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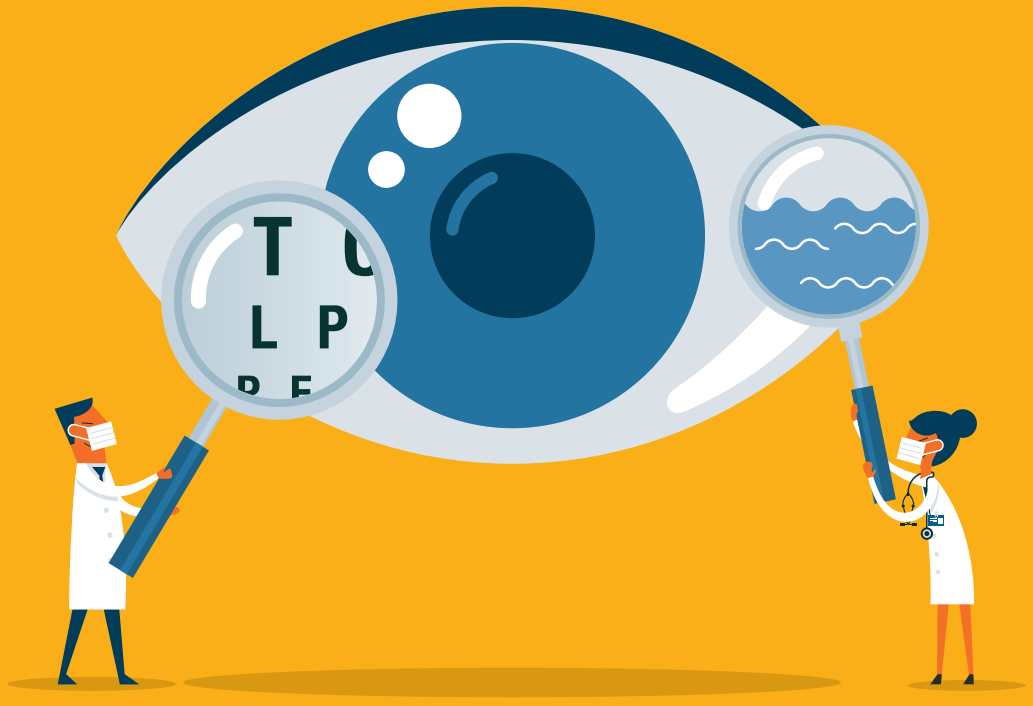

OCULAR SURFACE DISEASE:

IMPACT ON PATIENTS & POTENTIAL SOLUTIONS

KELLY K. NICHOLS, OD, MPH, PHD, FAAO
PROGRAM CHAIR
DEAN OF THE SCHOOL OF OPTOMETRY
UNIVERSITY OF ALABAMA AT BIRMINGHAM
BIRMINGHAM, AL

LESLIE O'DELL, OD, FAAO
MEDICAL DIRECTOR
DIRECTOR OF CLINICAL RESEARCH
MEDICAL OPTOMETRY AMERICA
YORK, PA

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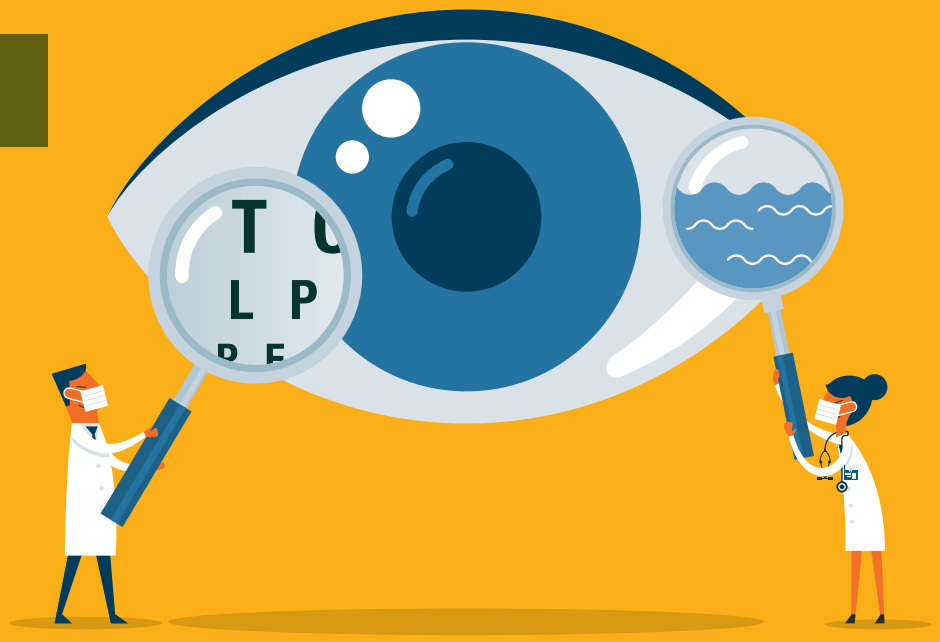

OCULAR SURFACE DISEASE:
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Content Source
This continuing education (CE) activity captures content from a live satellite symposium.

Activity Description
This supplement focuses on the overall importance of ocular surface health, including pre- and postoperatively, as well as treatment options for patients experiencing ocular discomfort from improper contact lens use. The differences in artificial tear formulations that can impact ocular surface disease treatment and best practices for in-office management of meibomian gland dysfunction are also discussed

Target Audience
This certified CE activity is designed for optometrists.

Learning Objectives
Upon completion of this activity, the participant should be able to:
- **Evaluate** the pathophysiology, risk factors, symptoms, and impact on patient quality of life of diseases that affect the ocular surface, namely dry eye disease (DED) and meibomian gland dysfunction (MGD)
- **Review** the role of a healthy ocular surface on contact lens wear
- **Modify** treatment plans for patients experiencing ocular discomfort from improper contact lens use
- **Explain** the importance of ocular surface health in pre- and postoperative dry eye management
- **Discuss** how differences in artificial tear formulations can impact the treatment of patients with DED and MGD
- **Summarize** best practices for the in-office management of MGD

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PRETEST QUESTIONS

Please complete prior to accessing the material and submit with Posttest/Activity Evaluation/Satisfaction Measures for credit.

1. Please rate your confidence in your ability to understand and explain to patients the importance of ocular surface health in pre- and postoperative dry eye management (based on a scale of 1 to 5, with 1 being not at all confident and 5 being extremely confident).

A. 1
B. 2
C. 3
D. 4
E. 5

2. All of the following are risk factors for dry eye disease (DED), EXCEPT:

A. Male gender
B. Older age
C. History of diabetes
D. Digital device use

3. According to studies, what percentage of contact lens wearers have signs of meibomian gland dysfunction (MGD)?

A. 20%
B. 40%
C. 60%
D. 80%

4. A 43-year-old contact lens wearer presents to your office for examination. She notes increasing discomfort while wearing her contact lenses and seeks treatment. All of the following are reasonable options EXCEPT?

A. Changing contact lens care solution
B. Switching from daily disposables to monthly lenses
C. Tear supplementation
D. Dietary supplements

5. A 72-year-old patient presents to your office with a chief complaint of blurry vision. Exam is notable for 2+ PEE OU as well as 2+ nuclear sclerotic cataracts OU. What is the next best step in management?

A. Refer this patient for cataract surgery
B. Refer this patient for cataract surgery, but counsel him that his dry eye may delay healing
C. Aggressively treat his ocular surface disease (OSD) preoperatively and repeat lens measurements prior to referring this patient for cataract surgery
D. Sign this patient up for cataract surgery and aggressively treat his OSD postoperatively

6. All of the following statements about DED are true EXCEPT:

A. Increasing age results in increasing symptoms of dry eye
B. A diagnosis of diabetes decreases risk of DED
C. Increased digital device use increases risk of DED
D. A diagnosis of diabetes increases risk of DED

7. Which of the following statements about DED prevalence is TRUE?

A. Prevalence has increased in all age groups at the same rate
B. Prevalence has not increased with time
C. Prevalence has increased greater in the 18- to 39-year-old age group compared to the age 50 and older population
D. Prevalence has increased in all age groups but is greatest among those 50 and older

8. A 33-year-old patient presents to your office for evaluation. She notes increasing visual problems during the past year, including chronically red eyes, discomfort, blurry vision, and eye strain. On examination, you note ocular surface staining bilaterally, but an otherwise normal anterior segment exam. In her posterior segment, you note lattice degeneration in both eyes. All of the following findings are signs/symptoms of DED, EXCEPT?

A. Conjunctival hyperemia
B. Lattice degeneration
C. Ocular surface staining
D. Eye fatigue

9. You decide to test the patient described in Question #8 for tear film osmolarity. According to your suspected diagnosis, what would you expect your findings to be?

A. Hyperosmolar tear film
B. Hypoosmolar tear film
C. Normal osmolarity reading
D. Inconclusive

10. According to literature, what percentage of precataract surgery patients had signs of MGD?

A. ~23%
B. ~33%
C. ~53%
D. ~63%

11. All of the following are risk factors for MGD EXCEPT?

A. Contact lens wear
B. *Demodex*
C. Androgen excess
D. Menopause

12. A 33-year-old patient presents to your office. She has a history of long-term contact lens wear. She notes increasing discomfort and dryness during the past year. On further testing you note significant corneal surface staining and hyperosmolar tear film. What is the next best step in management of this patient?

A. Contact lens holiday to treat OSD
B. Observation with topical steroid drops
C. Switch to rigid, gas-permeable lenses
D. Continue contact lens wear but switch contact lens cleaning solution

13. The patient described in Question #12 asks if there are any dietary supplements that might help manage her OSD and contact lens discomfort. According to the Tear Film & Ocular Surface (TFOS) Contact Lens Discomfort Workshop, what dietary supplement might you recommend?

A. Evening primrose oil
B. Topical tea tree oil
C. AREDS2 vitamins
D. High-dose vitamin A

14. A 44-year-old patient presents to your office with a known diagnosis of DED. He has been noncompliant with his drops because he says his drops cause blurry vision after administration. He notes persistent ocular discomfort. On examination you note significant ocular surface staining. What is the next best step in management?

A. Switch to artificial tears with higher concentration of demulcent ingredients
B. Switch to artificial tears with lower concentration of demulcent ingredients
C. Switch to artificial tears that have increased viscosity
D. Switch to topical steroids

15. A patient presents to your office for cataract evaluation. He has significant cataracts in both eyes. On examination you note bilateral punctate epithelial erosions and 2+ nuclear sclerotic cataracts OU. IOL calculation measurements are variable on repeat calculation, with irregular keratometry values (Ks) and topography in both eyes. What is the most likely reason for his abnormal Ks?

A. Presence of DED
B. Prior history of LASIK
C. Corneal ectasia diagnosis
D. Regular astigmatism

16. A 43-year-old patient presents to your office for evaluation. She notes increasing eye discomfort with red eyes, blurry vision, and eye fatigue. On examination, you note significant meibomian gland inspissation with erythema and telangiectasia of the lid margins. All of the following are reasonable treatment options for this patient EXCEPT?

A. Meibomian gland expression
B. Thermopulsation treatment
C. Lid wipes and hypochlorite sprays
D. AREDS2 vitamins

OCULAR SURFACE DISEASE:
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The ocular surface is a key player in vision. Without a healthy ocular surface, 20/20 vision cannot be appreciated. While dry eye disease (DED) and meibomian gland dysfunction (MGD) is now better understood among eye care professionals, patients may not appreciate the prevalence of ocular surface disease (OSD), its signs or symptoms, or how it can impact their day-to-day lives. It is often up to us to extract this information by being aware of the different types of patients that are at risk of developing OSD and then asking the right questions. Several interventions that correct vision, like contact lenses or cataract and refractive surgery, also take a toll on the ocular surface. Indeed, a healthy ocular surface can significantly affect the chance of successful outcomes, and therefore patient satisfaction, with these interventions. While we have a great and varied toolkit of pharmaceutical and nonpharmaceutical options to treat OSD, this abundance can be overwhelming for some. Leslie O'Dell, OD, FAAO, and I took this opportunity to discuss different aspects of this multifactorial disease including best practices for diagnosing and managing it.

– Kelly K. Nichols, OD, MPH, PhD, FAAO, Program Chair

DEFINING THE PROBLEM THAT IS OCULAR SURFACE DISEASE

Dr. Nichols: When I started in dry eye many years ago, we didn't discuss it very much and it felt like there was a relatively low prevalence of the disease. Of course, we know now that DED has always been prevalent in the population. However, the prevalence has likely increased, partly because of the increasing number of activities that induce and exacerbate DED and partly because there is greater awareness of DED in our community which helps us diagnose it. It is strongly associated with age and digital device use.[1]

Globally, DED prevalence ranges from 5% to 50%.[2] In the United States, more than 16 million adults have been diagnosed with DED.[3] The prevalence increases from 2.7% among people ages 18 to 34 years to 18.6% in those age 75 years and older. The numbers are almost exponential. We should always be thinking about DED, and especially evaporative dry eye (EDE), as patients age.

Prevalence is also typically higher in women than in men, and in those of Asian descent versus other races.[2-4] Between 2003 and 2015, DED was the sixth most commonly occurring ocular condition.[4]

Leslie O'Dell, OD, FAAO: Screen time has become a huge component of our daily lives, and our patients are starting to understand that a lot more. Patients have asked me for glare filters or blue blockers in their glasses, but they often don't think about the effects of digital devices on their blink rate. They may notice burning sensations, blurry vision, or tired eyes later in the workday, but they may not automatically associate that with prolonged device use.

Dr. Nichols: What's interesting is that up to 9.3% of adult Americans have reported symptoms consistent with dry eye but have not been diagnosed with DED.[3] These patients are either suffering from these symptoms without relief or buying artificial tears without a doctor's recommendation. We can help fill that void by providing a specific diagnosis and suggesting tailored treatments.

Dr. O'Dell: I estimate that more than 60% of patients have used artificial tears before they visit the optometrist complaining of dry eye symptoms. We can see for ourselves that the artificial tears shelves in pharmacies and department stores continues to grow with a large variety of products, and it can be overwhelming. It's a great opportunity for us to guide them through those choices.

Dr. Nichols: The most common signs and symptoms of DED are conjunctival hyperemia, ocular surface staining, discomfort/dryness, blurry/fluctuating vision, and eye fatigue.[5] Patients should not be able to feel their eyes or contact lenses. If they do, this is worth evaluating and, potentially, treating.

Dr. O'Dell: I say that to patients all the time: "My goal with your treatment is to give you more days where you don't remember you have eyes."

Dr. Nichols: I'll note that "eye fatigue" may not be relatable to patients, but "tired eyes" will be. Ocular redness is a sign that we tend to forget to check as well.

Dr. O'Dell: Absolutely. Sometimes patients might not have redness on the day they see us. If it isn't a common problem, it won't be top of mind for them. We may need to extract that information specifically by asking them whether it has happened in the past several months. Ocular redness also impacts quality of life because it affects how patients are perceived by family, friends, employers, colleagues, etc. They tend to infer that the redness is indicative of something else rather than a DED symptom. A patient of mine would tell me about how her husband would know she would have a bad day just by how red her eyes were in the morning.

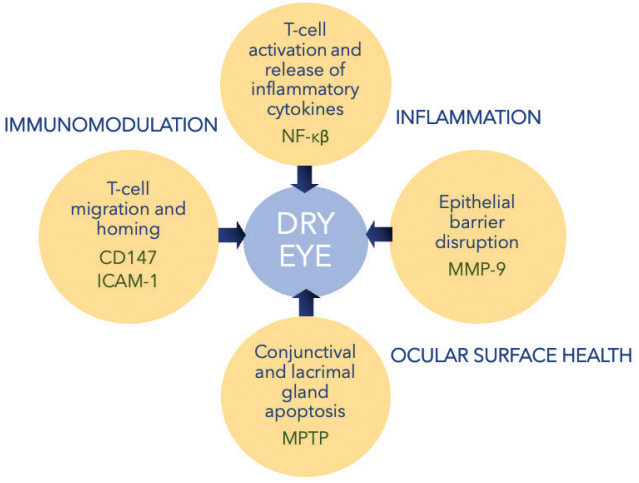

Figure 1. Multiple pathogenic mechanisms contribute to DED pathogenesis.[7]

Dr. Nichols: Dry eye is a chronic inflammatory disease. Typical of these diseases, most patients experience episodic exacerbations of signs and symptoms called flares, rather than continuous, ongoing disease.[6] Flares can be triggered by a variety of activities and environmental stressors. If patients have early DED, they may only experience flares about four to six times a year. If their annual exam with an optometrist happens between flares, they may not think to mention it.

Coupled with that, DED is a multifactorial disease (Figure 1),[7] which makes it hard to diagnose and treat. We use several different tests to measure the level or state of each of the contributing factors, which in turn is targeted by different therapeutics. For example, ocular inflammation plays a key role in DED pathogenesis, which is why immunomodulatory therapeutics are widely used as treatment. We now clinically measure the level of matrix metalloproteinase-9 (MMP-9), but there are other key molecules like nuclear factor-κB (NF-κB) that we don't. What would be ideal in dry eye diagnosis and management is being able to measure these key factors and pair those with treatments. In fact, there are several such microassays in development; although, we are somewhat limited by the reliability of collecting tear samples and the half-lives of the molecules in these samples.

Dr. O'Dell: I can imagine a day when these microassays help guide our treatment decisions, most likely for taking a combination approach similar to topical glaucoma medications. I currently have some patients on two therapies, but that can be challenging from an insurance standpoint.

Dr. Nichols: We want to be able to do tests that get reimbursed, especially if they take time and involve support from your office staff.

Dr. O'Dell: I currently utilize all point-of-care testing. Vital dyes are an easy way to test ocular surface integrity. Tear hyperosmolarity is a good marker of ocular surface inflammation, but we know that it can be a highly variable measure. However, if you perform it often enough, you can see how a patient's osmolarity scores change over time, much like IOP in glaucoma. Sometimes in the winter months, I'll see great variability between fellow eyes. I now know to question patients about whether the car heater was on or they were near an air vent prior to their visit with me, because that may have stripped their eyes of some meibum and contributed to the observed tear film instability.

What's great about all point-of-care testing and even the Standard Patient Evaluation of Eye Dryness Questionnaire (SPEED) survey is that I can gauge symptoms before I see the patient. I'm prepared to discuss their ocular surface in more detail if I need to. It prevents disruptions to your schedule, especially if a patient mentions an ocular surface issue which requires further evaluation, but only at the end of their appointment.

Dr. Nichols: Previously, MGD and DED were thought to be separate entities. Only the fine print would say that patients can have one without the other and that the phenotype may be mixed. Now we know that most patients have a mixed phenotype and require a mixed approach to treatment. EDE is the most common type of DED and is most often caused by MGD. It can also occur in conjunction with aqueous-deficient dry eye (ADDE),[8] so start with therapies that address the whole patient and the predominant clinical manifestation.

For seemingly asymptomatic patients with whom you may see signs of DED at the slit lamp, we may have to ask the right questions to extract information about their symptoms. As Dr. O' Dell noted, if our staff conduct a survey beforehand, it can prime us to approach the exam and the patient with ocular surface issues in mind.

Dr. O'Dell: I will note that patients with neurotrophic keratitis (NK) can masquerade as asymptomatic patients. Some patients will be aware of a difference in sensations between their eyes but not attribute it to corneal sensitivity issues. Unless we test for this, we will not uncover the issue until it is too far gone. Of course, this then changes the way we'd treat that patient.

Dr. Nichols: Many of us don't routinely measure corneal sensitivity. We tend to perform this test only when we suspect an issue. We learn it during our training and then forget about it. However, we do want to detect these issues earlier before they become harder to manage. I encourage everyone to try testing corneal sensitivity in practice, especially if they have not done so in a long time. Start with a "normal" patient for a reference standard. It is handy to be able to distinguish between an asymptomatic and NK patient. The easiest technique is to use a cotton wisp to elicit a blink reaction. Try to test the different quadrants of both eyes.

Dr. O'Dell: Some doctors will also use unflavored dental floss. I use a cotton wisp and start by having patients look up so that they don't see the cotton wisp and blink in response to that. I

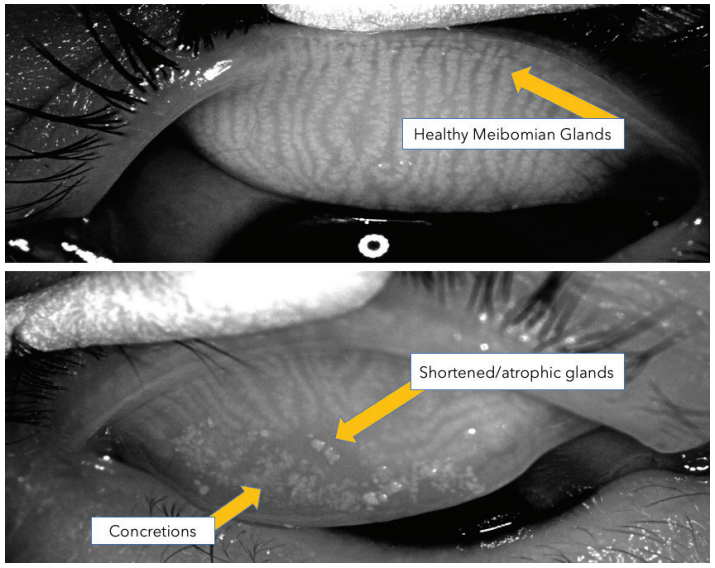

Figure 2. Meibography images of healthy and atrophic meibomian glands. *Courtesy of Jennifer Loh, MD.*

would typically do this outside of the slit lamp; however, at the slit lamp, you have better visibility. In theory, you wouldn't test normal corneas but it's best to start with those eyes so that we can then use it, as needed, on suspicious corneas.

Dr. Nichols: We come across MGD in different patient groups. Studies have shown that 63% of presurgical patients with cataract, 80% of patients with glaucoma taking long-term anti-glaucoma medications, 60% of contact lens wearers, and 86% of patients with dry eye have MGD.[9-13] Again, oftentimes, patients may be single-mindedly focused on their chief visual complaint, eg, cataract, and neglect to mention ocular surface issues unless we perform checks and query them appropriately. This is important because OSD can impact surgical outcomes.

Remember that meibomian gland disease is an umbrella term. We're specifically referring to meibomian gland dysfunction with the term "MGD." The International Workshop on Meibomian Gland Dysfunction classifies MGD, first, based on the level of secretions, ie, low (hyposecretory and obstructive) and high (hypersecretory) delivery states, and then by potential consequences and manifestations.[14,15] Hypersecretory MGD is rare, but the most common form is obstructive MGD, whereby duct obstruction causes low or altered meibum secretion. Obstructive MGD can be further divided into cicatricial (scarring) or non-cicatricial (nonscarring) forms, each either occurring as primary disease or secondary to other conditions. For example, patients with acne rosacea will most likely have some type of MGD as it has been associated with both obstructive and hypersecretory MGD.[14,15] Gland dropout occurs in obstructive MGD because the increasing pressure causes cell death, starting at the distal ends of the ducts.

Dr. O'Dell: To see gland dropout, I use the transilluminator to flip the bottom lid and see the dark shadows of the glands. You do have to adjust the light settings to prevent bleaching, but you can appreciate gland dropout using this technique.

In some gland scans, you can even see gland dilation first due to the pressure build-up. Patients that regularly wear eye makeup may also notice cicatricial changes as irregularities on their eyelid margin. Meibography highlights these changes very well (Figure 2).

Before I had meibography, I used three images to explain gland dropout to patients, ie, one of normal glands, 25% to 50% gland dropout, and more than 75% gland dropout. I would explain that there are oil glands inside their eyelids that help stabilize their tears every time they blink, allowing them to tolerate their day-to-day environments. I would then show them the image of the normal glands and indicate that theirs looked like one of the other two images. With meibography, that conversation has gotten much easier because the difference, if there is one, is obvious.

Dr. Nichols: Whether cicatricial changes are indicative of chronic disease is still debated but I would say that it does tend to indicate that the MGD has been a long-standing issue. When you have abnormal and normal glands, they look like a picket fence, ie, some are forward and some are further back, like a scalloped lid margin. All forms of MGD can lead to alterations of the tear film, eye irritation, inflammation and eventually OSD.[14,15]

There are several risk factors associated with MGD including contact lens wear, chronic blepharitis, giant papillary conjunctivitis, aging, androgen deficiency, and menopause; however, the three most common are *Demodex* mite infestation leading to blepharitis, rosacea, and Sjögren syndrome.[16] In 2023, we may have our first treatment for *Demodex* blepharitis, TP-03. The New Drug Application (NDA) was submitted to the FDA in September 2022 and the data look promising.[17] Some of you may be skeptical about whether the mites exist. We now know that seeing collarettes is pathognomonic for them; there is no need to twirl the eyelashes.[18] I would encourage everyone to get into the practice of having patients look down at the slit lamp, to examine their upper eyelashes. You might not notice them in primary gaze.

Dr. O'Dell: These collarettes look very different to those seen in anterior blepharitis. They will look like a waxy cuff around the base of the eyelash. Again, using the transilluminator at the slit lamp can vastly improve visualization. I ask the patient to close their eyes, and I examine the lid and lash for any signs of collarettes. MGD has taught me a lot about *Demodex*. When I was having trouble improving lid and meibum quality, I started looking at lid laxity, nighttime problems, and patients' eyelashes in 2012. *Demodex* became a differential, particularly if I wasn't getting the desired result with a therapeutic. Hopefully, we'll soon have a treatment for it.

Dr. Nichols: With Sjögren syndrome, optometrists will often be the first to see these patients. They can sometimes go up to 7 or 8 years without a diagnosis. Frequently, patients with Sjögren syndrome will have ADDE, but they can also have MGD. When we come across these patients, we need to go down both lines of questioning.

Dr. O'Dell: If I suspect Sjögren syndrome, I will do a simple screening questionnaire, which includes questions about dry eyes, dry mouth, joint irritation, being able to eat a saltine cracker without drinking fluids, etc. I will also do some blood work, starting with standard markers such as antinuclear antibodies (ANA), anti-Ro/SSA, anti-La/SSB, and rheumatoid factor. If I receive a positive result, I set my patient up with a rheumatologist or loop in the family doctor.

Sometimes, patients may know about their dry mouth because of their dentists. Like us, a dentist may also see patients with Sjögren syndrome before a diagnosis is made. This is another partnership that may be useful for us to have as they can promote our services in the community.

Remember, patients with Sjögren syndrome have a higher risk for lymphoma. It's not just about their ocular health. This is one type of patient where we can make a big impact.

Dr. Nichols: It's good to have a rheumatologist in your practice's vicinity to make referrals and have those conversations. Some of us cannot order blood work, which is when a primary care provider can help.

Dr. O'Dell: As an aside, some patients may report taking a new medication and having dry mouth/dry eye. We know that 22 of the top 100 prescribed medications list dry eye as a side effect, so check to see if your patients are taking any of these medications before suspecting Sjögren syndrome. If they report a dry mouth, it's possible that they also have dry eye but haven't mentioned it.

CONTACT LENSES AND THE OCULAR SURFACE

Dr. Nichols: The tear film consists of the inner mucin, middle aqueous, and outer lipid layer and helps maintain ocular surface health, protects the cornea, and provides lubrication.[19] The lipid layer stabilizes the tear film and reduces tear evaporation.[19]

Dr. O'Dell: The tear film is also the first refractive surface. Approximately two-thirds of the total refractive power of the eye occurs at the tear film surface.[20] A stable tear film will create a smooth refractive surface for optimal vision, whereas an unstable tear film can deteriorate the retinal image quality, causing blurred vision (Figure 3). Think about a windshield wiper on a rainy day. If there's a smear on the windshield, the wiper will blur your vision. The eyelid is like the windshield wiper. It pulls tear film over the corneal surface more than 10,000 times a day, travelling about the length of a football field daily. An ocular surface that has irregularities will just cause more friction, which may then lead to lid changes and staining under the lid. You might even see changes to the conjunctival tissue under the lid. By giving our patients the best quality ocular surface, we're giving them the best possible vision.

I like to show patients a placido disk image overlaid on a topography image to show them the irregularities and equate that to an unstable tear film. If they have a low noninvasive tear breakup time (NI-TBUT), I can also explain how certain areas of the cornea may experience different or varying rates of tear evaporation,

Figure 3. A stable tear film is necessary for clear vision.

which can lead to the fluctuating vision they may be noticing but often have difficulty explaining. These patients will also experience glare at night. I've had patients that give up driving because of this and once we rehabilitate the ocular surface, they can go back to these activities. It can be life-changing for them.

Dr. Nichols: If patients have dry eye, contact lenses can further exacerbate the problem. They physically split the mucous/aqueous phases of the tear film into pre- and postcontact lens compartments. This compartmentalization leads to uneven or insufficient tear distribution and increased friction, both of which lead to contact lens-associated dryness.[21] Even patients who may have been asymptomatic before contact lens use can develop the signs and symptoms of DED due to higher tear evaporation rates.[21]

Dr. O'Dell: This is when they'll feel the contact lens on their eye. If they use toric contact lenses, they may even get rotation.

Dr. Nichols: DED is four times more prevalent in contact lens wearers and the average age of symptom onset is 27 years.[2,22] The main reasons for contact lens dropout are dryness and discomfort.[23] In a study comparing patients with contact lens intolerance to age-matched controls, ocular surface parameters remained changed in the former even after a long period of discontinuation.[24] Meibum quality in the upper and lower eyelids has been found to affect successful contact lens wear. Contact lens dropouts have more plugged glands and worse meibum quality.[25] In fact, meibomian gland secretions (ie, volume, quality, and expressibility) and morphology are strong predictors of contact lens discomfort.[26]

As optometrists, we can help to improve the contact lens wearing experience and retention. A few studies have shown that up to 74% of contact lens dropouts can resume contact lens wear, at least part-time.[23,27]

During the years, changes to contact lens technology have helped to mitigate the impact of contact lenses on the ocular surface by, for example, improving the water content and oxygen transmissibility. One of the most common ways to manage contact lens discomfort, in addition to treating the meibomian glands and/or inflammation, is to use daily disposable contact

lenses.[28] This can be difficult to prescribe to a toric or multifocal contact lens user. Of course, daily disposables do cost more.

Dr. O'Dell: Yes. When I make this switch, I always have an in-depth conversation about the reasons for the switch. It's not just about convenience, it has health benefits. However, as Dr. Nichols noted, what's more important is addressing the ocular surface. If patients don't have a healthy ocular surface before initiating contact lens wear, we may lose them to dropout even earlier. It's important to stay ahead of these issues. There's nothing more frustrating for us and our patients on contact lens fit day to discover that there's keratitis underneath the contact lens. We get to deliver the bad news that contact lens wear may need to be delayed until the ocular surface is appropriately treated.

Dr. Nichols: Many studies and surveys have shown that the first remedy for contact lens discomfort is changing the contact lens or the contact lens solution. I would suggest treating the ocular surface and meibomian glands with any number of OSD treatments before considering the contact lens itself. Practices that perform a high volume of contact lens fittings may not necessarily make the connection between OSD and contact lenses because we tend to operate in silos. However, optimizing the ocular surface and meibomian glands is the best thing we can do.

Dr. O'Dell: There are some great studies that show that when we address the ocular surface, the wearability of contact lenses increases by between 4 and 6 hours.[29] Imagine combining OSD treatments with these newer contact lenses that are designed for extended wear.

Dr. Nichols: Several of our research studies have used the increase in comfortable contact lens wear time as an outcome measure.[29-31] I find that patients continue to wear contact lenses past the point where it becomes bothersome. Instead of asking them how long they wear contact lenses, ask them when they start becoming a bother. Usually, it'll be around dinner or right after work. If we can extend that time by even 2 hours, it would make them a lot happier, especially if that part of the day is important to them.

Another strategy to manage contact lens discomfort is dietary supplements. Certainly, omega-3 fatty acid supplementation can be helpful; however, the literature is mixed. A recent example was the studies published by the Dry Eye Assessment and Management (DREAM) Study Research Group. Patients with DED who were randomly assigned to receive omega-3 fatty acid supplementation for 12 months did not have significantly better outcomes than those who received placebo.[32] The extension study found that taking these supplements for 12 more months (2 years total) did not improve outcomes compared to those patients who discontinued use after the main trial, ie, after the initial 12 months.[33] There are likely several reasons why no difference was seen between these groups.

In general, if your patient is willing to consider it, it could be helpful. We are currently running a 6-month trial with healthy contact lens wearers who have reduced contact lens wear time, but are not on any DED medication, to see if omega-3 fatty acid supplementation can increase wear time. Watch this space.

"DED is four times more prevalent in contact lens wearers and the average age of symptom onset is 27 years. The main reasons for contact lens dropout are dryness and discomfort."

—Kelly K. Nichols, OD, MPH, PhD, FAAO

Dr. O'Dell: I am a big believer in omega-3 fatty acids. I've seen improved gland secretions and improved comfort in patients that use them consistently at my practice. Both groups in the DREAM study were on other medications, which may have made it difficult to tease out the effect of dietary supplementation alone. I can only speak to my own experience. For OSD, I use a capsule of 1,000 mg of eicosatetraenoic acid (EPA) and 400 mg of docosahexaenoic acid (DHA), for a daily dose of 2 mg during the first 3 months. Most patients are very tolerant of a high-quality omega-3 fatty acid versus an OTC version that may induce gastrointestinal distress or discomfort.

Dr. Nichols: Patients will often notice the effect of the supplementation when they stop taking it. They'll notice that things get worse.

Dr. O'Dell: I also use a blood test called the Omega-3 Index to measure EPA and DHA levels, mostly for patients that are on OTC or no supplementation. We preregister them for this at-home test, which collects the blood sample in a similar manner to the blood glucose test. Patients then mail away the blood smear. Both the patient and doctor receive the test result by email. The optimal level is 8%, which also has protective cardiovascular effects, but usually patients will have between 2% and 4%. I usually retest when I transition/place them on the high-quality omega-3 fatty acid supplement. It's been powerful for my patients.

DO THE INGREDIENTS IN ARTIFICAL TEARS MATTER?

Dr. Nichols: Dr. O'Dell previously mentioned the variety of artificial tears that are available. I'll reiterate that it's good for us to know what choices are available and where they are in our communities.

Dr. O'Dell: It also helps to understand how much patients are willing to spend on OTC tears for dry eye relief.

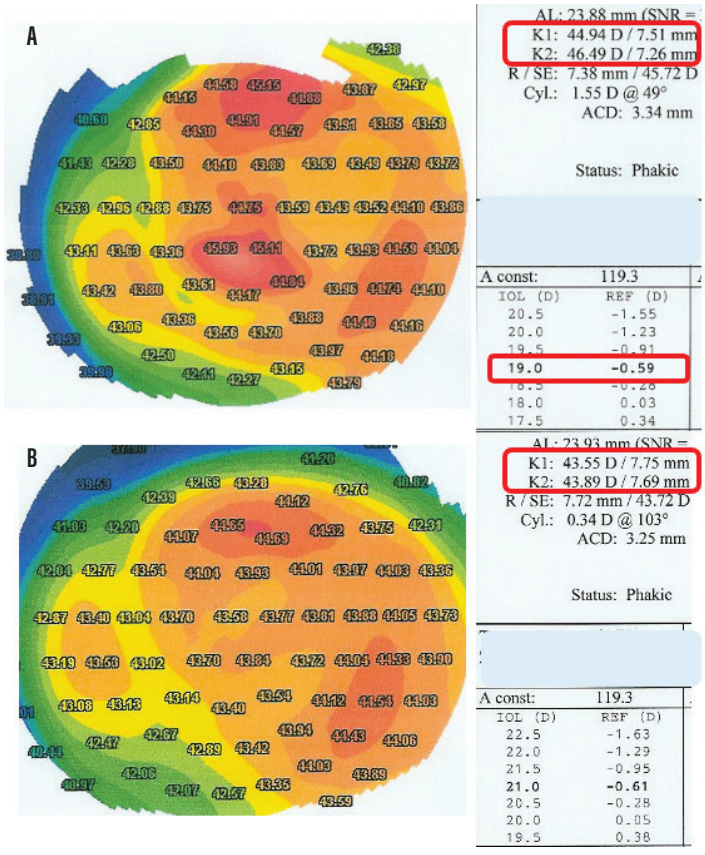

Figure 4. Ocular surface disease can affect preoperative keratometric (K) measurements. (A) An 86-year-old woman scheduled for cataract surgery was found to have dry eye that resulted in 1.50 D difference in K readings. After treatment of dry eye for 1 month, the K readings were more aligned. (B) The difference in IOL power pre- and posttreatment was 2.00 D. *Courtesy of Jennifer Loh, MD.*

Dr. Nichols: The price can vary from store to store, mainly because of the way each will negotiate with the manufacturer. If you have preferred brands, check around your community for where they're stocked and which might be the least expensive, so you can advise patients. We don't necessarily want them to pick up whichever brand is on sale.

There are a lot of ingredients in artificial tears, mainly falling into the categories of active, excipient, and preservative (or preservative-free).[34-36] To receive FDA approval, OTC artificial tears must follow an ophthalmic monograph. Active ingredients can be demulcents or emollients. Demulcents are water-soluble polymers that soothe mucous membranes and provide a mucoprotective film, thereby alleviating discomfort, improving water retention, and decreasing friction. Demulcents include carboxymethylcellulose (CMC), dextran, propylene glycol, or some percentage combinations of these elements allowed within the monograph. Emollients are lipid-containing eyedrops that can increase the lipid layer thickness (LLT) of the tear film, stabilize it, and reduce evaporation. In some instances, patients with MGD or meibomian gland dropout like lipid-containing tears and in other instances, they don't. It depends on each patient, but it's likely to do with blurred vision. The size and concentration of the oil droplets in these formulations can cause visual blur on instillation.[34-36]

Dr. O'Dell: Some people don't tolerate blur at all. A higher concentration of demulcents can also make the formulation more viscous and cause transient blur. This is why I write out a list of tears or, if I have it, provide patients with a variety of samples. This gives them the opportunity to test whether they notice blur on instillation or are bothered by eyelid debris. A key consideration with artificial tears is the presence of preservatives, especially in the generic versions. Benzalkonium chloride (BAK) is the most used preservative and there is a lot of literature to support how it can damage the ocular surface. Although the concentration in eyedrops ranges between 0.004% and 0.02%, BAK is known to cause corneal and conjunctival cell apoptosis is a dose-dependent manner at doses above 0.005%, delay wound healing, decrease goblet cell density, and cause corneal nerve damage.[37-40] Patients don't necessarily understand why they should avoid preservative-containing generics, particularly if the generic is cheaper than the brand.

Dr. Nichols: We now also have preservative-free unit doses or preservative-free bottles of artificial tears. If you think that preservatives might be an issue for certain patients, the preservative-free options are something to consider. Preservatives can have a significant detrimental effect on the ocular surface of patients with glaucoma. These patients, in particular, need to be observed carefully.

PREOPERATIVE AND POSTOPERATIVE CARE

Dr. O'Dell: My passion for DED started when I was working at a refractive cataract practice and caring for patients at their postoperative visits. I most commonly saw patients who had 20/20 VA on manifest refraction but had issues with visual quality. I quickly saw all the aspects of cataract surgery that contributed to postoperative dry eye, from the betadine used during surgical preparation to the prescribed postoperative topical medication.

Studies have now also shown that a large proportion of patients presenting for cataract surgery have some degree of DED and MGD but are undiagnosed.[41-43] Tear hyperosmolarity can lead to significantly higher variability in average K readings and up to 1.00 D difference in anterior corneal astigmatism measurements.[44] That is a big amount of blur. This, in turn, is more likely to result in an IOL power calculation difference of more than 0.50 D.[44] This is why we emphasize the importance of treating the ocular surface before cataract or refractive surgery. There are less likely to be mistakes in the biometric measurements and, consequently, IOL power calculations. Certainly, we know that optimizing the ocular surface in the preoperative period also reduces the incidence and severity of postoperative DED.

This responsibility falls to us, the referring doctors. I try to give the surgeon the healthiest eye possible. If I know that I will

be sending a patient with a cataract for surgical evaluation, I preappoint them to me first for a dry eye evaluation.

Dr. Nichols: Yes. We don't want to see unhappy patients with OSD after surgery.

Dr. O'Dell: Oftentimes, when a patient is sent to the cataract surgeon, they have the paperwork exam or even the surgery preappointed. If the surgeon then sees signs of OSD on the first day that could affect their measurements or further exacerbate postoperative dry eye, they may decide to delay the surgery. This not only disrupts the flow of their clinic but is also frustrating for the patient.

In 2019, the American Society of Cataract and Refractive Surgery (ASCRS) released their preoperative algorithm for diagnosing and treating OSD.[45] The algorithm recommended that if the patient had nonvisually limiting OSD, ie, they had dry eye, but point-of-care testing markers were within the normal range or the cornea looked clear, the surgeon could proceed with caution, bearing in mind that postoperative care would need to be rigorous. If the OSD was visually limiting and surgery needed to be postponed, the algorithm stated that preoperative treatment of OSD could be aggressive to expedite the time to surgery. Several treatments could be combined to get the ocular surface to a state in which accurate measurements could be obtained. Figure 4 shows an example of an 86-year-old woman at a cataract consultation with preoperative dry eye. The K readings differ by more than 1.50 D. After combining topical steroids for 1 week and twice-daily cyclosporine for 1 month, the K readings were in much better alignment. The OSD resulted in a 2.00-D shift in IOL power.

Usually, I'll see significant changes to the ocular surface even within a week of combining therapies. I tend to follow up with these patients within 3 to 4 weeks because I know they want to get that cataract resolved.

Dr. Nichols: With patients who want premium IOLs in particular, optimizing the ocular surface is paramount. We must evaluate their K readings and their topography to identify OSD. If patients have blurred mires, they could use an evaluation. Some technicians will instill a drop of artificial tears to see if that clarifies the image. This may not necessarily be helpful because it creates a temporarily smooth surface and does not fix the root cause of corneal staining.

Dr. O'Dell: We know that both cataract and refractive surgeries are associated with a postoperative flare of dry eye. With LASIK, corneal nerve denervation is thought to disrupt the functional lacrimal unit, resulting in postoperative dry eye.[46] As corneal sensation recovers, the symptoms of dry eye, tear quality, and tear secretion also improve. The patients who we refer for LASIK are often contact lens users that are choosing LASIK because their contact lenses are uncomfortable. Again, if they have an unhealthy ocular surface, they might not be an optimal LASIK referral at that moment. It is better to give that inflammation the attention it deserves. This helps ensure better outcomes after surgical procedures. You can see how important the ocular surface is regardless of the intervention we choose.

"Studies have now also shown that a large proportion of patients presenting for cataract surgery have some degree of DED and MGD but are undiagnosed."

—Leslie O'Dell, OD, FAAO

Dr. Nichols: Postoperative dry eye symptoms can persist for 6 to 12 months. Be prepared to manage OSD both pre- and postoperatively.

Dr. O'Dell: We also can't forget about the meibomian glands. Sometimes, especially if the lid looks normal or quiet, we might not appreciate gland changes unless we actually look. As I previously mentioned, gland dropout can be seen inexpensively at the slit lamp with a transilluminator. Another test to is express the glands and ensure they're producing good quality secretions.

IN-OFFICE TREATMENTS FOR OSD

Dr. Nichols: Gland expression can be done as part of an evaluation or diagnosis for MGD or an in-office treatment for MGD. Usually, if expression is done in-office, we would warm up the glands with an eyelid warming device, either warm compresses, steam-based devices, or radiant heat-based devices. Therapeutic expression is more comprehensive than diagnostic gland expression and can be done with our fingers, cotton tip applicators, or meibomian gland evaluators. As with testing for corneal sensitivity, if you are not in the habit of expressing glands, try it first on patients who are likely to have healthy meibum. Meibum is most often being secreted from the lower lid, towards the canthus. This would be the easiest place to express first. Meibum should look clear, like olive oil. Hazy meibum is abnormal and suggestive of dysfunction of the meibomian glands. Meibum can be graded numerically but I find it easier to use words to describe the quality of the secretion like clear, hazy/cloudy, hazy and granular, and toothpaste-like consistency.

Dr. O'Dell: Many different groups have proposed treatment plans for OSD. For example, the Tear Film and Ocular Surface Society (TFOS) Dry Eye Workshop (DEWS) II Management and Therapy Subcommittee recommends a stepwise approach to treatment, depending on disease severity.[47] This does not

mean that treatment should be initiated in order of steps. Conventional, low-risk, commonly available therapies like oral essential fatty acid supplements can be a good starting point for the early stages of disease; however, with more advanced disease, a combined approach is beneficial. For example, with grade 4 keratitis that is diffuse, I would use the therapies designated for advanced disease but also combine them with therapies from "earlier" steps. I would initiate patients on nutraceuticals and topical corticosteroids, but if I then saw persistent epithelial defects or decreased corneal sensitivity, that would be additional justification to consider amniotic membranes to expedite the healing process. This often gives me the "jump start" I need to better control the inflammation and improve quality of vision.

Regardless of which treatment plan you choose to follow, the main takeaway from the TFOS DEWS II, ASCRS, and CEDARS ASPENS groups is to start treatment. If we do not treat dry eye early, the chronic inflammation will only result in accumulated tissue damage, which will be harder to treat.

Dr. Nichols: Let's start with pharmaceutical therapies for OSD. Both cyclosporine and lifitegrast, which are immunomodulating drugs, have been around for several years. Cyclosporine ophthalmic emulsion 0.09% is the most recent addition to this family of drugs. For patients with dryness and corneal staining, these drugs are obvious choices for treatment. They both have their own side effect profiles, but I find that setting the appropriate expectations with patients can really help adherence to therapy.

Dr. O'Dell: I agree. I always tell patients to expect stinging or burning and when it doesn't happen for most patients, they're pleasantly surprised. I also explain that as the ocular surface heals, this sensation may lessen. This seems to resonate with patients that do experience stinging or burning.

Dr. Nichols: Recently, we saw that azithromycin, a topical antibiotic, will be commercially available again in the United States. It is currently approved for bacterial conjunctivitis and remains on the formularies. Previously, it was used off-label for the treatment of MGD and posterior blepharitis because it altered fatty acid metabolism and reduced the expression of matrix metalloproteinases and inflammatory cytokines.[48] It was a very handy option, and we're glad it will be available again.

Dr. O'Dell: In October 2021, varenicline aqueous nasal spray 0.03 mg was approved by the FDA to treat the signs and symptoms of DED.[49] Used twice daily with a spray in each nostril, the drug activates the parasympathetic pathway to increase basal tear production. Neurostimulation via a nasal spray is a completely novel mechanism and mode of action to treat DED.[49] Patients are happy to have an alternative that won't irritate their eyes. It's particularly practical for patients who wear make-up and who don't want to keep administering eye drops throughout the day.

Dr. Nichols: It's also a good option for contact lens wearers. Unlike the oxymetazoline nasal spray, it is not administered straight up into the nostril. It must be aimed low and towards the ear on the same side of the nostril that is being sprayed into.[50] Sneezing is the most common side effect. If the patient administers the drug up into their nostril, they will sneeze right away. As patients use it correctly over time, the sneezing side effect does diminish to some degree.

Dr. O'Dell: Not only are we seeing expansion in our therapeutics toolbox, but we're also seeing expansion in market for procedural MGD treatment. We now have two thermal pulsation systems approved by the FDA for treatment of MGD. In a multicenter trial that compared both systems, both significantly improved the Ocular Surface Disease Index (OSDI), TBUT, and total meibomian gland scores, with no statistically significant difference between the two systems.[51] There were no device-related adverse events involving changes in lid margins, eyelids, or lash integrity for either system.

We also have intense pulsed light (IPL) therapy which is a drug-free, drop-free, light-based treatment that induces coagulation and ablation of blood vessels.[52] It's not surprising to see a therapy that started in dermatology spill into our realm, particularly for MGD, because we're dealing with oil-secreting glands. We are leaning on dermatology for some of our pipeline interventions because they know how these types of glands work.

IPL has been an exciting addition to my clinic, but there are some limitations. Patients should always wear sunscreen during treatment. I find that I don't use this modality as heavily in summer because so many more patients are sunburnt. If I want to treat them, I have to change the settings because their skin changes. In that same vein, it may not be the best option for patients with heavily pigmented skin.

Dr. Nichols: Learning more about IPL and trying the product is probably the best way to decide if it will suit your practice. As with other technologies, if IPL is not the right fit for your practice, make sure you know other optometrists in your area that do offer it. We want to encourage optometry-to-optometry referrals.

Dr. O'Dell: I have been very fortunate to have some great technology at my practice and so I do fortunately get referrals from optometry colleagues in my area. Every time this happens, the patient never complains that their doctor didn't have the technology. They are always happy that the referring doctor found somebody with the technology and think very highly of them. For my part, I look out for the other doctor. I work hard to make sure that patient returns to them. I have the same experience when I refer my patients to colleagues who are much more experienced with contact lenses, especially scleral contact lenses.

Dr. Nichols: Absolutely, we will do that for each other. In general, I hope to see optometry as a whole expanding the way we

think and treat MGD and DED in practice. If you have not tried many of the therapeutic interventions available to us, I encourage you to start slow. Start with relatively healthy patients to build confidence. We have a good idea of the prevalence and risk factors for OSD but putting this into practice means performing those diagnostic tests in the patients you think might be at-risk. This includes contact lens wearers, aging patients, and presurgical patients.

Dr. O'Dell: I agree. We already have the tools that we need to check the eyelids and ocular surface. Take the time, and often it is only a minute or so, to perform one of these diagnostic evaluations. Stay proactive and look for the signs of OSD even in the absence of symptoms. That's what I hope to see in our practice of medicine, ie, moving toward a model of preventative care, similar to dentistry.

Dr. Nichols: Absolutely. Given the multitude of things we do to our eyes, eg, screen time, different environmental conditions, medications, etc, the better we are at being preventive, the fewer ocular surface problems that will arise, and the easier it will be to treat them.

Dr. O'Dell: This is going to be an exciting year for the ocular surface. We have a robust pipeline, which I think will make it easier to treat OSD.

Dr. Nichols: It can be overwhelming to have so many options available to us. We may even feel, in fact, that it gets harder to treat these patients. I would say to keep it simple! Look at the patient, ask questions, and do something. "Do something" could even be a follow-up to do more. ■

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OCULAR SURFACE DISEASE: IMPACT ON PATIENTS & POTENTIAL SOLUTIONS

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INSTRUCTIONS FOR CREDIT

To receive credit, you must complete the attached **Pretest/Posttest/Activity Evaluation/Satisfaction Measures** Form and mail or fax to Evolve Medical Education LLC; 353 West Lancaster Avenue, Second Floor, Wayne, PA 19087; Fax: (215) 933-3950. To answer these questions online and receive real-time results, go to https://evolvemeded.com/course/2243-supp. If you experience problems with the online test, email us at info@evolvemeded.com. NOTE: *Certificates are issued electronically.*

Please type or print clearly, or we will be unable to issue your certificate.

Full Name_____ DOB (MM/DD): _____

Phone (required) _____ Email (required*) _____

Address/P.O. Box_____

City _____ State/Country _____ Zip _____

License Number:_____OE Tracker Number:_____National Provider ID:_____

*Evolve does not share email addresses with third parties.

DEMOGRAPHIC INFORMATION

Profession
___ MD/DO
___ OD
___ NP
___ Nurse/APN
___ PA
___ Other

Years in Practice
___ >20
___ 11-20
___ 6-10
___ 1-5
___ <1

Patients Seen Per Week (with the disease targeted in this educational activity)
___ 0
___ 1-15
___ 16-30
___ 31-50
____ >50

Region
___ Midwest
___ Northeast
___ Northwest
___ Southeast
___ Southwest

LEARNING OBJECTIVES

Did the program meet the following educational objectives?	Agree	Neutral	Disagree
Evaluate the pathophysiology, risk factors, symptoms, and impact on patient quality of life of diseases that affect the ocular surface, namely dry eye disease (DED) and meibomian gland dysfunction (MGD)	_____	_____	_____
Review the role of a healthy ocular surface on contact lens wear	_____	_____	_____
Modify treatment plans for patients experiencing ocular discomfort from improper contact lens use	_____	_____	_____
Explain the importance of ocular surface health in pre- and postoperative dry eye management	_____	_____	_____
Discuss how differences in artificial tear formulations can impact the treatment of patients with DED and MGD	_____	_____	_____
Summarize best practices for the in-office management of MGD	_____	_____	_____

POSTTEST QUESTIONS

Please complete at the conclusion of the program.

1. Based on this activity, please rate your confidence in your ability to understand and explain to patients the importance of ocular surface health in pre- and postoperative dry eye management (based on a scale of 1 to 5, with 1 being not at all confident and 5 being extremely confident).

A. 1
B. 2
C. 3
D. 4
E. 5

2. All of the following are risk factors for dry eye disease (DED), EXCEPT:

A. Male gender
B. Older age
C. History of diabetes
D. Digital device use

3. According to studies, what percentage of contact lens wearers have signs of meibomian gland dysfunction (MGD)?

A. 20%
B. 40%
C. 60%
D. 80%

4. A 43-year-old contact lens wearer presents to your office for examination. She notes increasing discomfort while wearing her contact lenses and seeks treatment. All of the following are reasonable options EXCEPT?

A. Changing contact lens care solution
B. Switching from daily disposables to monthly lenses
C. Tear supplementation
D. Dietary supplements

5. A 72-year-old patient presents to your office with a chief complaint of blurry vision. Exam is notable for 2+ PEE OU as well as 2+ nuclear sclerotic cataracts OU. What is the next best step in management?

A. Refer this patient for cataract surgery
B. Refer this patient for cataract surgery, but counsel him that his dry eye may delay healing
C. Aggressively treat his ocular surface disease (OSD) preoperatively and repeat lens measurements prior to referring this patient for cataract surgery
D. Sign this patient up for cataract surgery and aggressively treat his OSD postoperatively

6. All of the following statements about DED are true EXCEPT:

A. Increasing age results in increasing symptoms of dry eye
B. A diagnosis of diabetes decreases risk of DED
C. Increased digital device use increases risk of DED
D. A diagnosis of diabetes increases risk of DED

7. Which of the following statements about DED prevalence is TRUE?

A. Prevalence has increased in all age groups at the same rate
B. Prevalence has not increased with time
C. Prevalence has increased greater in the 18- to 39-year-old age group compared to the age 50 and older population
D. Prevalence has increased in all age groups but is greatest among those 50 and older

8. A 33-year-old patient presents to your office for evaluation. She notes increasing visual problems during the past year, including chronically red eyes, discomfort, blurry vision, and eye strain. On examination, you note ocular surface staining bilaterally, but an otherwise normal anterior segment exam. In her posterior segment, you note lattice degeneration in both eyes. All of the following findings are signs/symptoms of DED, EXCEPT?

A. Conjunctival hyperemia
B. Lattice degeneration
C. Ocular surface staining
D. Eye fatigue

9. You decide to test the patient described in Question #8 for tear film osmolarity. According to your suspected diagnosis, what would you expect your findings to be?

A. Hyperosmolar tear film
B. Hypoosmolar tear film
C. Normal osmolarity reading
D. Inconclusive

10. According to literature, what percentage of precataract surgery patients had signs of MGD?

A. ~23%
B. ~33%
C. ~53%
D. ~63%

11. All of the following are risk factors for MGD EXCEPT?

A. Contact lens wear
B. *Demodex*
C. Androgen excess
D. Menopause

12. A 33-year-old patient presents to your office. She has a history of long-term contact lens wear. She notes increasing discomfort and dryness during the past year. On further testing you note significant corneal surface staining and hyperosmolar tear film. What is the next best step in management of this patient?

A. Contact lens holiday to treat OSD
B. Observation with topical steroid drops
C. Switch to rigid, gas-permeable lenses
D. Continue contact lens wear but switch contact lens cleaning solution

13. The patient described in Question #12 asks if there are any dietary supplements that might help manage her OSD and contact lens discomfort. According to the Tear Film & Ocular Surface (TFOS) Contact Lens Discomfort Workshop, what dietary supplement might you recommend?

A. Evening primrose oil
B. Topical tea tree oil
C. AREDS2 vitamins
D. High-dose vitamin A

14. A 44-year-old patient presents to your office with a known diagnosis of DED. He has been noncompliant with his drops because he says his drops cause blurry vision after administration. He notes persistent ocular discomfort. On examination you note significant ocular surface staining. What is the next best step in management?

A. Switch to artificial tears with higher concentration of demulcent ingredients
B. Switch to artificial tears with lower concentration of demulcent ingredients
C. Switch to artificial tears that have increased viscosity
D. Switch to topical steroids

15. A patient presents to your office for cataract evaluation. He has significant cataracts in both eyes. On examination you note bilateral punctate epithelial erosions and 2+ nuclear sclerotic cataracts OU. IOL calculation measurements are variable on repeat calculation, with irregular keratometry values (Ks) and topography in both eyes. What is the most likely reason for his abnormal Ks?

A. Presence of DED
B. Prior history of LASIK
C. Corneal ectasia diagnosis
D. Regular astigmatism

16. A 43-year-old patient presents to your office for evaluation. She notes increasing eye discomfort with red eyes, blurry vision, and eye fatigue. On examination, you note significant meibomian gland inspissation with erythema and telangiectasia of the lid margins. All of the following are reasonable treatment options for this patient EXCEPT?

A. Meibomian gland expression
B. Thermopulsation treatment
C. Lid wipes and hypochlorite sprays
D. AREDS2 vitamins

ACTIVITY EVALUATION

Your responses to the questions below will help us evaluate this activity. They will provide us with evidence that improvements were made in patient care as a result of this activity.

Rate your knowledge/skill level prior to participating in this course: 5 = High, 1 = Low____

Rate your knowledge/skill level after participating in this course: 5 = High, 1 = Low____

This activity improved my competence in managing patients with this disease/condition/symptom. _____ Yes _____No

Probability of changing practice behavior based on this activity: _____High _____ Low _____No change needed

If you plan to change your practice behavior, what type of changes do you plan to implement? (check all that apply)

Change in pharmaceutical therapy _____
Change in nonpharmaceutical therapy _____
Change in diagnostic testing _____
Choice of treatment/management approach _____
Change in current practice for referral _____
Change in differential diagnosis _____
My practice has been reinforced _____
I do not plan to implement any new changes in practice _____

Please identify any barriers to change (check all that apply):

_____ Cost
_____ Lack of consensus or professional guidelines
_____ Lack of administrative support
_____ Lack of experience
_____ Lack of time to assess/counsel patients
_____ Lack of opportunity (patients)
_____ Reimbursement/insurance issues
_____ Lack of resources (equipment)
_____ Patient compliance issues
_____ No barriers
_____ Other. Please specify: _____

The design of the program was effective for the content conveyed	___ Yes	___ No
The content supported the identified learning objectives	___ Yes	___ No
The content was free of commercial bias	___ Yes	___ No
The content was relative to your practice	___ Yes	___ No
The faculty was effective	___ Yes	___ No
You were satisfied overall with the activity	___ Yes	___ No
You would recommend this program to your colleagues	___ Yes	___ No

Please check the Core Competencies (as defined by the Accreditation Council for Graduate Medical Education) that were enhanced through your participation in this activity:

_____ Patient Care
_____ Practice-Based Learning and Improvement
_____ Professionalism
_____ Medical Knowledge
_____ Interpersonal and Communication Skills
_____ System-Based Practice

Additional comments:

_____

_____ I certify that I have participated in this entire activity.

This information will help evaluate this activity; may we contact you by email in 3 months to inquire if you have made changes to your practice based on this activity? If so, please provide your email address below.

_____

_____