunctivitis, or inflammation of the conjunctiva, is a general term that refers to a diverse group of diseases/disorders that affect the conjunctiva primarily. Most varieties of conjunctivitis are self-limited, but some progress and may cause serious ocular and extraocular complications.

Conjunctivitis can be classified as noninfectious or infectious, and as acute, chronic, or recurrent. The types of noninfectious conjunctivitis are allergic, mechanical/irritative/toxic, immune-mediated, and neoplastic. The causes for noninfectious conjunctivitis may overlap. The causes of infectious conjunctivitis include viruses and bacteria.

It is important to differentiate among processes that involve the conjunctiva primarily and those in which conjunctival inflammation is secondary to systemic or ocular diseases. For example, although dry eye and blepharitis are the most frequent causes of conjunctival inflammation, the treatment for each of these entities is directed at correcting the underlying problems.^{8,9} Systemic diseases such as gonorrhea or atopy may also cause conjunctival inflammation, and treatment of conjunctivitis should include treatment of the systemic disease. Ligneous conjunctivitis is caused by plasminogen deficiency resulting in multiorgan pseudomembranous disease of mucous membranes in the mouth, nasopharynx, trachea, and female genital tract. This chronic childhood membranous conjunctivitis has been treated successfully with intravenous lysplasminogen¹⁰ or topical plasminogen drops.¹¹

This Preferred Practice Pattern addresses the following types of conjunctivitis that are most common or are particularly important to detect and treat:

- ◆ Allergic
 - ◆ Seasonal allergic conjunctivitis
 - ◆ Vernal conjunctivitis
 - ◆ Atopic conjunctivitis
 - ◆ Giant papillary conjunctivitis (GPC), which also has a mechanical component
- ◆ Mechanical/Irritative/Toxic
 - ◆ Superior limbic keratoconjunctivitis (SLK)
 - ◆ Contact-lens-related keratoconjunctivitis
 - ◆ Floppy eyelid syndrome
 - ◆ Giant fornix syndrome
 - ◆ Pediculosis palpebrarum (Phthirus pubis)
 - ◆ Medication-induced keratoconjunctivitis
 - ◆ Conjunctival chalasis

**Conjunctivitis PPP:
Prevalence and Risk Factors**

- ◆ Viral
 - ◆ Adenoviral conjunctivitis
 - ◆ Herpes simplex virus (HSV) conjunctivitis
 - ◆ Varicella (herpes) zoster virus (VZV) conjunctivitis
 - ◆ Molluscum contagiosum
- ◆ Bacterial
 - ◆ Bacterial conjunctivitis (including nongonococcal and gonococcal)
 - ◆ Chlamydial conjunctivitis
- ◆ Immune-mediated
 - ◆ Ocular mucous membrane pemphigoid (OMMP)
 - ◆ Graft-versus-host disease (GVHD)
 - ◆ Stevens-Johnson syndrome
- ◆ Neoplastic
 - ◆ Sebaceous carcinoma
 - ◆ Ocular surface squamous neoplasia
 - ◆ Melanoma

PREVALENCE AND RISK FACTORS

Conjunctivitis is a diagnosis that encompasses a diverse group of diseases that occur worldwide and affect all ages, all social strata, and both genders. Although there are no reliable figures that document the incidence or prevalence of all forms of conjunctivitis, this condition has been cited as one of the most frequent causes of patient self-referral.⁴ Conjunctivitis infrequently causes permanent visual loss or structural damage, but the economic impact of the disease in terms of lost work time, cost of medical visits, diagnostic testing, and medication is considerable.^{5,6}

The risk factors for developing conjunctivitis depend on the etiology. The associated and predisposing factors for the types of conjunctivitis that are most common or most important to treat are listed in Table 1. Symptoms may be exacerbated by the coexistence of blepharitis, dry eye, or other causes of ocular surface inflammation.

TABLE 1 ASSOCIATED/PREDISPOSING FACTORS FOR CONJUNCTIVITIS

Type of Conjunctivitis	Associated/Predisposing Factors
Allergic	
Seasonal	<ul style="list-style-type: none"> • Environmental allergens
Vernal	<ul style="list-style-type: none"> • Hot, dry environments such as West Africa; parts of India, Mexico, Central, North, and South America; and the Mediterranean area • Environmental allergens for acute exacerbations
Atopic	<ul style="list-style-type: none"> • Genetic predisposition to atopy • Environmental allergens and irritants for acute exacerbations
Giant papillary conjunctivitis (GPC)	<ul style="list-style-type: none"> • Contact lens wear. (Risk factors include soft contact lenses, infrequent lens replacement, prolonged wearing time, poor lens hygiene, allergenic contact lens solutions, high water content or poor contact lenses fit.) Also occurs with irritation from exposed sutures and prostheses.
Mechanical/Irritative/Toxic	
Superior limbic keratoconjunctivitis (SLK)	<ul style="list-style-type: none"> • Frequently associated with dysthyroid states, female gender
Contact-lens-related keratoconjunctivitis	<ul style="list-style-type: none"> • Occurs in association with contact lens wear as reaction to mechanical irritation, chronic hypoxia, or preservatives
Floppy eyelid syndrome	<ul style="list-style-type: none"> • Obesity, sleep apnea, upper-eyelid laxity, upper-eyelid excursion over lower eyelid (eyelid imbrication)
Giant fornix syndrome	<ul style="list-style-type: none"> • Elderly women (8th to 10th decade), upper-eyelid ptosis with large superior fornix, which holds coagulum of mucopurulent material^{12,13}
Pediculosis palpebrarum (<i>Phthirus pubis</i>)	<ul style="list-style-type: none"> • Typically sexually transmitted. May have associated pubic lice or other sexually transmitted diseases. In children, may be an indication of sexual abuse.

**Conjunctivitis PPP:
Prevalence and Risk Factors**

TABLE 1 ASSOCIATED/PREDISPOSING FACTORS FOR CONJUNCTIVITIS (CONTINUED)

Type of Conjunctivitis	Associated/Predisposing Factors
Mechanical/Irritative/Toxic (continued)	
Medication-induced keratoconjunctivitis	<ul style="list-style-type: none"> • Glaucoma medications, antibiotics, antivirals, others; may be associated with preservatives in all eye medications. Most common with multiple eye medications and/or frequent dosing.
Conjunctival chalasis	<ul style="list-style-type: none"> • Previous eye surgery • Dry eye • Redundant conjunctivitis
Viral	
Adenoviral	<ul style="list-style-type: none"> • Exposure to infected individual (especially in school setting), recent ocular testing, concurrent upper respiratory infection
Herpes simplex virus (HSV)	<ul style="list-style-type: none"> • Prior infection with HSV: trigger for reactivation such as stress, other acute viral or febrile illnesses, ultraviolet exposure, or trauma • Primary HSV infection: exposure to infected individual
Varicella (herpes) zoster virus (VZV)	<ul style="list-style-type: none"> • Acute chicken pox, exposure to an individual with active chicken pox or recurrent VZV (shingles)
Molluscum contagiosum	<ul style="list-style-type: none"> • Predominantly older children and young adults. Immunocompromised state (e.g., human immunodeficiency virus) may predispose to multiple and/or large molluscum lesions
Bacterial	
Neonate	<ul style="list-style-type: none"> • Vaginal delivery by infected mother; inadequate prenatal care
Infant	<ul style="list-style-type: none"> • Nasolacrimal duct obstruction, concomitant bacterial otitis media or pharyngitis, exposure to infected individual
Child	<ul style="list-style-type: none"> • Contact with infected individual; concomitant bacterial otitis media, sinusitis, or pharyngitis; nasopharyngeal bacterial colonization; oculogenital spread with sexual abuse
Adult	<ul style="list-style-type: none"> • Contact with infected individual, oculogenital spread, infection or abnormality of adnexal structure, lid malposition, severe tear deficiency, immunosuppression, trauma
Immune-mediated	
Ocular mucous membrane pemphigoid (OMMP)	<ul style="list-style-type: none"> • Unknown (genetic predisposition may exist) • Topical drugs may produce OMMP-like disease, with spectrum of severity ranging from self-limited to progressive disease indistinguishable from OMMP. Associated drugs include pilocarpine and timolol. Cicatrizing conjunctivitis appearing similar to OMMP can be associated with other disorders including atopic disease and underlying neoplasms, such as paraneoplastic pemphigus and paraneoplastic lichen planus.^{14,15}
Graft-versus-host disease (GVHD)	<ul style="list-style-type: none"> • Patients who have undergone allogeneic stem cell transplantation
Stevens-Johnson syndrome	<ul style="list-style-type: none"> • Unknown (genetic predisposition may exist) • Prior infection (e.g., HSV, mumps, mycoplasma pneumoniae) • Systemic medications (e.g., sulfonamides, barbiturates, or phenytoin) produce inflammation and cicatricial changes of the various mucous membranes of the body including the bulbar and palpebral conjunctiva
Neoplastic	
Sebaceous carcinoma	<ul style="list-style-type: none"> • Unknown (rarely follows radiation therapy)
Ocular surface squamous neoplasia	<ul style="list-style-type: none"> • Associated with human papillomavirus (HPV); associated with significant exposure to ultraviolet (UV) light; longstanding chronic inflammation may be associated¹⁶
Melanoma	<ul style="list-style-type: none"> • Associated with significant exposure to UV light; a history of systemic melanoma may exist; previous pigmented lesions such as primary acquired melanosis (PAM) or nevus of Ota

Conjunctivitis PPP

NATURAL HISTORY

The natural history of each type of conjunctivitis depends on its etiology. Table 2 lists the natural history for the types of conjunctivitis that are most common or most important to treat.

TABLE 2 NATURAL HISTORY OF CONJUNCTIVITIS

Type of Conjunctivitis	Natural History	Potential Sequelae
Allergic		
Seasonal	Recurrent	Minimal, local
Vernal	Onset in childhood; chronic course with acute exacerbations during spring and summer. Gradual decrease in activity within 2 to 30 years.	Eyelid thickening; ptosis; conjunctival scarring; corneal neovascularization, thinning, ulceration, infection; visual loss; keratoconus
Atopic	Onset in childhood; chronic course with acute exacerbations	Eyelid thickening or tightening, loss of lashes; conjunctival scarring; corneal scarring, neovascularization, thinning, keratoconus, infection, ulceration; cataract; visual loss
Giant papillary conjunctivitis (GPC)	Chronic gradual increase in symptoms and signs with contact lens wear, exposed corneal or scleral sutures, ocular prosthesis	Ptosis
Mechanical/Irritative/Toxic		
Superior limbic keratoconjunctivitis (SLK)	Subacute onset of symptoms, usually bilateral. May wax and wane for years.	Superior conjunctival keratinization, pannus, filamentary keratitis
Contact-lens-related keratoconjunctivitis	Subacute to acute onset of symptoms. May take months or longer to resolve with treatment and withdrawal of contact lenses.	Superior epitheliopathy and corneal scarring; limbal stem cell deficiency; may progress centrally into the pupillary area
Floppy eyelid syndrome	Chronic ocular irritation due to nocturnal eyelid ectropion causing upper-tarsal conjunctiva to come in contact with bedding	Punctate epithelial keratitis; corneal neovascularization, ulceration, and scarring; keratoconus
Giant fornix syndrome	Chronic mucopurulent conjunctivitis, which waxes and wanes with typical short courses of topical antibiotic therapy	Elderly women, ptosis, superior hyperemia, chronic conjunctivitis, large superior fornix with coagulum of mucopurulent material
Pediculosis palpebrarum (<i>Phthirus pubis</i>)	Blepharitis and conjunctivitis persist until treated	Chronic blepharitis, conjunctivitis, and, rarely, marginal keratitis
Medication-induced keratoconjunctivitis	Gradual worsening with continued use	Corneal epithelial erosion, persistent epithelial defect, corneal ulceration, pannus, corneal and conjunctival scarring
Conjunctival chalasis ¹⁷	Chronic irritation; dry eye	Redundant conjunctiva
Viral		
Adenoviral	Self-limited, with improvement of symptoms and signs within 5–14 days	Mild cases: none. Severe cases: conjunctival scarring, symblepharon, and subepithelial corneal infiltrates
Herpes simplex virus (HSV)	Usually subsides without treatment within 4–7 days unless complications occur	Epithelial keratitis, stromal keratitis, neovascularization, scarring, thinning, perforation, uveitis, trabeculitis
Varicella (herpes) zoster (VZV)	Primary infection (chicken pox), as well as conjunctivitis from recurrent infection, usually subsides in a few days. Vesicles can form at the limbus, especially in primary infection. The conjunctivitis is generally papillary in nature.	Necrosis and scarring from vesicles on the eyelid margins, conjunctiva, and in the corneal stroma in primary disease in children. Conjunctival scarring from secondary infection can lead to cicatricial ectropion. In recurrent disease, keratitis of the epithelium or stroma and late corneal anesthesia or dry eye
Molluscum contagiosum	Conjunctivitis is associated with eyelid lesions, which can spontaneously resolve or persist for months to years	Conjunctival scarring, epithelial keratitis, pannus; less commonly subepithelial infiltrates/haze/scar, occlusion of the puncta, follicular conjunctivitis

TABLE 2 NATURAL HISTORY OF CONJUNCTIVITIS (CONTINUED)

Type of Conjunctivitis	Natural History	Potential Sequelae
Bacterial		
Nongonococcal	Mild: self-limited in adults. May progress to complications in children.	Rare, but possibly corneal infection, preseptal cellulitis
	Severe: may persist without treatment, rarely hyperacute	Corneal infection; may be associated with pharyngitis, otitis media, meningitis
Gonococcal		
Neonate	Manifests within 1–7 days after birth, later if a topical antibiotic was used. Rapid evolution to severe, purulent conjunctivitis.	Corneal infection, corneal scarring, corneal perforation, septicemia with arthritis, meningitis
Adult	Rapid development of severe hyperpurulent conjunctivitis	Corneal infection, corneal scarring, corneal perforation, urethritis, pelvic inflammatory disease, septicemia, arthritis
Chlamydial		
Neonate	Manifests 5–19 days following birth, earlier if placental membranes have ruptured prior to delivery. Untreated cases may persist for 3–12 months.	Corneal scarring, conjunctival scarring; up to 50% have associated nasopharyngeal, genital, or pulmonary infection
Adult	May persist if untreated	Corneal scarring, neovascularization, conjunctival scarring, urethritis, salpingitis, endometritis, perihepatitis, follicular conjunctivitis
Immune-mediated		
Ocular mucous membrane pemphigoid (OMMP)	Onset generally over age 60. Slowly progressive chronic course, sometimes with remissions and exacerbations.	Conjunctival scarring and shrinkage; symblepharon; trichiasis; corneal scarring, neovascularization, ulceration; ocular surface keratinization; bacterial conjunctivitis; cicatricial lid changes; severe tear deficiency; severe vision loss
Graft-versus-host disease (GVHD)	Can involve multiple tissues including skin, liver, gastrointestinal system, lung, and eye. Graft-versus-host disease may follow acutely within the first 3 months following hematopoietic stem cell transplantation, but ocular disease is more common in the chronic phase.	Conjunctivitis; subconjunctival fibrosis; symblepharon; lacrimal gland involvement; keratoconjunctivitis sicca; cicatricial lid disease. Less commonly limbal stem cell deficiency, corneal scarring, or intraocular involvement.
Stevens-Johnson syndrome	Involves the various mucous membranes including the gastrointestinal system, lung and eye following the systemic use of sensitizing medication	Conjunctival scarring and shrinkage; symblepharon; trichiasis; corneal scarring, neovascularization, ulceration; limbal stem cell deficiency; ocular surface keratinization; bacterial conjunctivitis; cicatricial lid changes; severe tear deficiency; severe vision loss
Neoplastic		
Sebaceous carcinoma	Occurs in fifth to ninth decades of life with fairly rapid progression ¹⁸	Orbital invasion, regional or distant metastases, melanoma
Ocular surface squamous neoplasia	May be history of HPV, significant UV exposure, chronic inflammation; may be mistreated as an unresponsive blepharoconjunctivitis	Conjunctival hyperemia, carcinoma in situ, or ocular surface squamous neoplasia, which can be locally invasive with regional metastases
Melanoma	Significant UV exposure, previous history of melanoma, previous primary acquired melanosis (PAM) or nevus of Ota	Pigmented, or non-pigmented lesion, invasive regional metastases, history of previous melanoma, primary may not be conjunctiva



CARE PROCESS

PATIENT OUTCOME CRITERIA

Outcome criteria for treating conjunctivitis include the following:

- ◆ Eliminate or reduce signs and symptoms of conjunctivitis
- ◆ Restore or maintain normal visual function
- ◆ Detect and treat the underlying systemic disease process when applicable
- ◆ Prevent or reduce the likelihood of damage to the ocular surface

DIAGNOSIS

The initial evaluation of a patient should include the relevant aspects of the comprehensive medical eye evaluation,^{19,20} but some elements of the evaluation may be deferred in patients with symptoms and signs suggestive of infectious conjunctivitis.

History

Questions about the following elements of the patient history may elicit helpful information:

- ◆ Symptoms and signs (e.g., itching, discharge, irritation, pain, photophobia, blurred vision)
- ◆ Duration of symptoms and time course
- ◆ Exacerbating factors
- ◆ Unilateral or bilateral presentation
- ◆ Character of discharge
- ◆ Recent exposure to an infected individual
- ◆ Trauma: mechanical, chemical, ultraviolet
- ◆ Mucus fishing (i.e., repetitive manipulation and wiping of the conjunctiva, leading to mechanical irritation)
- ◆ Contact lens wear: lens type, hygiene, and use regimen
- ◆ Symptoms and signs potentially related to systemic diseases (e.g., genitourinary discharge, dysuria, dysphagia, upper respiratory infection, skin and mucosal lesions)
- ◆ Allergy, asthma, eczema
- ◆ Use of topical and systemic medications

The ocular history includes details about previous episodes of conjunctivitis and previous ophthalmic surgery.

The medical history takes into account the following:

- ◆ Compromised immune status (e.g., human immunodeficiency virus (HIV), chemotherapy, immunosuppressants)
- ◆ Current or prior systemic diseases (e.g., atopy, Stevens-Johnson syndrome, carcinoma, leukemia, chicken pox, GVHD)

The social history should include smoking habits, occupation and hobbies, travel, and sexual activity.

Physical Examination

The initial eye examination includes measurement of visual acuity, an external examination, and slit-lamp biomicroscopy. The typical clinical signs for the types of conjunctivitis that are most common or most important to treat are listed in Table 3.

The external examination should include the following elements:

- ◆ Regional lymphadenopathy,²¹ particularly preauricular
- ◆ Skin: signs of rosacea, eczema, seborrhea
- ◆ Abnormalities of the eyelids and adnexae: swelling, discoloration, malposition, laxity, ulceration, nodules, ecchymosis, neoplasia
- ◆ Conjunctiva: pattern of injection, subconjunctival hemorrhage, chemosis, cicatricial change, symblepharon, masses, discharge

The slit-lamp biomicroscopy should include careful evaluation of the following:

- ◆ Eyelid margins: inflammation, ulceration, discharge, nodules or vesicles, blood-tinged debris, keratinization
- ◆ Eyelashes: loss of lashes, crusting, scurf, nits, lice, trichiasis
- ◆ Lacrimal puncta and canaliculi: pouting, discharge
- ◆ Tarsal and forniceal conjunctiva:^{22,23}
 - ◆ Presence and size of papillae, follicles
 - ◆ Cicatricial changes, including foreshortening and symblepharon
 - ◆ Forniceal enlargement
 - ◆ Membranes and pseudomembranes
 - ◆ Ulceration
 - ◆ Hemorrhages
 - ◆ Foreign material
 - ◆ Mucus discharge
 - ◆ Masses
 - ◆ Lid laxity
- ◆ Bulbar conjunctiva/limbus:^{22,23} follicles, edema, nodules, chemosis, laxity, papillae, ulceration, scarring, phlyctenules, hemorrhages, foreign material, keratinization
- ◆ Cornea:²³
 - ◆ Epithelial defects
 - ◆ Punctate keratopathy and dendritic keratitis
 - ◆ Filaments
 - ◆ Ulceration
 - ◆ Infiltration, including subepithelial infiltrates and phlyctenules
 - ◆ Vascularization
 - ◆ Keratic precipitates
- ◆ Anterior chamber/iris: inflammatory reaction, synechiae, transillumination defects
- ◆ Dye-staining pattern: conjunctiva and cornea (see Appendix 4)

TABLE 3 TYPICAL CLINICAL SIGNS OF CONJUNCTIVITIS

Type of Conjunctivitis	Clinical Signs
Allergic	
Seasonal	<ul style="list-style-type: none"> • Bilateral. Conjunctival injection, chemosis, watery discharge, mild mucous discharge.
Vernal	<ul style="list-style-type: none"> • Bilateral. Giant papillary hypertrophy of superior tarsal conjunctiva, bulbar conjunctival injection, conjunctival scarring, watery and mucoid discharge, limbal Trantas dots, limbal "papillae", corneal epithelial erosions, corneal neovascularization and scarring, corneal vernal plaque/shield ulcer.
Atopic	<ul style="list-style-type: none"> • Bilateral. Eczematoid blepharitis; eyelid thickening, scarring; lash loss; papillary hypertrophy of superior and inferior tarsal conjunctiva; conjunctival scarring; watery or mucoid discharge; boggy edema; corneal neovascularization, ulcers and scarring; punctate epithelial keratitis. Can be associated with keratoconus and/or subcapsular cataract.
Giant papillary conjunctivitis (GPC)	<ul style="list-style-type: none"> • Laterality associated with contact lens wear pattern. Papillary hypertrophy of superior tarsal conjunctiva, mucoid discharge. Papillae with white fibrotic centers can be seen in patients with long-standing disease. In severe cases: lid swelling, ptosis.
Mechanical/Irritative/Toxic	
Superior limbic keratoconjunctivitis (SLK)	<ul style="list-style-type: none"> • Bilateral superior bulbar injection, laxity, edema, and keratinization. Superior corneal and conjunctival punctate epitheliopathy, corneal filaments.
Contact-lens-related keratoconjunctivitis	<ul style="list-style-type: none"> • Ranges from mild to diffuse conjunctival injection, focal or diffuse corneal neovascularization, peripheral or circumferential corneal neovascularization, focal or diffuse superficial punctate keratopathy. Papillary hypertrophy of tarsal conjunctivitis is variable. May result from limbal stem cell deficiency.
Floppy eyelid syndrome	<ul style="list-style-type: none"> • Upper eyelid edema; upper eyelid easily everted, sometimes by simple elevation or lifting of lid; diffuse papillary reaction of superior tarsal conjunctiva; punctate epithelial keratopathy; pannus. Bilateral often asymmetric.

**Conjunctivitis PPP:
Physical Examination**

TABLE 3 TYPICAL CLINICAL SIGNS OF CONJUNCTIVITIS (CONTINUED)

Type of Conjunctivitis	Clinical Signs
Mechanical/Irritative/Toxic (continued)	
Giant fornix syndrome	<ul style="list-style-type: none"> Enlarged superior fornix with coagulum of mucopurulent material, ptosis.
Pediculosis palpebrarum (<i>Phthirus pubis</i>)	<ul style="list-style-type: none"> Unilateral or bilateral follicular conjunctivitis. Adult lice at the base of the eyelashes, nits (eggs) adherent to the eyelash shafts, blood-tinged debris on the eyelashes and eyelids.
Medication-induced keratoconjunctivitis	<ul style="list-style-type: none"> Laterality based on drug use. Conjunctival injection, inferior fornix and bulbar conjunctival follicles. Distinctive signs: contact dermatitis of eyelids with erythema, scaling in some cases.
Conjunctival chalasis	<ul style="list-style-type: none"> Redundant conjunctival.
Viral	
Adenoviral	<ul style="list-style-type: none"> Abrupt onset. Unilateral or bilateral (often sequentially bilateral). Varies in severity. Bulbar conjunctival injection, watery discharge, follicular reaction of inferior tarsal conjunctiva, chemosis, eyelid swelling, and erythema. Distinctive signs: preauricular lymphadenopathy, petechial and subconjunctival hemorrhage, corneal epithelial defect, multifocal epithelial punctate keratitis evolving to anterior stromal keratitis, membrane/pseudomembrane formation, eyelid ecchymosis.
Herpes simplex virus (HSV)	<ul style="list-style-type: none"> Unilateral. Bulbar conjunctival injection, watery discharge, mild follicular reaction of conjunctiva. May have palpable preauricular node. Distinctive signs: vesicular rash or ulceration of eyelids, pleomorphic or dendritic epithelial keratitis of cornea or conjunctiva.
Varicella (herpes) zoster virus (VZV)	<ul style="list-style-type: none"> Unilateral or bilateral. Bulbar conjunctival injection, watery discharge, mild follicular reaction of conjunctiva. May have palpable preauricular node. Typically punctate keratitis in primary disease; punctate or dendritic keratitis in recurrent disease. Distinctive signs: vesicular rash or ulceration of eyelids, pleomorphic or dendritic epithelial keratitis of cornea or conjunctiva.
Molluscum contagiosum	<ul style="list-style-type: none"> Typically unilateral, but can be bilateral. Mild to severe follicular reaction, punctate epithelial keratitis. May have corneal pannus, especially if longstanding. Distinctive signs: single or multiple shiny, dome-shaped umbilicated lesion(s) of the eyelid skin or margin.
Bacterial	
Nongonococcal	<ul style="list-style-type: none"> Unilateral or bilateral. Bulbar conjunctival injection, purulent or mucopurulent discharge.
Gonococcal	<ul style="list-style-type: none"> Unilateral or bilateral. Marked eyelid edema, marked bulbar conjunctival injection, marked purulent discharge, preauricular lymphadenopathy. Important sign to detect: corneal infiltrate or ulcer, which often begins superiorly.
Chlamydial	
Neonate/Infant	<ul style="list-style-type: none"> Unilateral or bilateral. Eyelid edema, bulbar conjunctival injection, discharge may be purulent or mucopurulent, no follicles.
Adult	<ul style="list-style-type: none"> Unilateral or bilateral. Bulbar conjunctival injection, follicular reaction of tarsal conjunctiva, mucoid discharge, corneal pannus, punctate epithelial keratitis, preauricular lymphadenopathy. Distinctive sign: bulbar conjunctival follicles.
Immune-mediated	
Ocular mucous membrane pemphigoid (OMMP)	<ul style="list-style-type: none"> Bilateral. Bulbar conjunctival injection, papillary conjunctivitis, conjunctival subepithelial fibrosis and keratinization, conjunctival scarring beginning in the fornices, punctal stenosis and keratinization, progressive conjunctival shrinkage, symblepharon, entropion, trichiasis, corneal ulcers, neovascularization, and scarring.
Graft-versus-host disease (GVHD)	<ul style="list-style-type: none"> Bilateral. Conjunctival injection, chemosis, pseudomembranous conjunctivitis, keratoconjunctivitis sicca, superior limbic keratoconjunctivitis, cicatricial eyelid disease, episcleritis, corneal epithelial sloughing, limbal stem cell failure, calcareous corneal degeneration; rare intraocular involvement.
Stevens-Johnson syndrome	<ul style="list-style-type: none"> Unilateral or bilateral. Bulbar conjunctival injection, conjunctival subepithelial fibrosis and keratinization, conjunctival scarring, punctal stenosis and keratinization, progressive conjunctival shrinkage, symblepharon, entropion, trichiasis, corneal ulcers, neovascularization, and scarring.

TABLE 3 TYPICAL CLINICAL SIGNS OF CONJUNCTIVITIS (CONTINUED)

Type of Conjunctivitis	Clinical Signs
Neoplastic	
Sebaceous carcinoma	<ul style="list-style-type: none"> • Unilateral. Intense bulbar conjunctival infection, conjunctival scarring. May have a mucopurulent discharge. Corneal epithelial invasion may occur. • Eyelids may exhibit a hard nodular, nonmobile mass of the tarsal plate with yellowish discoloration; may appear as a subconjunctival, multilobulated yellow mass, may resemble a chalazion.
Ocular surface squamous neoplasia	<ul style="list-style-type: none"> • Conjunctival hyperemia, papillomatous or sessile nodules.
Melanoma	<ul style="list-style-type: none"> • Unilateral. Pigmented or nonpigmented lesion. Sentinel vessel. Changing size or pigment to a lesion.

NOTE: Typical clinical signs may not be present in all cases. Distinctive signs are most useful in making a clinical diagnosis but may occur uncommonly. In all entities, laterality may vary and may be asymmetrical.

Diagnostic Tests

Some cases of conjunctivitis can be diagnosed on the basis of history and examination (e.g., viral conjunctivitis in the presence of an upper respiratory infection). In other cases, however, additional diagnostic tests may be helpful.

Cultures

Cultures of the conjunctiva are indicated in all cases of suspected infectious neonatal conjunctivitis.²⁴ Bacterial cultures also may be helpful for recurrent, severe, or chronic purulent conjunctivitis in any age group and in cases where the conjunctivitis has not responded to medication.

Viral Diagnostic Tests

Viral cultures are not routinely used to establish a diagnosis. A rapid, in-office immunodiagnostic test using antigen detection is available for adenovirus conjunctivitis. In a study of 186 patients with acute conjunctivitis, this test had a sensitivity of 88% to 89% and a specificity of 91% to 94%.²⁵ More recently, a study of 128 patients with acute viral conjunctivitis found that a newer test had a sensitivity between 85% and 93% and a specificity between 96% and 99%.²⁶ Immunodiagnostic tests may be available for other viruses, but these are not validated for ocular specimens. Polymerase chain reaction (PCR) may be used to detect viral deoxyribonucleic acid. Availability will vary depending on laboratory policy.

Chlamydial Diagnostic Tests

Suspected cases of adult and neonatal chlamydial conjunctivitis can be confirmed by laboratory testing.^{27,28} Immunologically-based diagnostic tests are available, including a direct immunofluorescent antibody test and enzyme-linked immunosorbent assay.^{28,29} These tests have been largely supplanted by PCR for genital specimens, and, therefore, their availability for conjunctival specimens is more limited. The availability of PCR for testing ocular samples varies. Although specimens from the eye have been used with satisfactory performance,³⁰⁻³² these applications have not been approved by the Food and Drug Administration (FDA).

Smears/Cytology

Smears for cytology and special stains (e.g., Gram, Giemsa) are recommended in cases of suspected infectious neonatal conjunctivitis, chronic or recurrent conjunctivitis, and in cases of suspected gonococcal conjunctivitis in any age group.^{18,24}

Biopsy

Conjunctival biopsy may be helpful in cases of conjunctivitis unresponsive to therapy. Because such eyes may harbor a neoplasm, directed biopsy may be both vision-saving and lifesaving.¹⁶ Conjunctival biopsy and immunofluorescent staining diagnostic tests may be helpful to establish the diagnosis of diseases such as OMMP and paraneoplastic syndromes.^{33,34} A biopsy of bulbar conjunctiva should be performed and a sample should be taken from an uninvolved

Conjunctivitis PPP: Management

area in an eye with active inflammation when OMMP is suspected.³³ Biopsy itself may cause further conjunctival scarring in OMMP, so arrangements should be made in advance for appropriate immune staining. Multiple biopsies should be avoided. In cases of suspected sebaceous carcinoma, a full-thickness lid biopsy is indicated.³⁵ When considering a biopsy, a preoperative consultation with the pathologist is advised to ensure proper handling and staining of specimens.

Confocal Microscopy

Confocal microscopy may be helpful as a non-invasive tool to evaluate some forms of conjunctivitis (e.g., atopic, SLK).^{36,37}

Blood Tests

Thyroid function tests are indicated for patients with SLK who do not have known thyroid disease.³⁸

MANAGEMENT

Prevention

The most important reason for early detection of conjunctivitis is that prompt, appropriate treatment, available for most types of conjunctivitis, speeds resolution of the disease, minimizing both the sequelae of untreated conjunctivitis and time away from work or school. Early detection of conjunctivitis is also important because conjunctivitis can herald serious systemic disease. For example, some types of neonatal conjunctivitis are associated with pneumonia, otitis media, or Kawasaki disease. In adults, conjunctivitis caused by OMMP, GVHD, gonococcus, and chlamydia is important to detect early because it is necessary to treat the concomitant systemic disorder. Diagnosis of SLK may lead to further investigations that reveal a thyroid disorder. Early detection of conjunctivitis associated with neoplasms may be lifesaving.

Individuals can protect against some chemical and toxin exposures by using adequate eye protection. Contact lens wearers can be instructed in appropriate lens care and frequent lens replacement to reduce the risk or severity of GPC.

Infectious conjunctivitis in neonates can be prevented by means of prenatal screening and treatment of the expectant mother and prophylactic treatment of the infant at birth. Single-use tubes of ophthalmic ointment containing 0.5% erythromycin are used as the standard prophylactic agent to prevent ophthalmia neonatorum.³⁹ Povidone-iodine solution 2.5% has been suggested as an alternative to antibiotic ointments for the prevention of neonatal conjunctivitis,^{40,41} but it may be less effective and more toxic to the ocular surface.⁴²

Studies show bacteria are cleared in 7 days in self-limiting mucopurulent acute bacterial conjunctivitis. The use of a 7-day course of antibiotics has been shown to eradicate bacteria within 5 days.

The ophthalmologist plays a critical role in breaking the chain of transmission of epidemic adenoviral conjunctivitis, primarily by educating the patient and family about proper hygiene. Infected individuals should be counseled to wash hands frequently with soap and water (as opposed to sanitizer only) and use separate towels, and to avoid close contact with others during the period of contagion. Avoiding contact with others is especially important for individuals in professions with high potential for transmission, such as health care workers and child care providers. While the exact length of the period of infectivity is variable, many consider 7 days from the onset of symptoms as the contagious period, because the recovery of virus from infected cases drops off after 7 days of infection.⁴³ However, other studies have suggested that patients should be considered potentially contagious for at least 10 to 14 days.^{44,45}

Health care facilities have occasionally been associated with epidemic outbreaks of adenoviral keratoconjunctivitis.^{7,44-47} To avoid cross-contamination, multiple-dose eyedrop containers should be discarded after inadvertent contact with the ocular surface.⁴⁸ Hand-washing procedures with antimicrobial soap and water⁴⁹ and disinfecting ophthalmic equipment may reduce the risk of transmission of viral infection, as the virus can remain infectious in a

desiccated state on surfaces for up to 28 days.^{50,51} Exposed surfaces on equipment can be decontaminated by wiping with sodium hypochlorite (a 1:10 dilution of household chlorine bleach) or other appropriate disinfectants.^{48,49,52} Disinfecting agents recommended for routine decontamination of tonometer tips include 70% ethyl alcohol and sodium hypochlorite (a 1:10 dilution of household chlorine bleach). The Centers for Disease Control and Prevention suggest that tonometer tips be wiped clean and then disinfected by immersing them for 5 to 10 minutes in either 70% ethyl ethanol or 1:10 sodium hypochlorite.⁷ After disinfection, the tonometer should be thoroughly rinsed in tap water and air dried before use.⁷ The common practice of wiping the tonometer tip with a 70% isopropyl alcohol wipe may not provide adequate disinfection after exposure to a patient who has adenoviral keratoconjunctivitis. Any disinfecting agent can result in iatrogenic corneal de-epithelialization and haze if not properly removed from the tonometer tip before use by thorough rinsing in tap water and air drying. Disinfecting agents can also cause damage to the tonometer tip. Though not in wide use, disposable tonometer tips can also be considered to eliminate cross infections.⁵³ Intraocular pressure (IOP), alternatively, can be checked using an applanation tonometer with a disposable coverlet.

Despite the use of reasonable measures, it may not be possible to prevent all transmission of viral infection. Unless absolutely necessary, consideration should be given to deferring IOP measurement for a patient with acute conjunctivitis. In addition to tonometer tips, attention should be paid to disinfecting other items that may have come in contact with the patient's secretions. During an active epidemic, consideration should be given to triaging patients upon arrival to the office and directing those who appear infected to a dedicated "red-eye room."

Treatment

Treatment of conjunctivitis is ideally directed at the root cause. Indiscriminate use of topical antibiotics or corticosteroids should be avoided, because antibiotics can induce toxicity and corticosteroids can potentially prolong adenoviral infections and worsen HSV infections. Treatment methods are described below for the most common types of conjunctivitis and for those types that are particularly important to treat.

Seasonal Allergic Conjunctivitis

Mild allergic conjunctivitis can be treated with an over-the-counter antihistamine/vasoconstrictor agent or with the more effective second-generation topical histamine H₁-receptor antagonists.⁵⁴ Chronic use of vasoconstrictor agents can be associated with rebound vasodilation once the agent is stopped. If the condition is frequently recurrent or persistent, mast-cell stabilizers can be utilized.⁵⁴ Many new medications combine antihistamine activity with mast-cell stabilizing properties and can be utilized for either acute or chronic disease.⁵⁵⁻⁶⁰ If the symptoms are not adequately controlled, a brief course (1 to 2 weeks) of low-potency topical corticosteroids can be added to the regimen. The lowest potency and frequency of corticosteroid administration that relieves the patient's symptoms should be used. A nonsteroidal anti-inflammatory drug, ketorolac, has also been approved by the FDA for the treatment of allergic conjunctivitis.⁶¹ Table 4 lists topical medications that can be used for seasonal allergic conjunctivitis. Additional measures include using artificial tears, which dilute allergens and treat co-existing tear deficiency; cool compresses; oral antihistamines, and allergen avoidance. Frequent clothes washing and bathing/showering before bedtime may also be helpful.

Consultation with an allergist or dermatologist may be helpful for patients who have disease that cannot be adequately controlled with topical medications and oral antihistamines.

The use of topical mast cell inhibitors can also be helpful in alleviating the symptoms of allergic rhinitis.⁶²

Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy. If corticosteroids are used in chronic or recurrent conjunctivitis, baseline and periodic measurement of IOP and pupillary dilation should be performed to evaluate for cataract and glaucoma.

Conjunctivitis PPP: Treatment

TABLE 4 TOPICAL MEDICATIONS FOR SEASONAL ALLERGIC CONJUNCTIVITIS

Generic Name	Trade Name	Class	Typical Daily Dose
Alcaftadine	Lastacaft	H ₁ -antagonist	1
Azelastine HCl	Optivar Available generically	H ₁ -antagonist/mast-cell inhibitor	2
Bepotastine besilate	Bepreve	H ₁ -antagonist/mast-cell inhibitor	2
Cromolyn sodium	Crolom Available generically	Mast-cell inhibitor	4-6
Emedastine difumarate	Emadine	H ₁ -antagonist	4
Epinastine HCl	Elestat	H ₁ - and H ₂ -antagonist/mast-cell inhibitor	2
Ketoralac tromethamine	Acular, Acular LS, Acular PF	NSAID	4
Ketotifen fumarate	Alaway, Zaditor (OTC)	H ₁ -antagonist/mast-cell inhibitor	2
Lodoxamide tromethamine	Alomide	Mast-cell inhibitor	4
Loteprednol etabonate	Alrex	Corticosteroid	4
Naphazoline/antazoline	Vasocon-A (OTC)	Antihistamine/decongestant	4
Naphazoline/pheniramine	Naphcon-A (OTC) Opcon-A (OTC) Visine-A (OTC)	Antihistamine/decongestant	4
Nedocromil sodium	Alocril	Mast-cell inhibitor	2
Olopatadine HCl 0.1%	Patanol	H ₁ -antagonist/mast-cell inhibitor	2
Olopatadine HCl 0.2%	Pataday	H ₁ -antagonist/mast-cell inhibitor	1
Pemirolast potassium	Alamast	Mast-cell inhibitor	4

Adapted with permission from PDR Network LLC. PDR® for Ophthalmic Medicines. 40th ed. 2012. Montvale, NJ: PDR Network LLC; 2011:9. Original chart is "Table 11. Agents for Relief of Seasonal Allergic Conjunctivitis." For more information from this title, please visit www.pdrbooks.com.

NSAID = nonsteroidal anti-inflammatory drug; OTC = over the counter

Vernal/Atopic Conjunctivitis

General treatment measures include modifying the environment to minimize exposure to allergens or irritants, and using cool compresses and ocular lubricants. Topical and oral antihistamines and topical mast-cell stabilizers can be useful to maintain comfort.

For acute exacerbations of vernal/atopic conjunctivitis, topical corticosteroids are usually necessary to control severe symptoms and signs.⁶³ The minimal amount of corticosteroid should be used based on patient response and tolerance. Topical cyclosporine 2% is effective as adjunctive therapy to reduce the amount of topical corticosteroid used to treat severe atopic keratoconjunctivitis.⁶⁴⁻⁶⁶ In a randomized controlled trial of 22 patients who were followed for 4 weeks, patients treated with cyclosporine 0.05% had fewer signs and symptoms than patients using artificial tears.⁶⁷ A Japanese study evaluated cyclosporine 0.1% ophthalmic solution and found that 30% of topical corticosteroid users were able to discontinue their use when using adjunctive topical cyclosporine 0.1%.⁶⁸ As such, commercially available topical cyclosporine 0.05% may be a useful adjunct in the treatment of vernal/atopic conjunctivitis. For entities such as vernal keratoconjunctivitis, which may require repeat short-term therapy with topical corticosteroids, patients should be informed about potential complications of corticosteroid therapy, and general strategies to minimize corticosteroid use should be discussed.

For severe sight-threatening atopic keratoconjunctivitis that is not responsive to topical therapy, supratarsal injection of corticosteroid can be considered.⁶⁹

Systemic immunosuppression rarely warranted. In patients 2 years old or older, eyelid involvement can be treated with pimecrolimus cream 1% or topical tacrolimus ointment applied to the affected eyelid skin.⁷⁰⁻⁷³ Tacrolimus ointment 0.03% is used for children 2 years to 15 years old; either 0.03% or 0.1% is used for patients 16 years and older. A randomized, placebo-controlled clinical trial of topical tacrolimus 0.1% showed efficacy in patients who had failed

therapy with topical corticosteroids and topical antiallergy medications.⁷⁴ Tacrolimus or pimecrolimus are rarely associated with development of skin cancer or lymphoma.^{75,76}

Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. Consultation with a dermatologist is often helpful. A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy. If corticosteroids are prescribed, baseline and periodic measurement of IOP and pupillary dilation should be performed to evaluate for glaucoma and cataract. Discussion of treatment of complications such as corneal plaques and ulceration is beyond the scope of this document. Keratoconus, which is also associated with vernal conjunctivitis, is discussed in much more detail in the Corneal Ectasia PPP.⁷⁷

Giant Papillary Conjunctivitis

The treatment of GPC generally involves modifying the causative entity. Protruding suture knots can be treated by removing or replacing the sutures, rotating the knots, or using a therapeutic contact lens. However, long-term use of therapeutic contact lenses may be associated with an increased risk of microbial keratitis and GPC. Ocular prostheses that cause GPC can be cleaned, polished, or replaced. Mild contact-lens-related GPC may respond to replacing lenses more frequently, decreasing contact lens wearing time, increasing the frequency of enzyme treatment, using preservative-free lens-care systems, administering mast-cell stabilizing agents,⁷⁸ refitting contact lenses, switching to disposable lenses (recommending daily-wear disposables), and/or changing the contact lens polymer. Associated abnormalities such as aqueous tear deficiency and MGD should be treated. For patients with moderate or severe GPC, discontinuing contact lens wear for several weeks to months and a brief course of topical corticosteroid treatment may also rarely be necessary. If corticosteroids are used for conjunctivitis, baseline and periodic measurement of IOP and pupillary dilation should be performed to evaluate for cataract and glaucoma.

Frequency of follow-up visits is based on the severity of disease and treatment used. At the follow-up visit, an interval history, measurement of visual acuity, and slit-lamp biomicroscopy should be performed.

Superior Limbic Keratoconjunctivitis

Mild cases of SLK may respond to treatment of concomitant dry eye syndrome with lubricants, mast-cell stabilizers, cyclosporine,⁷⁹ soft contact lenses, and/or punctal occlusion; however, the response may be temporary. Associated filamentary keratitis may occasionally respond to topical 10% acetylcysteine⁸⁰ or hypertonic (5%) saline.⁸¹ Unlike contact-lens-related keratoconjunctivitis, which is caused by hypoxia, SLK seems to be caused by a tight upper eyelid with loose superior bulbar conjunctiva. This tight eyelid drags the loose conjunctiva down chronically with every blink over the superior cornea, creating chronic irritation and inflammation. Persistent symptoms may necessitate surgical intervention such as cautery (chemical or thermal) to tighten redundant conjunctiva or conjunctival resection.⁸² Up to 65% of patients with SLK may have underlying thyroid dysfunction, and many of these have associated ophthalmopathy.⁸³ An underlying thyroid disorder should be investigated by means of thyroid function tests.^{38,83} Because SLK may persist with exacerbations over a period of years, treatment and frequency of follow-up are driven by the patient's symptoms. Patients should be informed that this is a chronic and recurrent condition that rarely can decrease vision.

Contact-Lens-Related Keratoconjunctivitis

This phenomenon is essentially hypoxia of the limbal stem cells creating punctate epithelial keratitis, pannus, neovascularization, inflammation, edema, and ultimately epitheliopathy. In cases of contact-lens-related keratoconjunctivitis, contact lens wear should be discontinued for 2 or more weeks until the cornea returns to normal. A brief (1 to 2 weeks) course of topical corticosteroids may be prescribed, in addition to more long-term topical cyclosporine 0.05%. If related to limbal stem cell failure, symptoms may be prolonged, but usually will ultimately clear with contact lens abstinence. At the follow-up evaluation, the contact lens fit, type, and lens care regimen should be reviewed (e.g., nonpreserved lens-care systems, daily disposable contact lenses, high D/k ratio material, reduction in contact lens wear time) and consideration should be given to alternatives to contact lenses (e.g., eyeglasses or refractive surgery) once the keratoconjunctivitis has resolved.

Conjunctivitis PPP: Treatment

Floppy Eyelid Syndrome

Temporary relief of floppy eyelid syndrome is afforded by taping the patient's eyelids shut or by having the patient wear a protective shield while sleeping.^{84,85} Lubricants may help in managing mild cases. Definitive therapy involves surgical procedures such as full-thickness horizontal shortening of the upper eyelid to prevent it from everting.⁸⁶ Follow-up depends on the patient's clinical course. Floppy eyelid syndrome has been associated with keratoconus, mitral valve prolapse (MVP), and sleep apnea,^{87,88} and referral for evaluation of the MVP and sleep apnea should be considered.⁸⁹

Giant Fornix Syndrome

Cultures are nearly always positive for *Staphylococcus aureus*, although other organisms are possible. Many patients have concomitant nasolacrimal duct obstruction and chronic dacryocystitis, which may need to be addressed surgically. Treatment with antibiotic regimens used for routine cases of bacterial conjunctivitis generally result in only temporary improvement. Recommended treatment strategies include the prolonged use of systemic anti-staphylococcal antibiotics and intensive topical antibiotics and corticosteroids. More recently, supratarsal injections of antibiotics and corticosteroids, along with irrigation and sweeping of the fornix with povidone-iodine solution, have been advocated. Given the increasing frequency of methicillin-resistant *Staphylococcus aureus* (MRSA) in the general population, conjunctival cultures before starting treatment can help guide the appropriate choice of antibiotic. In addition, surgical correction of the ptosis may be helpful.

Pediculosis Palpebrarum (*Phthirus pubis*)

Jeweler's forceps can be used to remove the adult lice and nits (eggs) mechanically from the eyelids and eyelashes. Adherent nits may require epilation of the involved lashes. A bland ophthalmic ointment (e.g., petrolatum, erythromycin, bacitracin) applied 2 to 3 times a day for 10 days will smother the adult lice and nits. Compliance is important for eradication. Patients and close contacts should be advised to use anti-lice lotion and shampoo for nonocular areas and to wash and dry clothing and bedding thoroughly (using the highest temperature of the dryer for 30 minutes). Patients and sexual contacts should be informed about the possibility of concomitant disease and should be referred appropriately. Sexual abuse should be considered in children with this condition. Pediculosis palpebrarum can also be transferred from one child to another in a situation of close contact (e.g., during school).

Medication-Induced Keratoconjunctivitis

Discontinuation of the agent responsible for medication-induced keratoconjunctivitis results in resolution over a period of weeks to months. If severe inflammation of the conjunctiva or eyelid is present, a brief course of topical corticosteroids is indicated. Nonpreserved artificial tears may be beneficial. The clinician should look for sub-epithelial fibrosis (refer to the subsection Ocular Mucous Membrane Pemphigoid Conjunctivitis below for more details).

A recent study showed conjunctival cicatricial changes after chronic use of glaucoma medications. Importantly, the process may continue despite stopping the offending medications.

Adenoviral Conjunctivitis

The majority of cases of acute, infectious conjunctivitis in the adult population are viral and self-limited; these cases do not require antimicrobial treatment. Patients with adenoviral conjunctivitis need to understand that the condition is highly contagious and should be informed of appropriate measures to reduce the risk of spreading the infection to their other eye or to other people.⁷ Because of its ability to infect multiple members of a family or a classroom, this infection is often termed epidemic keratoconjunctivitis.

There is no effective treatment for adenovirus infection; however, artificial tears, topical antihistamines, or cold compresses may be used to mitigate symptoms. There is inadequate evidence to support the use of available antiviral agents for treating adenoviral conjunctivitis.

Topical corticosteroids are helpful to reduce symptoms and may reduce scarring in severe cases of adenoviral keratoconjunctivitis with marked chemosis or lid swelling, epithelial sloughing, or membranous conjunctivitis. Close follow-up is warranted for patients with adenoviral

conjunctivitis who are being treated with corticosteroids. In an animal model of adenoviral conjunctivitis, administration of topical corticosteroids led to prolonged viral shedding.⁹⁰ Patients who use topical corticosteroids should be instructed to maintain precautions against the spread of the virus for 2 additional weeks after symptoms resolve. For patients with membranous conjunctivitis, debridement of the membrane can be considered to prevent corneal epithelial abrasions or permanent cicatricial changes (e.g., foreshortening of the conjunctival cul de sac).

Patients with severe disease who have corneal epithelial ulceration or membranous conjunctivitis should be re-evaluated within 1 week. Patients who are prescribed prolonged topical corticosteroids should be monitored using periodic measurement of IOP and pupillary dilation to evaluate for glaucoma and cataract. Topical corticosteroids should be tapered once inflammation is controlled.

Patients who are not treated with topical corticosteroids should be instructed to return for follow-up if they continue to experience symptoms of red eye, pain, or decreased vision after 2 to 3 weeks. This follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy.

During follow-up, patients should be evaluated for the presence of corneal subepithelial infiltrates, which typically occur 1 or more weeks after the onset of conjunctivitis. Treatment of subepithelial infiltrates varies with the severity of the disease. In mild cases, observation is sufficient. In cases with blurring, photophobia, and decreased vision, topical corticosteroids at the minimum effective dose may be considered.

Patients who are being treated with topical corticosteroids should have the dosage slowly tapered to the minimum effective dose. Corticosteroids with poor ocular penetration, including fluorometholone or site-specific corticosteroids such as rimexolone or loteprednol, may be less likely to result in elevated IOP or cataract formation. A follow-up examination should be conducted every 4 to 8 weeks, initially, then at least every 3 months. Visits should include an interval history, measurement of visual acuity and IOP, and slit-lamp biomicroscopy. Recurrence of subepithelial infiltrates has been reported in patients with a history of adenoviral infection who have undergone photorefractive keratectomy or LASIK.^{91,92}

Herpes Simplex Virus Conjunctivitis

Topical and/or oral antiviral treatment is recommended for HSV conjunctivitis to prevent corneal infection. Possible options include topical ganciclovir 0.15% gel used 3 to 5 times per day,⁹³⁻⁹⁶ trifluridine 1% solution 5 to 8 times per day or oral acyclovir 200 to 400 mg 5 times per day.⁹⁷ Oral valacyclovir (500 mg 2 or 3 times a day) and famciclovir (250 mg twice a day) also can be used.^{98,99} Topical trifluridine inevitably causes epithelial toxicity if used for more than 2 weeks. Topical ganciclovir is less toxic. Topical corticosteroids potentiate HSV infection and should be avoided. Within 1 week of treatment, patients should have a follow-up visit consisting of an interval history, visual acuity measurement, and slit-lamp biomicroscopy. Neonates require prompt consultation with the pediatrician or primary care physician, because systemic HSV infection is a life-threatening condition.¹⁰⁰

Varicella (Herpes) Zoster Virus Conjunctivitis

Children with chicken pox may present with conjunctivitis that is generally papillary in nature¹⁰¹ and sometimes associated with eyelid ulceration and/or limbal or conjunctival vesicles. Many clinicians treat such patients with topical antibiotics to prevent secondary infection, because the vesicles will undergo necrosis before healing. Severe conjunctival scarring from secondary bacterial infection can even lead to cicatricial ectropion.¹⁰¹ Topical antivirals have not been shown to be helpful in treating VZV conjunctivitis. In rare cases, dendritic or stromal keratitis can occur. Recurrent cases of VZV conjunctivitis are generally also papillary, but they can be pseudomembranous or vesicular.¹⁰² Varicella zoster virus conjunctivitis can be associated with other forms of intraocular disease including iritis, segmental iris atrophy, and secondary glaucoma.¹⁰³ When treatment seems justified for the immunocompetent patient, oral antivirals are recommended at a dose of 800 mg five times daily for 7 days for acyclovir, 1000 mg every 8 hours for 7 days for valacyclovir, or 500 mg three times daily for 7 days for famciclovir. Immunocompromised patients may need to be treated more aggressively. Caution is advised in patients with impaired renal clearance. Late sequelae include dry eye and corneal anesthesia with neurotrophic keratitis.¹⁰⁰

Conjunctivitis PPP: Treatment

Molluscum Contagiosum

Conjunctivitis and keratitis from molluscum contagiosum are due to viral shedding from the eyelid lesion(s) onto the surface of the eye. Molluscum lesions may spontaneously resolve, but they can also persist for months to years. Treatment to remove the lesions is indicated in symptomatic patients. Treatment options include incision and curettage (aggressive enough to cause bleeding), simple excision, excision and cauterization, and cryotherapy. The conjunctivitis may require weeks to resolve after elimination of the lesion. In adults, large and multiple molluscum lesions with relatively little conjunctival inflammation may indicate an immunocompromised state.¹⁰⁴ Follow-up is not usually necessary unless the conjunctivitis persists.

Bacterial Conjunctivitis

Mild bacterial conjunctivitis is usually self-limited, and it typically resolves spontaneously without specific treatment in immune-competent adults.¹⁰⁵ Use of topical antibacterial therapy is associated with earlier clinical and microbiological remission compared with placebo in days 2 to 5 of treatment.¹⁰⁵ These advantages persist over days 6 to 10, but the extent of benefit over placebo lessens over time.¹⁰⁵ The choice of antibiotic is usually empiric. Because a 5-to-7-day course of a broad-spectrum topical antibiotic is usually effective, the most convenient or least expensive option can be selected; there is no clinical evidence suggesting the superiority of any particular antibiotic.

Severe bacterial conjunctivitis is characterized by copious purulent discharge, pain, and marked inflammation of the eye. Conjunctival cultures and slides for Gram staining should be obtained if gonococcal infection is a possibility. In these cases, the choice of antibiotic is guided by the results of laboratory tests. Methicillin-resistant *Staphylococcus aureus* has been isolated with increasing frequency from patients with bacterial conjunctivitis.^{106,107} Increasing colonization of MRSA has been found in nursing home residents,¹⁰⁸ and the incidence of community-acquired MRSA infections also has risen.¹⁰⁹ Methicillin-resistant *S. aureus* organisms are resistant to many commercially available topical antibiotics.^{106,107,110} Systemic antibiotic therapy is necessary to treat conjunctivitis due to *Neisseria gonorrhoeae* and *Chlamydia trachomatis* (see Table 5).¹⁸ Topical therapy, while not necessary, is usually also used. Saline lavage may promote comfort and more rapid resolution of inflammation in gonococcal conjunctivitis. If corneal involvement is present, the patient should also be treated topically as for bacterial keratitis (see Bacterial Keratitis PPP¹¹¹). Patients and sexual contacts should be informed about the possibility of concomitant disease and referred appropriately. Sexual abuse should be considered in children with this condition.

Patients with gonococcal conjunctivitis should be seen daily until resolution of the conjunctivitis. At each follow-up visit, an interval history, visual acuity measurement, and slit-lamp biomicroscopy should be performed. For other types of bacterial conjunctivitis, patients should be asked to return for a visit in 3 to 4 days if they note no improvement. *N. meningitidis* should be eliminated as the causative organism before concluding that *N. gonorrhoeae* is responsible.

An epidemiologic study found that infants with conjunctivitis in the neonatal intensive care setting with low birth weight and/or low gestational age have an increased incidence of gram-negative conjunctivitis that is often resistant to gentamicin.¹¹²

Chlamydial Conjunctivitis

Table 5 contains recommendations for the treatment of chlamydial conjunctivitis. Because more than 50% of infants with chlamydial conjunctivitis may also be infected at other sites such as the nasopharynx, genital tract, or lungs, systemic therapy is indicated.¹⁸ Empiric antibiotic therapy can be considered in patients with symptoms and signs highly suggestive of chlamydia (e.g., follicular conjunctivitis that persists for several weeks). There are no data to support the use of topical therapy in addition to systemic therapy. Because the incidence of treatment failure can be as high as 19%,²⁴ patients should be re-evaluated following treatment. The follow-up visit should consist of an interval history, visual acuity measurement, and slit-lamp biomicroscopy. Adult conjunctivitis usually responds to systemic therapy, and sexual contacts should be treated at the same time. Patients and sexual contacts should be informed about the possibility of concomitant disease and should be referred appropriately. Sexual abuse should be considered in children with this condition.

TABLE 5 SYSTEMIC ANTIBIOTIC THERAPY FOR GONOCOCCAL AND CHLAMYDIAL CONJUNCTIVITIS

Cause	Drug of Choice	Dosage
Adults		
Gonococcus*	Ceftriaxone [†]	250 mg IM, single dose
	and Azithromycin	1 g orally, single dose
	or Doxycycline	100 mg orally, twice a day for 7 days
	For cephalosporin-allergic patients:	
	Azithromycin [‡]	2 g orally, single dose
Chlamydia	Azithromycin	1 g orally, single dose
	or Doxycycline	100 mg orally twice a day for 7 days
Children[§] (<18 years)		
Gonococcus		
Children who weigh <45 kg	Ceftriaxone or Spectinomycin [¶]	125 mg IM, single dose 40 mg/kg (maximum dose 2 g) IM, single dose
Children who weigh ≥45 kg	Same treatment as adults	
Chlamydia		
Children who weigh <45 kg	Erythromycin base or ethylsuccinate	50 mg/kg/day orally divided into 4 doses daily for 14 days
Children who weigh ≥45 kg but are aged <8 years	Azithromycin	1 g orally, single dose
Children ≥8 years	Azithromycin	1 g orally, single dose
	or Doxycycline	100 mg orally, twice daily for 7 days
Neonates		
Ophthalmia neonatorum caused by <i>N. gonorrhoeae</i>	Ceftriaxone	25–50 mg/kg intravenous or IM, single dose, not to exceed 125 mg
Chlamydia	Erythromycin base or ethylsuccinate	50 mg/kg/day orally divided into four doses daily for 14 days**

NOTE: Pregnant women should not be treated with doxycycline, quinolones, or tetracyclines. Either erythromycin or amoxicillin is recommended for treatment of chlamydia during pregnancy.

Data from:

Centers for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines, 2010. MMWR Morb Mortal Wkly Rep 2010;59 (No. RR-12):44–55.

Update in: Centers for Disease Control and Prevention. Update to CDC's Sexually transmitted diseases treatment guidelines, 2010. Oral cephalosporins no longer a recommended treatment for gonococcal infections. MMWR Morb Mortal Wkly Rep 2012;61 (No. 31):590–4.

* The Centers for Disease Control and Prevention (CDC) currently recommends that patients treated for gonococcal infection also be treated routinely with a regimen effective against uncomplicated genital *Chlamydia trachomatis* infection, because patients infected with *Neisseria gonorrhoeae* often are coinfecting with *C. trachomatis*.

[†] If ceftriaxone is not available, cefixime 400 mg in a single dose or doxycycline 100 mg orally, twice a day for 7 days may be used. Consider lavage of infected eyes with saline solution once.

[‡] A single oral dose of azithromycin 2 g is effective against uncomplicated gonococcal infections, but the CDC does not recommend widespread use of azithromycin because of concerns over emerging antimicrobial resistance to macrolides. Because data are limited regarding alternative regimens for treating gonorrhea among persons who have severe cephalosporin allergy, providers treating such patients should consult infectious disease specialists.

[§] The CDC recommends advising all women and men with chlamydial or gonococcal infection to be retested approximately 3 months after treatment.

^{||} Sexual abuse must be considered a cause of infection in preadolescent children. A diagnosis of *C. trachomatis* or *N. gonorrhoeae* infection in preadolescent children should be documented by standard culture.

[¶] Spectinomycin is not available in the United States; updated information from the CDC on the availability of spectinomycin will be available at www.cdc.gov/std/treatment.

** An association between oral erythromycin and infantile hypertrophic pyloric stenosis has been reported in infants aged less than 6 weeks who were treated with this drug. Infants treated with erythromycin should be followed for signs and symptoms of infantile hypertrophic pyloric stenosis.

Conjunctivitis PPP: Treatment

Ocular Mucous Membrane Pemphigoid Conjunctivitis

This condition is a progressive immune-mediated process targeting the conjunctival basement membrane. Early symptoms may be very non-specific ocular surface complaints such as redness, foreign body sensation, dryness, tearing, discharge, and the like. Early signs are mild conjunctival injection, staining of the cornea and conjunctiva, and lacy scarring or cicatricial changes of the palpebral conjunctiva, especially the superior. As the condition progresses, the inflammation may increase and the complaints may persist and worsen. Symblephara, conjunctival cul de sac foreshortening, and progressive conjunctival scarring occurs in the later stages. As a result of the conjunctival scarring, entropion occurs, and trichiasis and acquired distichiasis cause corneal trauma with eventual scarring. Typically, elderly women are at increased risk. The diagnosis is typically one of exclusion, and a conjunctival biopsy for immunopathology confirms the diagnosis. If the patient is using any of the drugs associated with medication-induced mucous membrane pemphigoid, OMMP should be considered, and trial discontinuation of the medication should be attempted. Medications include epinephrine and glaucoma medications, especially the miotics.

Because OMMP is a chronic, progressive disease characterized by subepithelial fibrosis with frequent remissions and exacerbations of disease activity, it may be difficult to gauge the response to therapy accurately. Grading systems and photographic documentation of the conjunctiva may be helpful to assess disease progression.^{34,113} Although topical corticosteroid therapy may aid in controlling acute conjunctival inflammation, systemic immunosuppressive therapy is usually required to inhibit inflammation and prevent progression of conjunctival scarring.¹¹⁴ The rate of disease progression, age and general condition of the patient, and the potential complications of immunosuppressive therapy should be considered and discussed with the patient before initiating therapy. Systemic corticosteroids may be indicated to control inflammation initially, but they should be weaned as other immunosuppressive therapy becomes effective to avoid complications of chronic corticosteroid use. Mild and slowly progressive disease may be treated using mycophenolate mofetil, dapson, azathioprine, or methotrexate.¹¹⁴⁻¹¹⁶

If dapson is considered, caution should be taken in patients with glucose-6-phosphate dehydrogenase (G6PD) deficiency.¹¹⁷ For severe inflammation or for inflammation unresponsive to treatment with other agents, cyclophosphamide should be considered.^{114,118} These therapies can be used alone or in combination. In general, a physician with expertise in immunosuppressive therapy should administer and monitor the treatment to minimize and manage side effects.^{119,120} Other less commonly used therapies that may be effective for treatment or adjunctive therapy include oral tetracycline and niacinamide,¹²¹ sulfasalazine,¹²² and intravenous immunoglobulin.¹²³ Associated dry eye state, trichiasis, distichiasis, and entropion should be treated. Mucous membrane or amniotic membrane grafting for fornix reconstruction is possible if eyes are not severely dry and inflammation is under control. In advanced disease with corneal blindness, keratoprosthesis surgery may improve vision.¹²⁴

The timing and frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment. A follow-up visit should include an interval history, visual acuity measurement, slit-lamp biomicroscopy, and documentation of corneal and conjunctival changes to monitor progression. Ocular procedures such as cataract surgery may worsen the disease. Perioperative immunosuppression and close postoperative follow-up are warranted in such cases.¹¹⁸

Graft-versus-Host Disease

Patients with multiorgan systemic GVHD are treated with systemic immunosuppression. Systemic corticosteroids are the mainstay of initial treatment and are commonly used in conjunction with cyclosporine or tacrolimus. In corticosteroid-refractory GVHD, numerous therapies have been studied, including cyclophosphamide, T-cell modulators, and photopheresis, with varied success depending on the tissues involved and the severity of disease.

For ocular GVHD, aggressive lubrication and punctal occlusion are particularly useful in treating patients with secondary keratoconjunctivitis sicca, which is very common. There may be some role for topical corticosteroids in treating conjunctival hyperemia and scarring.¹²⁵ Topical cyclosporine or autologous serum tears can be used to treat dry eye syndrome associated with GVHD.¹²⁶⁻¹²⁸ Topical corticosteroids and/or cyclosporine are routinely used to treat active ocular GVHD, both acute and chronic.¹²⁹ Treating the underlying inflammatory process with topical corticosteroids and cyclosporine may help to reduce conjunctival damage leading to dry eye disease. In more severe cases, surgical excision of pseudomembranous tissue has been advocated over conservative therapy.¹³⁰ Other secondary complications of ocular GVHD such as cicatricial eyelid malposition, SLK, or limbal stem cell failure should be managed on a case-by-case basis. For vision correction and relief from dry eye symptoms in these patients, scleral lenses may be helpful, although these may be expensive.

Sebaceous Carcinoma

When a diagnosis of sebaceous carcinoma is confirmed by an eyelid biopsy, local excision is indicated. The excision should be performed by a surgeon experienced in the treatment of eyelid tumors, and adjunctive therapy should be used as needed for any residual pagetoid component.

Ocular Surface Squamous Neoplasia

When a diagnosis of ocular surface squamous neoplasia is confirmed by biopsy, treatment may consist of local excision with or without chemotherapeutics. In addition, some studies have indicated that topical chemotherapeutics alone may completely resolve the malignancy. The optimal treatment is still under debate, and, therefore, management should be done by an experienced specialist.¹³¹ Anterior segment optical coherence tomography may facilitate follow-up for patients with ocular surface squamous neoplasia.

PROVIDER AND SETTING

Because there is a spectrum of etiologies and treatment, optimal diagnosis and management of conjunctivitis require broad medical skills and experience. Some types of conjunctivitis are associated with systemic diseases and may require systemic drug treatment.

Patients with conjunctivitis who are evaluated by non-ophthalmologist health care providers should be referred promptly to the ophthalmologist in any of the following circumstances:

- ◆ Visual loss
- ◆ Moderate or severe pain
- ◆ Severe, purulent discharge
- ◆ Corneal involvement
- ◆ Conjunctival scarring
- ◆ Lack of response to therapy
- ◆ Recurrent episodes
- ◆ History of HSV eye disease
- ◆ History of immunocompromise

A majority of patients with conjunctivitis can be treated effectively in an outpatient setting. Hospitalization may be necessary to administer parenteral therapy for severe gonococcal conjunctivitis and is mandatory for neonatal conjunctivitis.

COUNSELING AND REFERRAL

Counseling is imperative for all contagious varieties of conjunctivitis to minimize or prevent spread of the disease in the community. Modes of transmission include eye-hand contact, sexual contact, exposure to contaminated droplets, and exposure to airborne pathogens. Hand-washing is important to reduce the risk of transmission of viral infection. Return to school or work depends on the age of the patient, occupation, and type and severity of conjunctivitis.

When conjunctivitis is associated with sexually transmitted disease, treatment of sexual partners is essential to minimize recurrence and spread of the disease. Patients as well as their sexual partners should be referred to an appropriate medical specialist. The physician must remain alert to the

Conjunctivitis PPP: Socioeconomic Considerations

possibility of child abuse in cases of potentially sexually transmitted ocular disease in children. In many states, sexually transmitted diseases and suspected child abuse must be reported to local health authorities or other state agencies.

In cases of ophthalmia neonatorum due to gonococcus, chlamydia, and HSV, the infant should be referred to an appropriate specialist. Infants who require systemic treatment are best managed in conjunction with a pediatrician.

When conjunctivitis appears to be a manifestation of systemic disease, patients should be referred to an appropriate medical specialist for evaluation.

SOCIOECONOMIC CONSIDERATIONS

Allergic Conjunctivitis

Conjunctivitis is very common worldwide, and it has a broad spectrum of disease severity and underlying etiologies. There have been multiple studies that have examined how allergic conjunctivitis causes a reduction in quality of life¹³²⁻¹³⁵ and increases economic costs.^{133,135-137} The costs include not only direct costs such as doctors' visits and medications, but also indirect costs such as missed days from work and school, and decreased productivity while at work. An observational cross-sectional study on allergic rhinitis in four European countries showed that the presence of ocular symptoms reduces quality of life, reduces work productivity, and increases resource utilization regardless of the severity of nasal symptoms.¹³³ Another cross-sectional study looked at patients diagnosed with allergic conjunctivitis in 16 ophthalmology departments in Portugal. It found that 59% of patients had year-round symptoms, and that 46% had significant impairment in their quality of life during an acute episode.¹³⁴ Chronic allergic rhinitis/conjunctivitis is also a common disease among children.¹³⁶ Among students with nasal and ocular symptoms, 42%, 24%, 36%, and 28% reported moderate to severe interference of daily activities, at least 1 day of absence from school, a visit to a health care professional, and drug usage for rhinitis, respectively. In the United States, the direct and indirect costs are estimated to be at least \$6 billion a year.¹³⁷ Similar decreases in quality of life and progressively increasing economic costs for seasonal allergic conjunctivitis were also found in Spain and Oxfordshire, England.¹³⁸ Treatment options that address ocular symptoms may have a large beneficial impact on quality of life and decrease direct and indirect costs associated with allergic rhinitis.¹³³

Vernal keratoconjunctivitis (VKC) is a rarer form of allergic conjunctivitis that is more common in children and young adults and is more prevalent in hot, dry climates.¹³⁹ A population-based case-control study was conducted on 3049 children in Rwanda. It not only found that hot climate and male gender were risk factors for the disease but that higher socioeconomic status was also a risk factor.¹³⁹ The authors hypothesize that there may be possible immunologic and environmental mechanisms present in urban settings compared with rural settings that account for this socioeconomic finding, and they suggest that further study is warranted.

Bacterial Conjunctivitis

The economic impact of bacterial conjunctivitis is also substantial. A study was performed on a single outbreak of pneumococcal conjunctivitis at Dartmouth College in 2002 that affected 698 students.⁶ Even though the course of the disease was very short and there were no long-term ocular sequelae, the estimated cost, including doctors' visits, cultures, and antibiotics, ranged from \$66,468 to \$120,583. Another study looked at the entire country using data from the medical literature, existing national databases, and Current Procedural Terminology codes.⁵ The estimated number of cases of bacterial conjunctivitis in the United States in 2005 was 4 million, and the total direct and indirect cost of treating patients with bacterial conjunctivitis was \$589 million. Data on costs associated with missed work or school, as well as the economic impact of untreated bacterial conjunctivitis, are not available, unfortunately.

Adenoviral Conjunctivitis

While adenoviral conjunctivitis is a common condition that often results in several missed days of work and can lead to painful and visually debilitating keratoconjunctivitis, there have not been any published studies yet on its overall economic impact in the general population. A single outbreak of adenoviral keratoconjunctivitis in a long-term care facility, which affected 41 residents, resulted in hospital costs of \$29,527 (\$1085 for medical costs, \$8210 for investigative costs, \$3048 for preventive measures, and \$17,184 for lost productivity).¹⁴⁰ Preventive infection-control measures can be extremely cost-effective if such an outbreak is avoided. There is a quick point-of-care test for adenovirus. The cost per case of adenoviral conjunctivitis is \$111.56 with no rapid test (including the cost of unnecessary antibiotic therapy), and it is \$40.25 with the test, implying a cost savings of \$71.31 per case.¹⁴¹ If these costs are extrapolated to include the entire U.S. population, it is estimated that nearly \$430 million in unnecessary medical care could be saved and that over 1 million cases of unnecessary antibiotic treatment could be avoided.



APPENDIX 1. QUALITY OF OPHTHALMIC CARE CORE CRITERIA

*Providing quality care
is the physician's foremost ethical obligation, and is
the basis of public trust in physicians.
AMA Board of Trustees, 1986*

Quality ophthalmic care is provided in a manner and with the skill that is consistent with the best interests of the patient. The discussion that follows characterizes the core elements of such care.

The ophthalmologist is first and foremost a physician. As such, the ophthalmologist demonstrates compassion and concern for the individual, and utilizes the science and art of medicine to help alleviate patient fear and suffering. The ophthalmologist strives to develop and maintain clinical skills at the highest feasible level, consistent with the needs of patients, through training and continuing education. The ophthalmologist evaluates those skills and medical knowledge in relation to the needs of the patient and responds accordingly. The ophthalmologist also ensures that needy patients receive necessary care directly or through referral to appropriate persons and facilities that will provide such care, and he or she supports activities that promote health and prevent disease and disability.

The ophthalmologist recognizes that disease places patients in a disadvantaged, dependent state. The ophthalmologist respects the dignity and integrity of his or her patients, and does not exploit their vulnerability.

Quality ophthalmic care has the following optimal attributes, among others.

- ◆ The essence of quality care is a meaningful partnership relationship between patient and physician. The ophthalmologist strives to communicate effectively with his or her patients, listening carefully to their needs and concerns. In turn, the ophthalmologist educates his or her patients about the nature and prognosis of their condition and about proper and appropriate therapeutic modalities. This is to ensure their meaningful participation (appropriate to their unique physical, intellectual and emotional state) in decisions affecting their management and care, to improve their motivation and compliance with the agreed plan of treatment, and to help alleviate their fears and concerns.
- ◆ The ophthalmologist uses his or her best judgment in choosing and timing appropriate diagnostic and therapeutic modalities as well as the frequency of evaluation and follow-up, with due regard to the urgency and nature of the patient's condition and unique needs and desires.
- ◆ The ophthalmologist carries out only those procedures for which he or she is adequately trained, experienced and competent, or, when necessary, is assisted by someone who is, depending on the urgency of the problem and availability and accessibility of alternative providers.
- ◆ Patients are assured access to, and continuity of, needed and appropriate ophthalmic care, which can be described as follows.
 - ◆ The ophthalmologist treats patients with due regard to timeliness, appropriateness, and his or her own ability to provide such care.
 - ◆ The operating ophthalmologist makes adequate provision for appropriate pre- and postoperative patient care.
 - ◆ When the ophthalmologist is unavailable for his or her patient, he or she provides appropriate alternate ophthalmic care, with adequate mechanisms for informing patients of the existence of such care and procedures for obtaining it.
 - ◆ The ophthalmologist refers patients to other ophthalmologists and eye care providers based on the timeliness and appropriateness of such referral, the patient's needs, the competence and qualifications of the person to whom the referral is made, and access and availability.
 - ◆ The ophthalmologist seeks appropriate consultation with due regard to the nature of the ocular or other medical or surgical problem. Consultants are suggested for their skill, competence, and accessibility. They receive as complete and accurate an accounting of the problem as necessary to provide efficient and effective advice or intervention, and in turn respond in an adequate and timely manner.

Appendix 1. Quality of Ophthalmic Care Core Criteria

- ◆ The ophthalmologist maintains complete and accurate medical records.
- ◆ On appropriate request, the ophthalmologist provides a full and accurate rendering of the patient's records in his or her possession.
- ◆ The ophthalmologist reviews the results of consultations and laboratory tests in a timely and effective manner and takes appropriate actions.
- ◆ The ophthalmologist and those who assist in providing care identify themselves and their profession.
- ◆ For patients whose conditions fail to respond to treatment and for whom further treatment is unavailable, the ophthalmologist provides proper professional support, counseling, rehabilitative and social services, and referral as appropriate and accessible.
- ◆ Prior to therapeutic or invasive diagnostic procedures, the ophthalmologist becomes appropriately conversant with the patient's condition by collecting pertinent historical information and performing relevant preoperative examinations. Additionally, he or she enables the patient to reach a fully informed decision by providing an accurate and truthful explanation of the diagnosis; the nature, purpose, risks, benefits, and probability of success of the proposed treatment and of alternative treatment; and the risks and benefits of no treatment.
- ◆ The ophthalmologist adopts new technology (e.g., drugs, devices, surgical techniques) in judicious fashion, appropriate to the cost and potential benefit relative to existing alternatives and to its demonstrated safety and efficacy.
- ◆ The ophthalmologist enhances the quality of care he or she provides by periodically reviewing and assessing his or her personal performance in relation to established standards, and by revising or altering his or her practices and techniques appropriately.
- ◆ The ophthalmologist improves ophthalmic care by communicating to colleagues, through appropriate professional channels, knowledge gained through clinical research and practice. This includes alerting colleagues of instances of unusual or unexpected rates of complications and problems related to new drugs, devices or procedures.
- ◆ The ophthalmologist provides care in suitably staffed and equipped facilities adequate to deal with potential ocular and systemic complications requiring immediate attention.
- ◆ The ophthalmologist also provides ophthalmic care in a manner that is cost effective without unacceptably compromising accepted standards of quality.

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APPENDIX 2. INTERNATIONAL STATISTICAL CLASSIFICATION OF DISEASES AND RELATED HEALTH PROBLEMS (ICD) CODES

Conjunctivitis includes entities with the following ICD-9 and ICD-10 classifications:

	ICD-9 CM	ICD-10 CM
Conjunctivitis, other diseases of conjunctiva caused by viruses	372.00 – 372.39	Code first underlying virus or chemical and intent H10.011 – H10.813 (approximately 65 codes in this range)
<i>Chlamydia</i>	077.0 – 077.99	A74.0, B30.0 – B30.9
and ophthalmia neonatorum caused by gonococcus	098.40	A54.31

CM = Clinical Modification used in the United States; (-) = 1, right eye; 2, left eye; 3, bilateral

Additional information for ICD-10 codes:

- Certain ICD-10 CM categories have applicable 7th characters. The applicable 7th character is required for all codes within the category, or as the notes in the Tabular List instruct. The 7th character must always be the 7th character in the data field. If a code that requires a 7th character is not 6 characters, a placeholder X must be used to fill in the empty characters.
- For bilateral sites, the final character of the codes in the ICD-10 CM indicates laterality. If no bilateral code is provided and the condition is bilateral, separate codes for both the left and right side should be assigned. Unspecified codes should only be used when there is no other code option available.
- When the diagnosis code specifies laterality, regardless of which digit it is found in (i.e., 4th digit, 5th digit, or 6th digit):
 - Right is always 1
 - Left is always 2
 - Bilateral is always 3



APPENDIX 3. PREFERRED PRACTICE PATTERN RECOMMENDATION GRADING

The grades herein report the SIGN grade associated with the included studies supporting each recommendation (I++; I+; I-; II++; II+; II-; III), the GRADE evaluation of the body of evidence (Good, Moderate, Insufficient), and the GRADE assessment of the strength of the recommendation (Strong, Discretionary). Details of these grading systems are reported in the Methods and Key to Ratings section at the beginning of this document.

Highlighted Findings and Recommendations for Care

Page 4: Infected individuals should be counseled to wash hands frequently and use separate towels, and to avoid close contact with others during the period of contagion: II++; Good; Strong

Page 4: Surfaces should be disinfected with an EPA-registered hospital disinfectant in accordance with the label's use directions and safety precautions: II+; Good; Strong

Page 4: Indiscriminate use of topical antibiotics or corticosteroids should be avoided: III; Good; Strong

Page 4: The choice of topical antibiotic agent for treatment of bacterial conjunctivitis is empiric: III; Insufficient; Discretionary

Care Process – Diagnosis

Page 10: The initial evaluation of a patient should include the relevant aspects of the comprehensive medical eye evaluation: II++; Good; Strong

Page 10: Some elements of the evaluation may be deferred in patients with symptoms and signs suggestive of infectious conjunctivitis: III; Insufficient; Discretionary

Page 10: The initial eye examination includes measurement of visual acuity, an external examination, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 10: The external examination should include regional lymphadenopathy, skin, abnormalities of the eyelids and adnexae, and conjunctiva: III; Insufficient; Discretionary

Page 11: The slit-lamp biomicroscopy should include careful evaluation of the eyelid margins, eyelashes, lacrimal puncta and canaliculi, tarsal and forniceal conjunctiva, bulbar conjunctiva/limbus, cornea, anterior chamber/iris and dye-staining pattern: III; Insufficient; Discretionary

Page 13: Cultures of the conjunctiva are indicated in all cases of suspected infectious neonatal conjunctivitis: II+; Moderate; Strong

Page 13: Bacterial cultures also may be helpful for recurrent or severe purulent conjunctivitis in any age group and in cases where the conjunctivitis has not responded to medication: III; Insufficient; Discretionary

Page 13: Viral cultures are not routinely used to establish a diagnosis: III; Insufficient; Discretionary

Page 13: Suspected cases of adult and neonatal chlamydial conjunctivitis can be confirmed by laboratory testing: II++; Good; Discretionary

Page 13: Smears for cytology and special stains (e.g., Gram, Giemsa) are recommended in cases of suspected infectious neonatal conjunctivitis, chronic or recurrent conjunctivitis, and in cases of suspected gonococcal conjunctivitis in any age group: II-; Insufficient; Discretionary

Page 13: Directed conjunctival biopsy may be both vision-saving and lifesaving: III; Insufficient; Discretionary

Conjunctivitis PPP:

Appendix 3. PPP Recommendation Grading

Page 13: Conjunctival biopsy and immunofluorescent staining diagnostic tests may be helpful to establish the diagnosis of diseases such as OMMP and paraneoplastic syndromes: II-; Insufficient; Discretionary

Page 13: A biopsy of bulbar conjunctiva should be performed and a sample should be taken from an uninvolved area in an eye with active inflammation when OMMP is suspected: II-; Insufficient; Discretionary

Page 14: In cases of suspected sebaceous carcinoma, a full-thickness lid biopsy is indicated: III; Insufficient; Discretionary

Page 14: When considering a biopsy, a preoperative consultation with the pathologist is advised to ensure proper handling and staining of specimens: III; Insufficient; Strong

Page 14: Confocal microscopy may be helpful as a non-invasive tool to evaluate some forms of conjunctivitis (e.g., atopic, SLK): II-; Moderate; Discretionary

Page 14: Thyroid function tests are indicated for patients with SLK who do not have known thyroid disease: III; Insufficient; Discretionary

Care Process – Management

Page 14: Individuals can protect against some chemical and toxin exposures by using adequate eye protection: III; Good; Strong

Page 14: Contact lens wearers can be instructed in appropriate lens care and frequent lens replacement to reduce the risk or severity of GPC: III; Good; Strong

Page 14: Infectious conjunctivitis in neonates can be prevented by prenatal screening and treatment of the expectant mother and by prophylactic treatment of the infant at birth: III; Moderate; Strong

Page 14: Single-use tubes of ophthalmic ointment containing 0.5% erythromycin is used as the standard prophylactic agent to prevent ophthalmia neonatorum: II++; Insufficient; Discretionary

Page 14: Povidone-iodine solution 2.5% may be less effective and more toxic to the ocular surface: I+; Moderate; Discretionary

Page 14: The use of a 7-day course of antibiotics has been shown to eradicate bacteria within 5 days: III; Good; Strong

Page 14: Infected individuals should be counseled to wash hands frequently with soap and water (as opposed to sanitizer only) and use separate towels, and to avoid close contact with others during the period of contagion: II++; Good; Strong

Page 14: Avoiding contact with others is especially important for individuals in professions with high potential for transmission, such as health care workers and child care providers: III; Good; Strong

Page 14: To avoid cross-contamination, multiple-dose eyedrop containers should be discarded when inadvertent contact with the ocular surface occurs: III; Good; Strong

Page 14: Hand-washing procedures with antimicrobial soap and water⁴⁹ and disinfecting ophthalmic equipment may reduce the risk of transmission of viral infection: III; Good; Strong

Page 15: Exposed surfaces on equipment can be decontaminated by wiping with sodium hypochlorite or other appropriate disinfectants: III; Insufficient; Discretionary

Page 15: Disinfecting agents recommended for routine decontamination of tonometer tips include 70% ethyl alcohol and sodium hypochlorite: III; Good; Strong

Page 15: Tonometer tips should be wiped clean and then disinfected by immersing them for 5 to 10 minutes in either 70% ethyl ethanol or 1:10 sodium hypochlorite: II+; Good; Strong

Page 15: After disinfection, the tonometer should be thoroughly rinsed in tap water and air dried before use: II+; Good; Strong

Page 15: The common practice of wiping the tonometer tip with a 70% isopropyl alcohol wipe does not provide adequate disinfection for a patient who has adenoviral keratoconjunctivitis: III; Insufficient; Discretionary

Page 15: Disposable tonometer tips can also be considered to eliminate cross infections: III; Insufficient; Discretionary

Page 15: Intraocular pressure can be checked using an applanation tonometer with a disposable coverlet: III; Insufficient; Discretionary

Page 15: Consideration should be given to possibly deferring IOP measurement for a patient with acute conjunctivitis: III; Insufficient; Discretionary

Page 15: Indiscriminate use of topical antibiotics or corticosteroids should be avoided, because antibiotics can induce toxicity and corticosteroids can potentially prolong adenoviral infections and worsen HSV infections: III; Good; Strong

Page 15: Mild allergic conjunctivitis can be treated with an over-the-counter antihistamine/vasoconstrictor agent or with the more effective second-generation topical histamine H₁-receptor antagonists: I++; Good; Strong

Page 15: If the condition is frequently recurrent or persistent, mast-cell stabilizers can be utilized: III; Insufficient; Discretionary

Page 15: Many new medications combine antihistamine activity with mast-cell stabilizing properties and can be utilized for either acute or chronic disease: I-; Moderate; Discretionary

Page 15: If the symptoms are not adequately controlled, a brief course (1 to 2 weeks) of low-potency topical corticosteroids can be added to the regimen: III; Insufficient; Discretionary

Page 15: The lowest potency and frequency of corticosteroid administration that relieves the patient's symptoms should be used: III; Insufficient; Discretionary

Page 15: Ketorolac has been FDA-approved for the treatment of allergic conjunctivitis: I-; Moderate; Discretionary

Page 15: Additional measures include using artificial tears, which dilute allergens and treat co-existing tear deficiency; cool compresses; oral antihistamines, and allergen avoidance: III; Insufficient; Discretionary

Page 15: Frequent clothes washing and bathing/showering before bedtime may also be helpful: III; Insufficient; Discretionary

Page 15: Consultation with an allergist or dermatologist may be helpful for patients who have disease that cannot be adequately controlled with topical medications and oral antihistamines: III; Insufficient; Discretionary

Page 15: The use of topical mast cell inhibitors can also be helpful in alleviating the symptoms of allergic rhinitis: I-; Moderate; Discretionary

Page 15: Intranasal corticosteroid therapy, however, is not effective for the treatment of seasonal allergic conjunctivitis: I-; Moderate; Discretionary

Page 15: Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment: III; Insufficient; Discretionary

Conjunctivitis PPP:

Appendix 3. PPP Recommendation Grading

Page 15: A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 15: If corticosteroids are used in chronic or recurrent conjunctivitis, baseline and periodic measurement of IOP and pupillary dilation should be performed to evaluate for cataract and glaucoma: III; Insufficient; Discretionary

Page 16: General treatment measures include modifying the environment to minimize exposure to allergens or irritants, and using cool compresses and ocular lubricants: III; Insufficient; Discretionary

Page 16: Topical and oral antihistamines and topical mast-cell stabilizers can be useful to maintain comfort: III; Insufficient; Discretionary

Page 16: For acute exacerbations of vernal/atopic conjunctivitis, topical corticosteroids are usually necessary to control severe symptoms and signs: III; Insufficient; Discretionary

Page 16: The minimal amount of corticosteroid should be used based on patient response and tolerance: III; Insufficient; Discretionary

Page 16: Topical cyclosporine 2% is effective as adjunctive therapy to reduce the amount of topical corticosteroid used to treat severe atopic keratoconjunctivitis: I-; Moderate; Discretionary

Page 16: Commercially available topical cyclosporine may be a useful adjunct in the treatment of vernal/atopic conjunctivitis: I++; Good; Strong

Page 16: For entities such as vernal keratoconjunctivitis, patients should be informed about potential complications of corticosteroid therapy, and general strategies to minimize corticosteroid use should be discussed: III; Good; Strong

Page 16: For severe sight-threatening atopic keratoconjunctivitis that is not responsive to topical therapy, systemic immunosuppression may be warranted rarely: I+; Moderate; Discretionary for tacrolimus 0.1%; III; Insufficient; Discretionary for all other treatments

Page 17: Frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment: III; Insufficient; Discretionary

Page 17: Consultation with a dermatologist is often helpful: III; Insufficient; Discretionary

Page 17: A follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 17: If corticosteroids are prescribed, baseline and periodic measurement of IOP and pupillary dilation should be performed to evaluate for glaucoma and cataract: III; Insufficient; Discretionary

Page 17: Protruding suture knots can be treated by removing, moving, or replacing the sutures, rotating the knots, or using a therapeutic contact lens: III; Insufficient; Discretionary

Page 17: Ocular prostheses that cause GPC can be cleaned, polished, or replaced: III; Insufficient; Discretionary

Page 17: Mild contact-lens-related GPC may respond to replacing lenses more frequently: III; Insufficient; Discretionary

Page 17: Mild contact-lens-related GPC may respond to decreasing contact lens wearing time: III; Insufficient; Discretionary

Page 17: Mild contact-lens-related GPC may respond to increasing the frequency of enzyme treatment: III; Insufficient; Discretionary

**Conjunctivitis PPP:
Appendix 3. PPP Recommendation Grading**

Page 17: Mild contact-lens-related GPC may respond to using preservative-free lens-care systems: III; Insufficient; Discretionary

Page 17: Mild contact-lens-related GPC may respond to administering mast-cell stabilizing agents: I+; Moderate; Discretionary

Page 17: Mild contact-lens-related GPC may respond to refitting contact lenses: III; Insufficient; Discretionary

Page 17: Mild contact-lens-related GPC may respond to switching to daily-wear disposable lenses: III; Insufficient; Discretionary

Page 17: Mild contact-lens-related GPC may respond to changing the contact lens polymer: III; Insufficient; Discretionary

Page 17: Associated abnormalities such as aqueous tear deficiency and MGD should be treated: III; Insufficient; Discretionary

Page 17: For patients with moderate or severe GPC, discontinuation of contact lens wear for several weeks to months and a brief course of topical corticosteroid treatment may also rarely be necessary: III; Insufficient; Discretionary

Page 17: If corticosteroids are used for conjunctivitis, baseline and periodic measurement of IOP and pupillary dilation should be performed to evaluate for cataract and glaucoma: III; Insufficient; Discretionary

Page 17: Frequency of follow-up visits is based on the severity of disease and treatment used: III; Insufficient; Discretionary

Page 17: At the follow-up visit, an interval history, measurement of visual acuity, and slit-lamp biomicroscopy should be performed: III; Insufficient; Discretionary

Page 17: Mild cases of SLK may respond to treatment of concomitant dry eye syndrome with lubricants: III; Insufficient; Discretionary

Page 17: Mild cases of SLK may respond to treatment of concomitant dry eye syndrome with mast-cell stabilizers: III; Insufficient; Discretionary

Page 17: Mild cases of SLK may respond to treatment of concomitant dry eye syndrome with cyclosporine: III; Insufficient; Discretionary

Page 17: Mild cases of SLK may respond to treatment of concomitant dry eye syndrome with soft contact lenses: III; Insufficient; Discretionary

Page 17: Mild cases of SLK may respond to treatment of concomitant dry eye syndrome with punctal occlusion: III; Insufficient; Discretionary

Page 17: Associated filamentary keratitis may occasionally respond to topical 10% acetylcysteine: III; Insufficient; Discretionary

Page 17: Persistent symptoms may necessitate surgical intervention such as cautery (chemical or thermal) to tighten redundant conjunctiva or conjunctival resection: III; Insufficient; Discretionary

Page 17: An underlying thyroid disorder should be investigated by means of thyroid function tests: III; Insufficient; Discretionary

Page 17: Because SLK may persist with exacerbations over a period of years, treatment and frequency of follow-up are driven by the patient's symptoms: III; Insufficient; Discretionary

Conjunctivitis PPP:

Appendix 3. PPP Recommendation Grading

Page 17: Patients should be informed that this is a chronic and recurrent condition that rarely can decrease vision: III; Insufficient; Discretionary

Page 17: In cases of contact-lens-related keratoconjunctivitis, contact lens wear should be discontinued for 2 or more weeks until the cornea returns to normal: III; Insufficient; Discretionary

Page 17: A brief (1 to 2 weeks) course of topical corticosteroids may be prescribed, in addition to more long-term topical cyclosporine 0.05%: III; Insufficient; Discretionary

Page 17: At the follow-up evaluation, the contact lens fit, type, and lens-care regimen should be reviewed: III; Insufficient; Discretionary

Page 17: At the follow-up evaluation, consideration should be given to alternatives to contact lenses once the keratoconjunctivitis has resolved: III; Insufficient; Discretionary

Page 18: Temporary relief of floppy eyelid syndrome is afforded by taping the patient's eyelids shut or by having the patient wear a protective shield while sleeping: III; Insufficient; Discretionary

Page 18: Lubricants may help in managing mild cases: III; Insufficient; Discretionary

Page 18: Definitive therapy involves surgical procedures such as full-thickness horizontal shortening of the upper eyelid to prevent the upper eyelid from everting: III; Insufficient; Discretionary

Page 18: Follow-up depends on the patient's clinical course: III; Insufficient; Discretionary

Page 18: Referral for evaluation of the mitral valve prolapse and sleep apnea should be considered: III; Insufficient; Discretionary

Page 18: Concomitant nasolacrimal duct obstruction and chronic dacryocystitis may need to be addressed surgically: III; Insufficient; Discretionary

Page 18: Treatment with antibiotic regimens used for routine cases of bacterial conjunctivitis generally results in only temporary improvement: III; Insufficient; Discretionary

Page 18: Recommended treatment strategies include prolonged use of systemic anti-staphylococcal antibiotics: III; Insufficient; Discretionary

Page 18: Recommended treatment strategies include intensive topical antibiotics and corticosteroids: III; Insufficient; Discretionary

Page 18: Supratarsal injections of antibiotics and corticosteroids, along with irrigation and sweeping of the fornix with povidone-iodine solution, have been advocated: III; Insufficient; Discretionary

Page 18: Conjunctival cultures before starting treatment can help guide the appropriate choice of antibiotic: III; Insufficient; Discretionary

Page 18: Surgical correction of the ptosis may play a role: III; Insufficient; Discretionary

Page 18: Jeweler's forceps can be used to remove the adult lice and nits mechanically from the eyelids and eyelashes: III; Insufficient; Discretionary

Page 18: Adherent nits may require epilation of the involved lashes: III; Insufficient; Discretionary

Page 18: A bland ophthalmic ointment applied 2 to 3 times a day for 10 days will smother the adult lice and nits: III; Insufficient; Discretionary

Page 18: Patients and close contacts should be advised to use anti-lice lotion and shampoo for non-ocular areas and to wash and dry clothing and bedding thoroughly: III; Good; Strong

Page 18: Patients and sexual contacts should be informed about the possibility of concomitant disease and should be referred appropriately: III; Good; Strong

Page 18: Sexual abuse should be considered in children with this condition: III; Insufficient; Discretionary

Page 18: Discontinuation of the agent responsible for medication-induced keratoconjunctivitis results in resolution over a period of weeks to months: III; Insufficient; Discretionary

Page 18: If severe inflammation of the conjunctiva or eyelid is present, a brief course of topical corticosteroids is indicated: III; Insufficient; Discretionary

Page 18: Nonpreserved artificial tears may be beneficial: III; Insufficient; Discretionary

Page 18: The clinician should look for sub-epithelial fibrosis: III; Insufficient; Discretionary

Page 18: The majority of cases of acute, infectious conjunctivitis in the adult population are viral and self-limited; these cases do not require antibiotic treatment: III; Insufficient; Discretionary

Page 18: Patients with adenoviral conjunctivitis need to understand that the condition is highly contagious and should be informed of appropriate measures to reduce the risk of spreading the infection to their other eye or to other people: III; Good; Strong

Page 18: Artificial tears, topical antihistamines, or cold compresses may be used to mitigate symptoms of adenoviral conjunctivitis: III; Insufficient; Discretionary

Page 18: There is inadequate evidence to support the use of available antiviral agents for treating adenoviral conjunctivitis: III; Insufficient; Discretionary

Page 18: Topical corticosteroids are helpful to reduce symptoms and may reduce scarring in severe cases of adenoviral keratoconjunctivitis with marked chemosis or lid swelling, epithelial sloughing, or membranous conjunctivitis: III; Insufficient; Discretionary

Page 18: Close follow-up is warranted for patients with adenoviral conjunctivitis who are being treated with corticosteroids: III; Insufficient; Discretionary

Page 19: Patients who use topical corticosteroids should be instructed to maintain precautions against the spread of the virus for 2 additional weeks after symptoms resolve: III; Insufficient; Discretionary

Page 19: For patients with membranous conjunctivitis, debridement of the membrane can be considered to prevent corneal epithelial abrasions or permanent cicatricial changes: III; Insufficient; Discretionary

Page 19: Patients with severe disease who have corneal epithelial ulceration or membranous conjunctivitis should be re-evaluated within 1 week: III; Insufficient; Discretionary

Page 19: The follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 19: Patients who are prescribed prolonged topical corticosteroids should be monitored using periodic measurement of IOP and pupillary dilation to evaluate for glaucoma and cataract: III; Insufficient; Discretionary

Page 19: Topical corticosteroids should be tapered once inflammation is controlled: III; Insufficient; Discretionary

Page 19: Patients who are not treated with topical corticosteroids should be instructed to return for follow-up if they continue to experience symptoms of red eye, pain, or decreased vision after 2 to 3 weeks: III; Insufficient; Discretionary

Conjunctivitis PPP:

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Page 19 This follow-up visit should include an interval history, measurement of visual acuity, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 19: During follow-up, patients should be evaluated for the presence of corneal subepithelial infiltrates, which typically occur 1 or more weeks after the onset of conjunctivitis: III; Insufficient; Discretionary

Page 19: In mild cases, observation is sufficient: III; Insufficient; Discretionary

Page 19: In cases with blurring, photophobia, and decreased vision, topical corticosteroids at the minimum effective dose may be considered: III; Insufficient; Discretionary

Page 19: Cyclosporine 1% may be a corticosteroid-sparing agent that is useful in the management of this post-EKC condition: II-; Insufficient; Discretionary

Page 19: Patients who are being treated with topical corticosteroids should have the dosage slowly tapered to the minimum effective dose: III; Insufficient; Discretionary

Page 19: A follow-up examination should be conducted every 4 to 8 weeks, and visits should include an interval history, measurement of visual acuity and IOP, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 19: Topical and/or oral antiviral treatment is recommended for HSV conjunctivitis to prevent corneal infection: I++; Good; Strong

Page 19: Topical antiviral agents may cause toxicity if used for more than 2 weeks: III; Insufficient; Discretionary

Page 19: Topical corticosteroids potentiate HSV infection and should be avoided: III; Insufficient; Discretionary

Page 19: Within 1 week of treatment, patients should have a follow-up visit consisting of an interval history, visual acuity measurement, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 19: Neonates require prompt consultation with the pediatrician or primary care physician, because systemic HSV infection is a life-threatening condition: III; Insufficient; Discretionary

Page 19: Many clinicians treat VZV conjunctivitis patients with topical antibiotics to prevent secondary infection, since the vesicles will undergo necrosis before healing: III; Insufficient; Discretionary

Page 19: Topical antivirals have not been shown to be helpful in treating VZV conjunctivitis: III; Insufficient; Discretionary

Page 19: When treatment seems justified for the immunocompetent patient, oral antivirals are recommended at a dose of 800 mg five times daily for 7 days for acyclovir, 1000 mg every 8 hours for 7 days for valacyclovir, or 500 mg three times daily for 7 days for famciclovir: III; Insufficient; Discretionary

Page 19: Immunocompromised patients may need to be treated more aggressively: III; Insufficient; Discretionary

Page 19: Caution is advised in patients with impaired renal clearance: III; Insufficient; Discretionary

Page 20: Treatment to remove the lesions is indicated in symptomatic molluscum contagiosum patients: III; Insufficient; Discretionary

Page 20: Treatment options include incision and curettage, simple excision, excision and cautery, and cryotherapy: III; Insufficient; Discretionary

Page 20: Follow-up is not usually necessary unless the conjunctivitis persists: III; Insufficient; Discretionary

**Conjunctivitis PPP:
Appendix 3. PPP Recommendation Grading**

Page 20: Mild bacterial conjunctivitis is usually self-limited and typically resolves spontaneously without specific treatment in immune-competent adults: I+; Good; Strong

Page 20: Use of topical antibacterial therapy is associated with earlier clinical and microbiological remission compared with placebo in days 2 to 5 of treatment: I+; Good; Strong

Page 20: Because a 5-to-7-day course of a broad-spectrum topical antibiotic is usually effective, the most convenient or least expensive option can be selected: III; Insufficient; Discretionary

Page 20: Conjunctival cultures and slides for Gram staining should be obtained if gonococcal infection is a possibility: III; Insufficient; Discretionary

Page 20: The choice of antibiotic is guided by the results of laboratory tests if gonococcal infection is a possibility: III; Insufficient; Discretionary

Page 20: Systemic antibiotic therapy is necessary to treat conjunctivitis due to *Neisseria gonorrhoeae* and *Chlamydia trachomatis*: III; Insufficient; Discretionary

Page 20: Topical therapy, while not necessary, is usually used: III; Insufficient; Discretionary

Page 20: Saline lavage may promote comfort and more rapid resolution of inflammation in gonococcal conjunctivitis: III; Insufficient; Discretionary

Page 20: If corneal involvement is present, the patient should also be treated topically as for bacterial keratitis: II++; Good; Strong

Page 20: Patients and sexual contacts should be informed about the possibility of concomitant disease and referred appropriately: III; Good; Strong

Page 20: Sexual abuse should be considered in children with this condition: III; Insufficient; Discretionary

Page 20: Patients with gonococcal conjunctivitis should be seen daily until resolution of the conjunctivitis: III; Insufficient; Discretionary

Page 20: At each follow-up visit, an interval history, visual acuity measurement, and slit-lamp biomicroscopy should be performed: III; Insufficient; Discretionary

Page 20: For other types of bacterial conjunctivitis, patients should be asked to return for a visit in 3 to 4 days if they note no improvement: III; Insufficient; Discretionary

Page 20: Systemic therapy is indicated for chlamydial conjunctivitis: III; Insufficient; Discretionary

Page 20: Empiric antibiotic therapy can be considered in patients with symptoms and signs highly suggestive of chlamydia: III; Insufficient; Discretionary

Page 20: There are no data to support the use of topical therapy in addition to systemic therapy: III; Insufficient; Discretionary

Page 20: Patients should be re-evaluated following treatment: III; Good; Strong

Page 20: The follow-up visit should consist of an interval history, visual acuity measurement, and slit-lamp biomicroscopy: III; Insufficient; Discretionary

Page 20: Adult conjunctivitis usually responds to systemic therapy, and sexual contacts should be treated at the same time: III; Insufficient; Discretionary

Page 20: Patients and sexual contacts should be informed about the possibility of concomitant disease and should be referred appropriately: III; Good; Strong

**Conjunctivitis PPP:
Appendix 3. PPP Recommendation Grading**

Page 20: Sexual abuse should be considered in children with this condition: III; Good; Strong

Page 22: The diagnosis of OMMP is typically one of exclusion, and a conjunctival biopsy for immunopathology confirms the diagnosis: III; Insufficient; Discretionary

Page 22: If the patient is using any of the drugs associated with medication-induced mucous membrane pemphigoid, OMMP should be considered, and trial discontinuation of the medication should be attempted: III; Insufficient; Discretionary

Page 22: Grading systems and photographic documentation of the conjunctiva may be helpful to assess disease progression: III; Insufficient; Discretionary

Page 22: Although topical corticosteroid therapy may aid in controlling acute conjunctival inflammation, systemic immunosuppressive therapy is usually required to inhibit inflammation and prevent progression of conjunctival scarring: III; Insufficient; Discretionary

Page 22: The rate of disease progression, age and general condition of the patient, and the potential complications of immunosuppressive therapy should be considered and discussed with the patient before initiating therapy: III; Insufficient; Discretionary

Page 22: Systemic corticosteroids may be indicated to control inflammation initially, but they should be weaned as other immunosuppressive therapy becomes effective to avoid complications of chronic corticosteroid use: III; Good; Strong

Page 22: Mild and slowly progressive disease may be treated using mycophenolate mofetil, dapsone, azathioprine, or methotrexate: III; Insufficient; Discretionary

Page 22: If dapsone is considered, caution should be taken in patients with glucose-6-phosphate dehydrogenase (G6PD) deficiency: I-; Moderate; Discretionary

Page 22: For severe inflammation or for inflammation unresponsive to treatment with other agents, cyclophosphamide should be considered: III; Insufficient; Discretionary

Page 22: These therapies can be used alone or in combination: III; Insufficient; Discretionary

Page 22: A physician with expertise in immunosuppressive therapy should administer and monitor the treatment to minimize and manage side effects: III; Good; Strong

Page 22: Other less commonly used therapies that may be effective for treatment or adjunctive therapy include oral tetracycline and niacinamide: III; Insufficient; Discretionary

Page 22: Other less commonly used therapies that may be effective for treatment or adjunctive therapy include sulfasalazine: III; Insufficient; Discretionary

Page 22: Other less commonly used therapies that may be effective for treatment or adjunctive therapy include intravenous immunoglobulin: III; Insufficient; Discretionary

Page 22: Associated dry eye state, trichiasis, distichiasis, and entropion should be treated: III; Insufficient; Discretionary

Page 22: Mucous membrane or amniotic membrane grafting for fornix reconstruction is possible if eyes are not severely dry and inflammation is under control: III; Insufficient; Discretionary

Page 22: In advanced disease with corneal blindness, keratoprosthesis surgery may improve vision: II-; Insufficient; Discretionary

Page 22: The timing and frequency of follow-up visits is based on the severity of disease presentation, etiology, and treatment: III; Insufficient; Discretionary

Page 22: A follow-up visit should include an interval history, visual acuity measurement, slit-lamp biomicroscopy, and documentation of corneal and conjunctival changes to monitor progression: III; Insufficient; Discretionary

Page 22: Ocular procedures such as cataract surgery may worsen the disease: III; Insufficient; Discretionary

Page 22: Perioperative immunosuppression and close postoperative follow-up are warranted in such cases: III; Insufficient; Discretionary

Page 23: For ocular GVHD, aggressive lubrication and punctal occlusion are particularly useful in treating patients with secondary keratoconjunctivitis sicca: III; Insufficient; Discretionary

Page 23: There may be some role for topical corticosteroids in treating conjunctival hyperemia: III; Insufficient; Discretionary

Page 23: Topical cyclosporine or autologous serum tears can be used to treat dry eye syndrome associated with GVHD: II-; Insufficient; Discretionary

Page 23: In more severe cases, surgical excision of pseudomembranous tissue has been advocated over conservative therapy: III; Insufficient; Discretionary

Page 23: Other secondary complications of ocular GVHD such as cicatricial eyelid malposition, SLK, or limbal stem cell failure should be managed on a case-by-case basis: III; Insufficient; Discretionary

Page 23: For vision correction and relief from dry eye symptoms in these patients, scleral lenses may be helpful: III; Insufficient; Discretionary

Page 23: When a diagnosis of sebaceous carcinoma is confirmed by an eyelid biopsy, local excision is indicated: III; Insufficient; Discretionary

Page 23: The excision should be performed by a surgeon experienced in the treatment of eyelid tumors, and adjunctive therapy should be used as needed for any residual pagetoid component: III; Insufficient; Discretionary

Page 23: When a diagnosis of ocular surface squamous neoplasia is confirmed by biopsy, treatment may consist of local excision with or without chemotherapeutics: III; Insufficient; Discretionary

Page 23: Topical chemotherapeutics alone may completely resolve the malignancy: III; Insufficient; Discretionary

Page 23: Management should be conducted by an experienced specialist: III; Insufficient; Discretionary

Page 23: Anterior segment OCT may be a tool facilitating follow-up for patients with ocular surface squamous neoplasia: III; Insufficient; Discretionary

Provider and Setting

Page 23: Patients with conjunctivitis who are evaluated by non-ophthalmologist health care providers should be referred promptly to the ophthalmologist when visual loss, moderate or severe pain, severe, purulent discharge, corneal involvement, conjunctival scarring, lack of response to therapy, recurrent episodes, history of HSV eye disease, or history of immunocompromise occur: III; Insufficient; Discretionary

Page 23: A majority of patients with conjunctivitis can be treated effectively in an outpatient setting: III; Insufficient; Discretionary

Page 23: Hospitalization may be necessary to administer parenteral therapy for severe gonococcal conjunctivitis and is mandatory for neonatal conjunctivitis: III; Insufficient; Discretionary

**Conjunctivitis PPP:
Appendix 3. PPP Recommendation Grading**

Counseling and Referral

Page 23: Counseling is imperative for all contagious varieties of conjunctivitis to minimize or prevent spread of the disease in the community: III; Insufficient; Discretionary

Page 23: Hand-washing is important to reduce the risk of transmission of viral infection: III; Good; Strong

Page 24: Return to school or work depends on the age of the patient, occupation, and type and severity of conjunctivitis: III; Insufficient; Discretionary

Page 23: When conjunctivitis is associated with sexually transmitted disease, treatment of sexual partners is essential to minimize recurrence and spread of the disease: III; Good; Strong

Page 23: Patients as well as their sexual partners should be referred to an appropriate medical specialist: III; Good; Strong

Page 23: The physician must remain alert to the possibility of child abuse in cases of potentially sexually transmitted ocular disease in children: III; Good; Strong

Page 24: In cases of ophthalmia neonatorum due to gonococcus, chlamydia, and HSV, the infant should be referred to an appropriate specialist: III; Good; Strong

Page 24: Infants who require systemic treatment are best managed in conjunction with a pediatrician: III; Insufficient; Discretionary

Page 24: When conjunctivitis appears to be a manifestation of systemic disease, patients should be referred for evaluation by an appropriate medical specialist: III; Good; Strong

APPENDIX 4: Ocular Surface Dye Staining

Page 41: Fluorescein, rose bengal, or lissamine green dyes may be used to assess the ocular surface: III; Insufficient; Discretionary

Page 41: Lissamine green dye is not recommended for evaluating corneal epithelial disease: III; Insufficient; Discretionary



APPENDIX 4. OCULAR SURFACE DYE STAINING

Fluorescein, rose bengal, or lissamine green dyes may be used to assess the ocular surface.

Fluorescein dye stains areas of the corneal and conjunctival epithelium where there is sufficient disruption of intercellular junctions to allow the dye to permeate into the tissue.¹⁴² Saline-moistened fluorescein strips or 1% to 2% sodium fluorescein solution is used to stain the tear film. After instilling the dye, the ocular surface is examined through a biomicroscope using a cobalt blue filter. Staining may become more apparent after 1 to 2 minutes. Staining is more intense when it is observed using a yellow filter. Mild fluorescein staining can be observed in normal eyes and may be more prominent in the morning. Exposure-zone punctate or blotchy fluorescein staining is observed in dry eye, and staining is more easily visualized on the cornea than on the conjunctiva.

Rose bengal dye stains ocular surface cells that lack a mucous coating as well as debris in the tear film,¹⁴² and they may be easier to observe with a red-free filter. Rose bengal staining of the tear film may be performed using a saline-moistened strip or 1% solution. (Patients should be informed that the drop might irritate the eye.) The saline drop used to moisten the strip should remain in contact with the strip for at least a minute to achieve an adequate concentration of rose bengal to stain the ocular surface. Rose bengal staining is more intense on the conjunctiva than on the cornea.

Lissamine green dye has a staining profile similar to that of rose bengal¹⁴³ and may cause less ocular irritation.¹⁴³ It is not recommended for evaluating corneal epithelial disease.

Diffuse corneal and conjunctival staining is commonly seen in viral keratoconjunctivitis and medicamentosa. Staining of the inferior cornea and bulbar conjunctiva is typically observed in patients with staphylococcal blepharitis, meibomian gland dysfunction, lagophthalmos, and exposure, while staining of the superior bulbar conjunctiva is typically seen in superior limbic keratoconjunctivitis. A pattern of exposure zone (interpalpebral) corneal and bulbar conjunctival staining is typically seen with aqueous tear deficiency.^{144,145}



RELATED ACADEMY MATERIALS

Basic and Clinical Science Course

External Disease and Cornea (Section 8, 2013–2014)

Focal Points

Chronic Conjunctivitis, Part 1 and Part 2 (2012)

Cicatrizing Conjunctivitis (2011)

Patient Education Brochure

Conjunctivitis (2011)

Preferred Practice Pattern® Guidelines – Free download available at www.aaopt.org/ppp.

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P.O. Box 7424
San Francisco,
California 94120-7424
415.561.8500

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