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# Blepharitis Preferred Practice Pattern®

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Preferred Practice Pattern® guidelines are developed by the Academy's H. Dunbar Hoskins Jr., MD Center for Quality Eye Care without any external financial support. Authors and reviewers of the guidelines are volunteers and do not receive any financial compensation for their contributions to the documents. The guidelines are externally reviewed by experts and stakeholders before publication.

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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 Blepharitis 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.

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The **Preferred Practice Patterns Committee** members reviewed and discussed the document during a meeting in June 2018. The document was edited in response to the discussion and comments.

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The Blepharitis PPP was then sent for review to additional internal and external groups and individuals in July 2018. 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.

# FINANCIAL DISCLOSURES

In compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies (available at [www.cmss.org/codeforinteractions.aspx](http://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 [www.aao.org/about-preferred-practice-patterns](http://www.aao.org/about-preferred-practice-patterns)). A majority (70%) of the members of the Cornea/External Disease Preferred Practice Pattern Panel 2017–2018 had no financial relationships to disclose.

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The disclosures of relevant relationships to industry of other reviewers of the document from January to October 2018 are available online at [www.aao.org/ppp](http://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 US 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 [www.aao.org/about-preferred-practice-patterns](http://www.aao.org/about-preferred-practice-patterns)) 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 Blepharitis 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 Network<sup>1</sup> (SIGN) and the Grading of Recommendations Assessment, Development and Evaluation<sup>2</sup> (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 Quality, and the American College of Physicians.<sup>3</sup>

- ◆ 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 SIGN<sup>1</sup> 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 GRADE<sup>2</sup> 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 GRADE<sup>2</sup> 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. Ratings are embedded throughout the PPP main text in italics
- ◆ Literature searches to update the PPP were undertaken in February 2017 and June 2018 in PubMed and the Cochrane Library. Complete details of the literature searches are available at [www.aao.org/ppp](http://www.aao.org/ppp).

## HIGHLIGHTED FINDINGS AND RECOMMENDATIONS FOR CARE

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In the management of ocular surface disease, it is helpful to distinguish blepharitis and meibomian gland dysfunction (MGD) from aqueous deficient dry eye. Worsening of symptoms in the morning is typical of blepharitis, whereas worsening of the symptoms later in the day are typical of aqueous deficient dry eye.

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Blepharitis is typically a chronic condition that cannot be permanently cured, and successful management is dependent on patient compliance with a treatment regimen. This should be explained to the affected patient.

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Topical antibiotic ointments with or without corticosteroids or oral antibiotics can be used effectively in the treatment of blepharitis. Although azithromycin is used as a treatment for blepharitis, it may be hazardous when used orally in patients with cardiovascular problems. Specifically, oral azithromycin may lead to abnormalities in the electrical activity of the heart, with the potential to create serious irregularities in heart rhythm.

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In patients with blepharitis who do not respond to therapy, the possibility of carcinoma or immune-mediated diseases should be considered, particularly if the blepharitis is associated with a loss of eyelashes and/or conjunctival cicatricial changes. Early diagnosis and appropriate treatment can prevent disfigurement and may be lifesaving.

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# INTRODUCTION

## DISEASE DEFINITION

Blepharitis is a chronic ocular inflammation that involves the eyelid margin primarily and is a common cause of chronic ocular irritation.

## PATIENT POPULATION

The patient population includes individuals of all ages who present with symptoms and signs suggestive of blepharitis, such as eyelid and ocular irritation and redness.

## CLINICAL OBJECTIVES

- ◆ Establish the diagnosis of blepharitis, differentiating it from other causes of irritation and redness
- ◆ Identify the type of blepharitis
- ◆ Establish appropriate therapy
- ◆ Relieve discomfort and pain
- ◆ Prevent complications
- ◆ Educate and engage the patient in the management of this potentially chronic disease

# BACKGROUND

Blepharitis can be classified according to anatomic location: anterior blepharitis affects the eyelid skin, base of the eyelashes and the eyelash follicles, and posterior blepharitis affects the meibomian glands. Blepharitis has traditionally been clinically subcategorized as staphylococcal, seborrheic, meibomian gland dysfunction (MGD), or a combination thereof.<sup>4</sup> Staphylococcal and seborrheic blepharitis involve mainly the anterior eyelid and can each be referred to as anterior blepharitis. Meibomian gland dysfunction, as defined by the International Workshop on Meibomian Gland Dysfunction ([www.tearfilm.org/mgdworkshop/index.html](http://www.tearfilm.org/mgdworkshop/index.html)), is a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease. Meibomian gland dysfunction is further subcategorized into hyposecretory, obstructive, and hypersecretory forms.<sup>5</sup> This PPP covers the three clinical subcategories of blepharitis: staphylococcal, seborrheic, and MGD.<sup>6</sup>

There is considerable overlap of symptoms in all types of blepharitis. Blepharitis frequently leads to ocular surface inflammation, including conjunctivitis, functional tear deficiency, and keratitis. Blepharitis may also exacerbate symptoms of coexisting ocular surface disease, including allergy and aqueous tear deficiency. The chronic nature of blepharitis, the uncertain etiology, and the frequent coexistence of ocular surface disease make blepharitis difficult to manage.

Staphylococcal blepharitis is characterized by scaling, crusting, and erythema of the eyelid margin with collarette formation at the base of the cilia. Chronic inflammation may include acute exacerbations that lead to the development of ulcerative blepharitis. Loss of eyelashes and corneal involvement, including punctate epithelial erosions, marginal infiltrates, peripheral corneal and epithelial defects, and corneal neovascularization, may occur.

Although coagulase-negative staphylococcus is isolated with great frequency from eyelids of both normal subjects and patients with blepharitis (in 89% to 100% of cases), *Staphylococcus aureus* is isolated with greater frequency from eyelids of patients with clinical diagnoses of staphylococcal blepharitis.<sup>4</sup> Both coagulase-negative staphylococcus and *S. aureus* are believed to play a role in the development of staphylococcal blepharitis, but the mechanisms of pathophysiology remain poorly understood. Toxin production has been reported to correlate with the presence of blepharoconjunctivitis;<sup>7</sup> however, other studies have found no association between toxin production of *S. aureus* isolates and the presence of clinical disease.<sup>8</sup> Immunologic mechanisms have been documented. Enhanced cell-mediated immunity to *S. aureus* has been detected in 40% of patients with chronic blepharitis but not among normal subjects.<sup>9</sup> Cell-mediated immunologic mechanisms have also been implicated in the development of keratitis associated with staphylococcal blepharitis.<sup>10</sup> Staphylococcal antigens themselves can initiate an inflammatory reaction by attaching to bacterial antigen-binding receptors that are present on the corneal epithelium.<sup>11,12</sup>

Patients with seborrheic blepharitis have greasy scaling of the anterior eyelid, and they frequently have seborrheic dermatitis of the eyebrows and scalp as well.

Eyelid manifestations of MGD include prominent blood vessels crossing the mucocutaneous junction, frothy discharge along the eyelid margin, pouting or plugging of meibomian orifices, expression of meibomian secretions that range from turbid fluid to thick cheese-like material, thickening and scalloping of the eyelid margin, trichiasis, and chalazion. These changes can lead to eventual atrophy and fibrosis of the meibomian gland. Patients with MGD frequently are noted to have coexisting rosacea or seborrheic dermatitis.<sup>4,13</sup> Alterations in the biochemical composition of meibomian gland secretions have been documented in patients with MGD blepharitis when compared with normal subjects.<sup>14</sup> The result of MGD is decreased availability of normal meibum to the lid margin and tear film. This, in turn, may result in hyperosmolarity and instability of the tear

film, increased bacterial growth on the lid margin, evaporative dry eye, and ocular surface inflammation and damage.<sup>15</sup>

## PREVALENCE

Although blepharitis is one of the most common ocular disorders, epidemiologic information on its incidence or prevalence within defined populations is lacking. One single-center study of 90 patients with chronic blepharitis noted that the mean age of patients was 50 years.<sup>15</sup> Compared with patients who have other forms of blepharitis, patients who have staphylococcal blepharitis were found to be relatively younger (42 years old) and most were female (80%).<sup>4,16</sup> In younger, active duty military personnel (mean age, 23.2 years), 5.3% were diagnosed with meibomian gland inflammation compared with 71.1% of older military veterans (mean age, 68.1 years).<sup>17</sup> A survey of a representative sample of US adults (n = 5000) revealed that typical symptoms associated with blepharitis are quite common and that younger people report more frequent symptoms than older individuals. A survey of ophthalmologists and optometrists reported that blepharitis was commonly seen in clinical practice in 37% and 47% of their patients, respectively. Meibomian gland dysfunction was considered to be the most common cause of evaporative dry eye disease.<sup>18</sup>

The prevalence of clinically diagnosed MGD varies widely in the published world literature,<sup>15</sup> with a suggestion that MGD is significantly more common among Asian populations than Caucasian populations. However, there is significant variation in how the disease was defined and in the age of the study groups.<sup>19-23</sup>

## RISK FACTORS AND ASSOCIATED CONDITIONS

### ◆ Dry eye

Dry eye has been reported to be present in 50% of patients with staphylococcal blepharitis.<sup>4</sup> Conversely, in a series of 66 patients with dry eye, 75% had staphylococcal conjunctivitis or blepharitis.<sup>24</sup> It is possible that a decrease in local lysozyme and immunoglobulin levels associated with tear deficiency may alter resistance to bacteria, predisposing to the development of staphylococcal blepharitis.<sup>10</sup>

Twenty-five percent to 40% of patients with seborrheic blepharitis and MGD,<sup>4</sup> and 37% to 52% of patients with ocular rosacea<sup>13</sup> also have aqueous tear deficiency. This may result from increased tear film evaporation due to a deficiency in the lipid component of the tears as well as reduced ocular surface sensation.<sup>25,26</sup> Low levels of tear film phospholipids have been found to be associated with the presence of dry eye in patients with chronic blepharitis.<sup>27</sup>

- ◆ Dermatologic conditions

Dermatologic conditions associated with seborrheic blepharitis and MGD may share common etiologies and predisposing factors. In one study of 99 chronic blepharitis patients and 33 age and sex matched controls, 95% of patients with seborrheic blepharitis also had seborrheic dermatitis.<sup>4</sup> In patients with a subset of MGD called primary (diffuse) meibomitis, 74% had a seborrheic dermatitis and 51% had rosacea (acne rosacea).<sup>4,15</sup>

- ◆ Demodicosis

*Demodex folliculorum* has been found in 30% of patients with chronic blepharitis, but this mite has also been found with nearly the same prevalence in patients without blepharitis.<sup>28</sup> However, patients with recalcitrant blepharitis have responded to therapy directed at decreasing or eradicating the *Demodex* mites.<sup>28</sup> Eyelashes with cylindrical dandruff or sleeves at the eyelash base are reported to be a sign of ocular *Demodex* infestation.<sup>29</sup> Studies have shown that severity of ocular surface discomfort has a strong positive correlation with the number of *Demodex* per cilia.<sup>30</sup>

- ◆ Rosacea

Rosacea is a disease of the skin and eye that is observed more frequently in fair-skinned individuals,<sup>31</sup> but it can occur in people of all races and both sexes. Characteristic facial skin findings include erythema, telangiectasia, papules, pustules, prominent sebaceous glands, and rhinophyma. Rosacea is also associated with epithelial basement membrane abnormalities and recurrent corneal epithelial erosions.<sup>32,33</sup> The *Demodex* mite may play a role in the pathogenesis of rosacea. The *Demodex* load is increased in individuals with rosacea.<sup>34</sup>

Rosacea may be difficult to diagnose in patients with darker skin tones because of the difficulty in visualizing telangiectasia or facial flushing. Rosacea is typically seen in middle age and occurs more often in women.<sup>35</sup> Although rosacea is more prevalent in women, it can be more severe when it occurs in men.<sup>36,37</sup> Because many patients exhibit only mild signs, such as telangiectasia and a history of easy facial flushing, the diagnosis of rosacea is often overlooked, especially in children who may present with chronic recurrent keratoconjunctivitis, phlyctenules, punctate erosions, keratitis, MGD, or recurrent chalazia and have subtle signs of rosacea.<sup>38</sup> Children with ocular rosacea often present with corneal involvement, asymmetry of ocular disease, and the potential for visual impairment such as corneal melting/perforation. Facial rosacea is less frequent in children, and associated atopy is common.<sup>39,40</sup> Children with a history of styes have an increased risk of developing adult rosacea.<sup>41</sup> A Cochrane systematic reviews

reported uncertainty with respect to indications and effectiveness of both topical and systemic treatments for blepharokeratoconjunctivitis in children due to the lack of high-quality evidence. More clinical trials are warranted to establish safety and efficacy for the proper treatment of blepharokeratoconjunctivitis in children.<sup>42-44</sup>

◆ Isotretinoin

Isotretinoin, an oral medication that is used to treat severe cystic acne, is associated with a significant increase in colonization of the conjunctiva with *S. aureus*, blepharitis, and a disruption in tear function.<sup>45</sup> Discontinuation of the medication leads to improvement in most cases.<sup>45-48</sup>

◆ Giant papillary conjunctivitis

Patients with contact-lens-associated giant papillary conjunctivitis (GPC) have an increased frequency of MGD.<sup>49</sup> The severity of GPC may correlate with the severity of MGD.<sup>49</sup>

Table 1 lists other entities that produce inflammation of the eyelid margin.

TABLE 1 OTHER CONDITIONS ASSOCIATED WITH EYELID INFLAMMATION

Condition	Entity
Bacterial infections	<ul style="list-style-type: none"> <li>• Impetigo (due primarily to <i>Staphylococcus aureus</i>)</li> <li>• Erysipelas (due primarily to <i>Streptococcus pyogenes</i>)</li> <li>• Angular blepharitis (<i>Moraxella</i>)</li> </ul>
Viral infections	<ul style="list-style-type: none"> <li>• Herpes simplex virus</li> <li>• Molluscum contagiosum</li> <li>• Varicella zoster virus</li> <li>• Papillomavirus</li> <li>• Vaccinia</li> </ul>
Parasitic infection	<ul style="list-style-type: none"> <li>• Pediculosis palpebrarum (<i>Phthirus pubis</i>), <i>Demodex folliculorum</i></li> </ul>

TABLE 1 OTHER CONDITIONS ASSOCIATED WITH EYELID INFLAMMATION (CONTINUED)

Condition	Entity
Immunologic conditions	<ul style="list-style-type: none"> <li>• Atopic dermatitis</li> <li>• Contact dermatitis</li> <li>• Erythema multiforme minor/major</li> <li>• Pemphigus foliaceus</li> <li>• Ocular mucous membrane pemphigoid (OMMP)</li> <li>• Stevens-Johnson syndrome/toxic epidermal necrolysis</li> <li>• Connective tissue disorders               <ul style="list-style-type: none"> <li>• Discoid lupus</li> <li>• Dermatomyositis</li> </ul> </li> <li>• Graft-versus-host disease (GVHD)</li> </ul>
Dermatoses	<ul style="list-style-type: none"> <li>• Psoriasis</li> <li>• Ichthyosis</li> <li>• Exfoliative dermatitis</li> <li>• Erythroderma</li> </ul>
Benign eyelid tumors	<ul style="list-style-type: none"> <li>• Pseudoepitheliomatous hyperplasia</li> <li>• Actinic keratosis</li> <li>• Squamous cell papilloma</li> <li>• Sebaceous gland hyperplasia</li> <li>• Hemangioma</li> <li>• Pyogenic granuloma</li> </ul>
Malignant eyelid tumors	<ul style="list-style-type: none"> <li>• Basal cell carcinoma</li> <li>• Squamous cell carcinoma</li> <li>• Sebaceous carcinoma</li> <li>• Melanoma</li> <li>• Kaposi sarcoma</li> <li>• Mycosis fungoides</li> </ul>
Trauma	<ul style="list-style-type: none"> <li>• Chemical</li> <li>• Thermal</li> <li>• Radiation</li> <li>• Mechanical</li> <li>• Surgical</li> </ul>
Toxic conditions	<ul style="list-style-type: none"> <li>• Medicamentosa</li> </ul>

## NATURAL HISTORY

Blepharitis is a chronic condition that has periods of exacerbation and remission. Although onset usually occurs in middle-aged adults, it can begin in childhood.<sup>38,50</sup> Severe staphylococcal blepharitis may eventually lead to eyelash loss, eyelid scarring with trichiasis, and corneal scarring and neovascularization.<sup>9</sup> Patients with seborrheic blepharitis and MGD are generally older and have a longer history of ocular symptoms (range 6.5 to 11.6 years).<sup>10</sup> Eyelid margin telangiectasia and meibomian gland orifice narrowing and pouting may occur in asymptomatic older patients.<sup>51</sup> Meibomian gland dysfunction can also occur in the absence of inflammation.<sup>5</sup>

Patients with severe ocular rosacea and blepharitis may develop superficial punctate keratopathy, corneal neovascularization, and scarring.<sup>31</sup> Although ulceration and perforation can rarely occur in blepharitis, the incidence of these complications is greater in children.<sup>52</sup>

## CARE PROCESS

### PATIENT OUTCOME CRITERIA

Outcome criteria for managing blepharitis include the following:

- ◆ Reduce the symptoms and signs of blepharitis
- ◆ Minimize structural damage
- ◆ Prevent loss of visual function

### DIAGNOSIS

The initial evaluation of a patient with symptoms and signs suggestive of blepharitis should include the relevant aspects of the comprehensive medical eye evaluation.<sup>53,54</sup> The diagnosis of blepharitis is usually based on a typical patient history and characteristic slit-lamp biomicroscopic findings. Ancillary testing such as taking microbiologic cultures of the eyelid and conjunctiva, dynamic meibomian gland imaging, and eyelash epilation for examination by light microscopy for identification/confirmation of *Demodex* infestation may be helpful.

#### History

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

- ◆ Symptoms and signs (e.g., redness, irritation, burning, tearing, itching, crusting of eyelashes, loss of eyelashes, eyelid sticking, blurring or fluctuating vision, contact lens intolerance, photophobia, increased frequency of blinking, and recurrent hordeolum)
- ◆ Time of day when symptoms are worse (worsening of the symptoms in the morning is typical of blepharitis, whereas worsening of the symptoms later in the day are typical of aqueous deficient dry eye)
- ◆ Duration of symptoms
- ◆ Unilateral or bilateral presentation

- ◆ Exacerbating conditions (e.g., smoke, allergens, wind, contact lenses, low humidity, retinoids, diet and alcohol consumption, eye makeup)
- ◆ Symptoms and signs related to systemic diseases (e.g., rosacea, atopy, psoriasis, and graft-versus-host disease [GVHD])
- ◆ Current and previous systemic and topical medications (e.g., antihistamines or drugs with anticholinergic effects, or drugs used in the past such as isotretinoin that might have an effect on the ocular surface)
- ◆ Recent exposure to an infected individual (e.g., pediculosis palpebrarum [*Phthirus pubis*])

The ocular history may include details about previous intraocular and eyelid surgery as well as local trauma, including mechanical, thermal, chemical, and radiation injury. A history of cosmetic blepharoplasty is important to obtain because increased surface exposure may increase tear evaporation. A history of styes and/or chalazia is common in patients with blepharitis.

The medical history may also include information about dermatologic diseases such as rosacea, atopic dermatitis, and herpes zoster ophthalmicus.

## Examination

Examination of the eye and adnexa includes measurement of visual acuity, an external examination, slit-lamp biomicroscopy, and measurement of intraocular pressure (IOP). The external examination should be performed in a well-lighted room with particular attention to the following:

- ◆ Skin
  - ◆ Changes consistent with rosacea such as rhinophyma, erythema, telangiectasia, papules, pustules, and hypertrophic sebaceous glands in malar areas
- ◆ Eyelids
  - ◆ Abnormal eyelid position (i.e., ectropion and entropion), incomplete eyelid closure (i.e., lagophthalmos), blink response, and/or eyelid laxity
  - ◆ Loss, breakage, or misdirection of eyelashes
  - ◆ Vascularization or hyperemia of eyelid margins
  - ◆ Abnormal deposits at the base of the eyelashes
  - ◆ Ulceration
  - ◆ Vesicles
  - ◆ Scaling, hyperkeratosis
  - ◆ Chalazion/hordeolum



- ◆ Scarring

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

- ◆ Tear film
  - ◆ Tear meniscus
  - ◆ Tear film break-up time and pattern
  - ◆ Foamy discharge
  - ◆ Debris in the tear film
- ◆ Anterior eyelid margin
  - ◆ Hyperemia
  - ◆ Telangiectasia
  - ◆ Scarring
  - ◆ Pigmentary changes
  - ◆ Keratinization
  - ◆ Ulceration
  - ◆ Vesicles
  - ◆ Blood-tinged debris
  - ◆ Pediculosis palpebrarum (*P. pubis*)
  - ◆ Presence of lesion
- ◆ Eyelashes
  - ◆ Malposition or misdirection
  - ◆ Loss or breakage
  - ◆ Pediculosis palpebrarum (*P. pubis*) nits
  - ◆ Cylindrical sleeves (demodicosis or seborrhea)
  - ◆ Cosmetic deposits and collarettes
- ◆ Posterior eyelid margin
  - ◆ Abnormalities of meibomian orifices such as capping, pouting, retroplacement, metaplasia, and obliteration<sup>55</sup>
  - ◆ Character of meibomian secretions such as expressibility, thickness, turbidity, and color
  - ◆ Vascularization, keratinization, nodularity
  - ◆ Thickening
  - ◆ Scarring/fibrosis
- ◆ Tarsal conjunctiva (everting eyelids)
  - ◆ Appearance of meibomian glands and ducts such as dilation and inflammation

- ◆ Chalazia
- ◆ Erythema
- ◆ Scarring
- ◆ Keratinization
- ◆ Papillary/follicular reaction
- ◆ Lipid exudation/inspissation/concretions
- ◆ Cicatricial changes: subepithelial fibrosis, fornix foreshortening, symblepharon formation
- ◆ Bulbar conjunctiva
  - ◆ Hyperemia
  - ◆ Phlyctenules, follicles
  - ◆ Conjunctivochalasis
  - ◆ Punctate staining with fluorescein, rose bengal, or lissamine green (generally fluorescein is used for cornea and lissamine green for conjunctiva)
  - ◆ Cicatricial changes: subepithelial fibrosis, fornix foreshortening, symblepharon formation
- ◆ Cornea
  - ◆ Epithelial defect, punctate staining with fluorescein, rose bengal, or lissamine green (generally, fluorescein is used for cornea and lissamine for conjunctiva)
  - ◆ Edema, infiltrates, ulcers, and/or scars (small subepithelial or superficial stromal, circumferential, in midperipheral cornea, usually without overlying fluorescein staining)
  - ◆ Vascularization, scarring, including pannus
  - ◆ Phlyctenules

### Diagnostic Tests

There are no specific clinical diagnostic tests for blepharitis. However, cultures of the eyelid margins may be indicated for patients who have recurrent anterior blepharitis with severe inflammation as well as for patients who are not responding to therapy. Microscopic evaluation of epilated eyelashes may reveal *Demodex* mites, which have been implicated in some cases of chronic blepharoconjunctivitis. This can be performed by placing the explanted eyelashes on a glass slide, adding a drop of fluorescein, and placing a cover slip.<sup>56</sup>

The possibility of carcinoma should be considered in patients with chronic blepharitis unresponsive to therapy, especially when only one eye is involved. Often such patients

will have a degree of conjunctival cicatricial changes in the affected eye. A biopsy of the eyelid may be indicated to exclude the possibility of carcinoma in cases of marked asymmetry, resistance to therapy, or unifocal recurrent chalazia that do not respond well to therapy.<sup>57</sup> Additional signs of concern may include loss of normal eyelid margin and conjunctival anatomy, and focal lash loss (ciliary madarosis). Before obtaining a biopsy for suspected sebaceous carcinoma, consultation with a pathologist is recommended to discuss the potential need for frozen sections and mapping of the conjunctiva to search for pagetoid spread. Fresh tissue may be needed to detect lipids using special dyes such as oil red-O.

It is also very important to do a complete ocular surface exam on patients with chronic blepharitis that has been unresponsive to standard medical treatment to look for any signs of conjunctival cicatricial changes. If there are any signs of cicatrizing disease, clinicians should be suspicious about the possibility of ocular mucous membrane pemphigoid (OMMP) and the proper workup should be initiated, including immunofluorescence studies of the biopsy specimen. (See the Conjunctivitis PPP.<sup>58</sup>)

Clinical features that may aid in the differential diagnosis of staphylococcal, seborrheic, and MGD blepharitis are summarized in Table 2. Features of these forms of blepharitis often overlap. In addition, patients with associated conditions such as dry eye can present with similar clinical features.

An important diagnostic tool for MGD is the assessment of lid margin changes and expression of the meibomian glands. This may be performed by applying pressure to the lower eyelids with either fingers or a cotton bud. A more detailed analysis of the lipid layer using interferometry technology can be used to evaluate the tear film lipid-layer thickness. Patients with low interferometry values of lipid-layer thickness report more dry eye symptoms.<sup>59,60</sup>

TABLE 2 CLINICAL FEATURES OF BLEPHARITIS BY CATEGORY

Feature	Anterior Eyelid		Posterior Eyelid
	Staphylococcal	Seborrheic	Meibomian Gland Dysfunction
Eyelash loss	Frequent	Rare	—
Eyelash misdirection	Frequent	Rare	May occur with long-standing disease
Eyelid deposits	Matted, hard scales/collarettes	Oily or greasy	Excess lipid, foamy discharge
Eyelid ulceration*	With severe exacerbations	—	—
Eyelid scarring	May occur	—	May occur with long-standing disease
Chalazia	Rare	Rare	Occasional to frequent, sometimes multiple
Hordeolum	May occur	—	—

Conjunctiva	Mild to moderate injection; phlyctenules may occur	Mild injection	Mild to moderate injection; papillary reaction of tarsal conjunctiva
Aqueous tear deficiency	Frequent	Frequent	Frequent
Cornea	Inferior punctate epithelial erosions, peripheral/marginal infiltrates (typically at 10, 2, 4, or 8 o'clock), scarring, neovascularization and pannus, thinning, phlyctenules	Inferior punctate epithelial erosions	Inferior punctate epithelial erosions, fine infiltrates superiorly and inferiorly, scarring, neovascularization and pannus, ulceration
Dermatologic disease	Atopy rarely	Seborrheic dermatitis	Rosacea

NOTE: A dash (—) in the column indicates that the feature is not found for the specific type of blepharitis.

Adapted with permission from the American Academy of Ophthalmology Basic and Clinical Science Course Subcommittee. Basic Clinical and Science Course. External Disease and Cornea: Section 8, 2017–2018. Table 3-11. San Francisco: American Academy of Ophthalmology, 2017.

\* Also consider herpes simplex virus.

## MANAGEMENT

### Detection

Detection and appropriate treatment can reduce signs and symptoms of blepharitis, and in severe cases it can prevent permanent structural damage and possible vision loss.

This is particularly important in children, in whom chronic blepharokeratoconjunctivitis is often unrecognized. It should be suspected in a child with recurrent conjunctivitis, keratitis, neovascularization, eyelid inflammation, hordeolum, and chalazia.<sup>38-40,50,61</sup> The presentation can be asymmetric and is often confused with herpetic disease.

Tear film break-up time using fluorescein is significantly shorter in patients with MGD, even if aqueous tear production is normal.<sup>62</sup> This suggests that meibomian gland secretions are important in maintaining a stable precorneal tear film. The overlap of clinical features of the various forms of chronic blepharitis and the variable association of all forms with tear dysfunction<sup>4</sup> underscore the complexity of the relationship between blepharitis and tear dysfunction as well as the need for customized treatment approaches for patients with complaints of ocular irritation.

Discoid lupus erythematosus and OMMP can masquerade as blepharokeratoconjunctivitis.<sup>63,64</sup> Recognizing the association of eyelid inflammation with these systemic diseases can lead to prompt and effective treatment. In cases where carcinoma masquerades as blepharitis, early diagnosis and appropriate treatment can prevent disfigurement and may be lifesaving.

Postoperative endophthalmitis is a feared complication following intraocular surgery. In a large retrospective study at a tertiary care center, the causative microorganisms of acute postoperative endophthalmitis following clear corneal cataract surgery included

the usual ocular surface pathogens that are commonly associated with blepharitis (coagulase-negative *Staphylococcus* [68.4%], *S. aureus* [6.8%], and *Streptococcus* species [8.2%]).<sup>65</sup> Therefore, it may be helpful to address moderate to severe blepharitis with topical antibiotics and eyelid hygiene so that symptoms and signs are controlled prior to an intraocular surgical procedure. Opinions vary on when and how aggressively to treat blepharitis prior to surgery, and there is no evidence proving that such treatment will prevent endophthalmitis. Long-term antibiotic treatment may result in the development of resistant organisms.<sup>66</sup>

## Treatment

The patient must understand that a cure is usually not possible. Treatments that may be helpful include the following:

- ◆ Warm compresses
- ◆ Eyelid cleansing, including eyelid massage in cases of MGD to express the meibomian glands
- ◆ Antibiotics (topical and/or systemic)
- ◆ Topical anti-inflammatory agents (e.g., corticosteroids, cyclosporine)

These treatment options are often used in combination. Eyelid cleansing is especially useful for anterior blepharitis, while warm compresses are especially helpful for posterior blepharitis and MGD. The optimal treatment regimen often requires persistence and a trial-and-error approach. An initial step in treating patients who have blepharitis is to recommend warm compresses and eyelid cleansing,<sup>67</sup> which may be accomplished in several ways.

One regimen is to apply warm compresses to the eyelids for several minutes to soften adherent scurf and scales or discharge and/or warm the meibomian secretions. Sustained warmth can be achieved by using hot tap water on a clean wash cloth, over the counter heat pack, or homemade bean/rice bag that can be heated in the microwave. It is very important to instruct patients to avoid using compresses that are so hot that they burn the skin.

Eyelid cleansing can be accomplished by brief, gentle massage of the eyelids. Eye cleaners with hypochlorous acid at 0.01% have a strong antimicrobial effect which has been used for the treatment of anterior blepharitis.<sup>68</sup> Vertical eyelid massage can be performed to express meibomian secretions. Rubbing the eyelid margins from side to side removes crusting from the eyelashes. Cleaning the eyelid can be safely accomplished by having the patient gently rub the base of the eyelashes using either

diluted baby shampoo or commercially available eyelid cleaner on a pad, cotton ball, cotton swab, or clean fingertip. Cleaning the eyelid using any of the above devices and/or digital massage potentially can be dangerous if the patient lacks manual dexterity or the necessary skill or judgment to perform the task safely. The ophthalmologist should consider the patient's ability to perform this treatment and tailor the therapeutic plan accordingly. Proper counseling of patients with neurotrophic corneas is important to avoid injury to corneal epithelium. A schedule of regularly performed eyelid cleansing, daily or several times weekly, often blunts the symptoms of chronic blepharitis.<sup>69</sup>

Once- or twice-daily compresses and massage, at a time most convenient for the patient, is generally adequate. Expression of the meibomian glands may be particularly helpful in cases of MGD,<sup>70</sup> but it must be performed with care. Frequent manipulation of the eyelid may lead to mechanically induced irritation. In addition, patients who have advanced glaucoma, with or without a history of a glaucoma filtering procedure, should be advised to not place pressure on the lids aggressively, because it may subsequently increase eye pressure. Patients should be advised that warm compress and eyelid cleansing treatment may be required long term, because the symptoms often recur when treatment is discontinued.

Topical antibiotics have been shown to provide some symptomatic relief, and they have been effective in decreasing bacteria from the eyelid margin in cases of anterior blepharitis. Eyelid hygiene may provide symptomatic relief for both anterior and posterior blepharitis. Evidence on the effectiveness of other treatments for blepharitis, such as topical corticosteroids or oral antibiotics, has been shown to be inconclusive.<sup>42</sup>

A topical antibiotic ointment such as bacitracin or erythromycin can be prescribed and applied on the eyelid margins one or more times daily or at bedtime for a few weeks. Topical antibiotic treatment can be repeated on an intermittent basis using different kinds of medications with different mechanisms of action to prevent the development of resistant organisms. The frequency and duration of treatment should be guided by the severity of the blepharitis and response to treatment. The clinical efficacy of topical tobramycin/dexamethasone ophthalmic suspension and azithromycin in a sustained release system has been evaluated in uncontrolled (off-label), manufacturer-sponsored studies, and these topical treatments appear to reduce some of the signs and symptoms of blepharitis.<sup>71-73</sup>

For patients with MGD, whose chronic symptoms and signs are not adequately controlled by eyelid cleansing or meibomian gland expression, oral tetracyclines and

topical antibiotics may be helpful. Doxycycline, minocycline, or tetracycline can be given daily, and tapered after clinical improvement is noted.<sup>74,75</sup> Alternatively, oral erythromycin or azithromycin can be used especially in women of childbearing age and children. Tetracyclines and macrolide antibiotics also have anti-inflammatory activity.<sup>76</sup> Treatments can be intermittently discontinued and reinstated, based on the severity of the patient's blepharitis and tolerance for the medication.

The rationale for the use of tetracyclines is based in part on small clinical trials that report efficacy of the drugs in improving symptoms in patients with ocular rosacea<sup>77</sup> and improving tear break-up time in patients with rosacea and MGD.<sup>78</sup> The tetracyclines decrease lipase production in both *S. epidermidis* and *S. aureus*.<sup>79,80</sup> Tetracyclines can cause photosensitization, gastrointestinal upset, vaginitis, and, rarely, azotemia. Tetracyclines have been implicated in cases of pseudotumor cerebri,<sup>81,82</sup> and their metabolism may alter the effectiveness of certain medications (e.g., decrease the effectiveness of oral contraceptives and potentiate the effect of warfarin). A sustained-release preparation of doxycycline can be used to reduce side effects. Tetracyclines are contraindicated in pregnancy, for nursing women, and for patients with a history of hypersensitivity to tetracyclines. Tetracyclines also should not be used in children under 8 years of age,<sup>83</sup> since staining of teeth may occur; however, oral erythromycin may be substituted.<sup>38,84</sup> Minocycline has been reported to stain skin, nails, sclera, teeth, conjunctiva, tongue, and bone.<sup>85-87</sup>

Oral azithromycin (off-label) has been used successfully in the management of acne rosacea as an alternative to oral tetracyclines, particularly in combination with 0.1% topical tacrolimus.<sup>88,89</sup> Similarly, oral azithromycin 500 mg per day for 3 days in three cycles with 7-day intervals yielded good clinical improvement in 13 patients with blepharitis in an open-label single-center prospective case series.<sup>90</sup> Importantly, a Medicaid cohort in Tennessee showed a small but absolute increase in cardiovascular deaths (hazard ratio, 2.88; 95% confidence interval [CI], 1.79 to 4.63;  $P < 0.001$ ), which was most pronounced among patients who had a high baseline risk of cardiovascular disease and were treated with a 5-day oral azithromycin therapy.<sup>91</sup> In March 2013, the FDA issued a warning that oral azithromycin may lead to abnormalities in the electrical activity of the heart, with the potential to create serious irregularities in heart rhythm.<sup>92</sup> Studies have shown that topical and systemic ivermectin have successfully reduced or eliminated the number of *D. folliculorum* found in the epilated lashes of patients with blepharitis or ocular rosacea.<sup>93</sup> Currently, there is only high-quality evidence to support topical azelaic acid, topical ivermectin, brimonidine, doxycycline and isotretinoin as

effective treatments for patients with systemic rosacea. [I+, Good, Strong] Additional studies must be performed to determine effectiveness of topical metronidazole, oral tetracycline, low dose minocycline or topical cyclosporine for ocular rosacea.<sup>94</sup>

A brief course of topical corticosteroids may be helpful for eyelid or ocular surface inflammation such as severe conjunctival infection, marginal keratitis, or phlyctenules. Corticosteroid eye drops or ointments are typically applied several times daily to the eyelids or ocular surface. Once the inflammation is controlled, the corticosteroid can be tapered and discontinued and then used intermittently to maintain patient comfort. The minimal effective dose of corticosteroids should be used, and long-term corticosteroid therapy should be avoided if possible. Patients should be informed of the potential adverse effects of corticosteroid use, including the risk for developing increased IOP and cataract. These adverse effects may be minimized by using a site-specific corticosteroid such as loteprednol etabonate and corticosteroids with limited ocular penetration, such as fluorometholone. Guidelines for maintenance therapy should be discussed. Topical cyclosporine 0.05% may be helpful in some patients with posterior blepharitis.<sup>95</sup>

Diet modification has been a traditional (though not well-documented) way of managing acne rosacea. The role of dietary supplementation with essential fatty acids in the management of blepharitis was evaluated in a 1-year study in which patients took two 1000-mg capsules of essential fatty acids three times a day. Those receiving the supplement demonstrated an improvement in the tear film break-up time, dry eye symptoms, and meibum score, suggesting a potential benefit for this treatment in some blepharitis patients.<sup>96</sup> In a recent, prospective, multicenter, double-blind clinical trial funded by the National Eye Institute and National Institutes of Health, the use of oral omega-3 supplements by patients with moderate to severe dry eye disease was studied. Patients who were randomly assigned to receive supplements containing 3000 mg of omega-3 fatty acids for 12 months did not have significantly better outcomes than patients assigned to receive placebo.<sup>97</sup> These two conflicting outcomes may indicate differences in patient population, formulations of the supplements, dosing, and/or the disease process being examined (i.e., blepharitis vs. moderate to severe dry eye disease). More studies are needed to clearly define the role of omega-3 supplements in ocular surface disease.

Because many blepharitis patients have tear film instability, artificial tears may improve symptoms when used as an adjunct to eyelid cleansing and medications. If artificial tears are used more than four times per day, nonpreserved tears should be used to avoid



preservative toxicity. Topical cyclosporine and/or punctal plugs may also be helpful in managing coexisting aqueous tear deficiency. (See the Dry Eye Syndrome PPP for more information on topical cyclosporine.<sup>98</sup>)

Demodicosis should be considered in patients who do not improve using the above treatments. Improvement in symptoms and signs was recently reported in a small case series in which weekly 50% tea tree oil eyelid scrubs and daily tea- tree- oil shampoo scrubs were used for a minimum of 6 weeks in a group of patients who failed the above treatment methods.<sup>30,99,100</sup> Oral ivermectin has also been reported to be of benefit in some cases of recalcitrant *Demodex* blepharitis.<sup>93,101</sup>

An eyelid tumor should be suspected in patients with atypical eyelid-margin inflammation or disease not responsive to medical therapy, and these patients should be carefully re-evaluated. The presence of features such as nodular mass, ulceration, extensive scarring, lash loss, localized crusting and scaling of the dermis, or yellow conjunctival nodules surrounded by intense inflammation may suggest the presence of an eyelid tumor. Basal cell carcinoma and squamous cell carcinoma are the most frequently encountered malignant tumors involving the eyelids. Melanoma and sebaceous carcinoma are the next most frequently diagnosed malignant tumors of the eyelid.<sup>102</sup> Sebaceous carcinoma may have a multicentric origin and may induce severe conjunctival inflammation due to pagetoid spread, and it may be difficult to diagnose. Sebaceous carcinoma should be considered in elderly patients who have unresponsive, chronic, unilateral blepharitis or conjunctivitis, or recurrent chalazia.

There are also several in-office procedural treatments available that may theoretically unclog the inspissated meibomian gland orifices using intense pulsed light (IPL) or mechanical means (e.g., microblepharoexfoliation of the eyelid margin, meibomian gland probing, and/or devices using thermal pulsation). Although there have been industry-sponsored studies, independent, randomized, masked clinical trials have yet to be performed to assess efficacy of these costly, primarily fee-for-service treatments.

- ◆ Meibomian gland probing is a procedure that can be performed at the slit lamp or in a minor-procedure room. This is a relatively safe procedure but is invasive and requires proper anesthesia of the area. An industry-associated retrospective review of 25 consecutive patients demonstrated that intraductal probing of meibomian glands provided lasting and rapid symptom relief in patients with obstructed meibomian glands.<sup>103</sup>
- ◆ Vectored thermal pulsation (VTP) therapy for meibomian glands is a technology designed to transfer heat and actively express the meibomian gland contents. This

commercially available device applies heat (42.5°C/108.5°F) to the inner eyelid surface while protecting the cornea, and pulsating pressure is applied to the outer eyelid surface. Multiple industry-sponsored studies have demonstrated that a single VTP treatment can be effective at improving meibomian gland function and reducing dry eye symptoms for a year or more postprocedure.<sup>104,105</sup> To date, there have been no independent, randomized, clinical trials confirming or refuting these industry-sponsored studies.

- ◆ Microblepharoexfoliation can be performed in the office with using a commercially available device that consists of a hand-held electromechanical unit and a disposable microsponge that spins rapidly to provide debridement and exfoliation at the lid margin. Limited, primarily industry-sponsored reports are available comparing this with conventional manual scrub techniques. Murphy et al reported that eyelid hygiene using tea tree oil with combination microblepharoexfoliation was of comparable benefit to hypochlorous acid scrubs or tea tree oil alone in patients with blepharitis secondary to *Demodex* infestation.<sup>106</sup>
- ◆ Intense pulsed light is a noncoherent polychromatic light source with a broad wavelength spectrum of 500 to 1200 nm that has been widely used for aesthetic or therapeutic purposes in the dermatology field. This is a promising new therapy for MGD. The photothermal effect helps decrease inflammation of the gland, but the exact mechanism of action is still unclear. Several groups have reported that IPL improved meibomian gland function and gland macro- and microstructure, with secondary improvement of dry eye symptoms. There has been one small independent 28 patient study showing improved symptoms, and tear quality in a contralateral eye study. This treatment is not covered by insurance, is relatively costly, and has to be repeated in order to obtain, theoretically, long-lasting effects.<sup>107,108</sup> Although intense pulsed light is effective for the treatment of telangiectasias, there is insufficient evidence to determine the effectiveness of this therapy in patients with rosacea.<sup>94</sup>

### Follow-Up

Patients with mild blepharitis should be advised to return to their ophthalmologist if their condition worsens. Visit intervals for patients are dictated by the severity of symptoms and signs, the current therapy, and comorbid factors such as glaucoma in patients who have been treated with corticosteroids. Patients with planned intraocular surgery should have a follow-up visit after initiating treatment to reassess the control of the eyelid inflammation prior to surgery. The follow-up visit should consist of an

interval history, measurement of visual acuity, external examination, and slit-lamp biomicroscopy. If corticosteroid therapy is prescribed, patients should be re-evaluated within a few weeks to determine the response to therapy, measure IOP, and assess treatment compliance.

## PROVIDER AND SETTING

The diagnosis and management of blepharitis requires broad medical skills and experience because of the potential association of systemic conditions, including cancer, with eyelid inflammation. At times, a multidisciplinary approach with a dermatologist, allergist, or oculoplastics specialist can be helpful. Patients with blepharitis who are evaluated by non-ophthalmologist health care providers should be promptly referred to an ophthalmologist if any of the following occurs:

- ◆ Visual loss
- ◆ Moderate or severe pain
- ◆ Severe or chronic redness
- ◆ Orbital involvement
- ◆ Recurrent episodes
- ◆ Lack of response to therapy
- ◆ Pediatric patients should be referred sooner

## COUNSELING AND REFERRAL

One of the most important aspects of caring for patients with blepharitis is educating them about the chronicity and recurrence of the disease process. Patients should be informed that symptoms can frequently be improved but are rarely eliminated. Patients with an inflammatory eyelid lesion that appears suspicious for malignancy should be referred to an appropriate specialist.

## SOCIOECONOMIC CONSIDERATIONS

The economic impact of blepharitis as a separate entity has not been adequately evaluated. One study reported the eye-related Medicare costs of a random sample of beneficiaries with diagnostic codes for at least one of the following - blepharitis (373.0x), chronic conjunctivitis (372.1x), or blepharoconjunctivitis (372.2x) - to be a median of \$658 and a mean of \$1428 ± \$1752 over a 5-year period.<sup>109</sup> The economic burden of blepharitis is magnified by its prevalence, and additional studies are needed to characterize its financial impact.

Multiple studies are available on the economic impact of dry eye. The link between MGD and aqueous tear deficiency, as well as between MGD and staphylococcal and seborrheic blepharitis, is well established.<sup>110-113</sup> Furthermore, this relationship is commonly understood by US eye professionals, as illustrated in a survey in which 74% to 94% agreed or strongly agreed that MGD is the most common cause of evaporative dry eye and 96% to 97% agreed that they were comorbidities.<sup>18</sup>

The impact of blepharitis alone on the quality of life has not been studied, but the burden of dry eye has been shown to profoundly impact daily tasks.<sup>114,115</sup> Given the established relationship between blepharitis and dry eye, it is possible that patients with blepharitis suffer a similar impact on their quality of life and difficulties with common activities of daily living. Additional studies need to be conducted to assess the impact of blepharitis on patients in order to address their needs and provide adequate resources.

Although there is no strong evidence that there is an effective cure for chronic blepharitis, there is evidence that certain treatment modalities may provide symptomatic relief. Improved signs and symptoms of blepharitis may lead to decreased office visits and increased productivity, which may result in a decrease in direct and indirect costs, and an increase in quality of life. In-office procedures, such as microblepharoexfoliation, thermal pulsation of meibomian glands, and IPL are not currently covered by insurance and can incur significant cost to the patient. The cost-effectiveness and the impact on quality of life of the treatment options for blepharitis need to be investigated.

To study the socioeconomic impact of blepharitis effectively, an improved understanding of the disease is needed, and a uniform classification system and accurate prevalence data must be utilized. The International Workshop on Meibomian Gland Dysfunction has endeavored to do just this ([www.tearfilm.org/mgdworkshop/index.html](http://www.tearfilm.org/mgdworkshop/index.html)), and the results of its work were published in 2011.<sup>5</sup> Additional studies, similar to those available on dry eye syndrome, should consider the consumption of health care dollars, including office visits and therapeutic remedies; the indirect costs, including lost time and productivity; and the intangible costs, including quality of life. Blepharitis likely is a significant public health burden, and additional studies are needed to accurately assess its socioeconomic impact.

## 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.

- ◆ 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

Blepharitis, which includes entities with the following ICD-10 classifications:

	ICD-10 CM
Ulcerative	H01.01-
Squamous	H01.02-
Stye	H00.01-
Meibomitis	H01.02-
Abscess of eyelid	H00.03-
Parasitic infestation of eyelid	B89

CM = Clinical Modification used in the United States; (-) = 1, right upper eyelid; 2, right lower eyelid; 4, left upper eyelid; 5, left lower eyelid

\* Code first underlying disease, as leishmaniasis (085.0–085.9), loiasis (125.2), onchocerciasis (125.3), or pediculosis (132.0)

Additional information:

- Certain ICD-10 CM categories have applicable 7<sup>th</sup> characters. The applicable 7<sup>th</sup> character is required for all codes within the category, or as the notes in the Tabular List instruct. The 7<sup>th</sup> character must always be the 7<sup>th</sup> character in the data field. If a code that requires a 7<sup>th</sup> 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., 4<sup>th</sup> digit, 5<sup>th</sup> digit, or 6<sup>th</sup> digit):
  - Right upper eyelid is always 1
  - Right lower eyelid is always 2
  - Left upper eyelid is always 4
  - Left lower eyelid is always 5

# LITERATURE SEARCHES FOR THIS PPP

Literature searches of the PubMed and Cochrane databases were conducted in March 2017; the search strategies were as follows. Specific limited update searches were conducted after June 2018.

## **Blepharitis:**

("blepharitis"[mh] OR "blepharitis")

## **Epidemiology:**

"blepharitis/epidemiology"[mh]

## **Risk Factors:**

("blepharitis"[MeSH Terms]) AND (("risk factors"[MeSH Terms]) OR ("cost of illness"[MeSH Terms]) OR ("cost benefit analysis"[MeSH Terms]) OR ("quality of life"[MeSH Terms]))

## **Rosacea:**

("blepharitis"[MeSH Terms]) AND ("rosacea"[MeSH Terms])

## **Drug Therapy:**

((("blepharitis/drug therapy"[MAJR]) OR ("blepharitis/therapy"[MAJR]) OR ("blepharitis/prevention and control"[MAJR]))

## **Etiology:**

("blepharitis/etiology"[MAJR])

## **Pathology, Physiology:**

("blepharitis/physiopathology"[MeSH Terms]) OR ("blepharitis/physiology"[MeSH Terms]) OR ("blepharitis/pathology"[MeSH Terms])

## **Disease Progression:**

(blepharitis[MeSH Terms]) AND ("disease progression"[MeSH Terms])

## **Blepharoconjunctivitis:**

("blepharitis"[tiab] OR blepharoconjunctivitis[tiab] OR blepharokeratoconjunctivitis[tiab])

## **Diagnosis:**

"blepharitis/diagnosis"[MeSH Terms]



## RELATED ACADEMY MATERIALS

### **Basic and Clinical Science Course**

External Disease and Cornea (Section 8, 2018–2019)

### **Focal Points**

Antibiotic Use in Corneal and External Eye Infections (2011)

### **Patient Education Brochure**

Blepharitis (2014)

**Preferred Practice Pattern® Guidelines – Free download available at [www.aaopt.org/ppp](http://www.aaopt.org/ppp).**

Comprehensive Adult Medical Eye Evaluation (2015)

Pediatric Eye Evaluations (2017)

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