On the Defense: Preventing Contact Lens Complications

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- Partner in a 4 location optometric practice
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Dry Eye is More Prevalent in Contact Lens Wearers

- Contact Lens Dryness Studies
  - 52% CL/24% Spectacle Wearers
    - Nicholas (2009)
  - 43% CL/15% Spectacle Wearers
    - Sullivan (2012)
Studies on Dry Eye Symptoms and Contact Lens Wear

<table>
<thead>
<tr>
<th>Study</th>
<th>Size</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doughty, et al (1997)</td>
<td>3285</td>
<td>50%</td>
</tr>
<tr>
<td>Brennan, et al (1989)</td>
<td>104</td>
<td>75%</td>
</tr>
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</table>

Reasons For Dropout

51% discomfort


Traditional Model

Updated Tear Film Model
**SEVERITY** | **SIGNS AND SYMPTOMS** | **RECOMMENDED TREATMENT**
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1 | Mild to moderate symptoms; no signs; Mild to moderate conjunctival signs | Patient counseling, preserved tears, environmental management, use of hypoallergenic products, water intake.

2 | Moderate to severe symptoms; Tear film signs; Mild corneal punctate staining; Corneal staining; Visual signs | Unpreserved tears, gels, ointments, cyclosporine A, secretagogues, topical steroids, nutritional support (flax-seed oil).

3 | Severe Symptoms; Marked corneal punctate staining; Central corneal staining; Filamentary keratitis | Tetracyclines, PUNCTAL PLUGS

4 | Severe symptoms; Severe corneal staining; erosions; Conjunctival scarring | Systemic anti-inflammatory therapy, moisture goggles, acetylcysteine, punctal cautery, surgery

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**Contact Lens Care**

- **Stand Alone Test**
  - ISO Standard 14729
  - A given volume of contact lens solution is challenged with a given concentration of standardized strains of microbes
  - Concentration of microbes have to be reduced by a certain amount over a given period of time

- **Bacteria:**
  - *Pseudomonas aeruginosa* ATCC 9027
  - *Serratia marcescens* ATCC 13880
  - *Staphylococcus aureus* ATCC 6538

- **Fungi:**
  - *Fusarium solani* ATCC 36301
  - *Candida albicans* ATCC 10231
Contact Lens Care

• Stand Alone Test
  Bacteria:
  – 3 Log units
  Fungi:
  – 1 Log unit

Contact Lens Care

• Regimen Test
  – Contact Lens is taken through the regimen
  – Rub and rinse
  – Soaked for a period of time
  – Result: less than 10 colony forming units (cfu’s) on the lens

2006
Fusarium not recovered from contact lens solution bottles

Lab study: Effects of simulated lens care non-compliance on antimicrobial efficacy of MPS Reuse, Topping off, Evaporation
ReNu with MoistureLoc rendered less effective under a variety of non-compliant conditions

2007

Percentage of Infectious Incidents Associated with MPS Products

Although not statistically significant additional hygiene factors (solution reuse, lack of rubbing, showering) suggest a pattern of risk.

FDA Criteria for Ancanthamoeba?

Ancanthamoeba

Standards

Safety
Compliance?

Hypertension
Hypercholesteremia
Glaucoma

? Contact Lens Care?

“Historically, between 40 and 90% of patients are non-compliant with the care of their lenses.”
When I take my Lenses out I ...

- 52% put them directly in solution and soak them
- 25% rinse and soak
- 16.00% rub, rinse, and soak
- 2.00% rinse only sometimes
- 2.00% rub sometimes and usually rinse
- 4.00% other

Role of patient compliance

- Lens wearing & replacement schedule
  - 49% wear their lenses longer than recommended
- Lens case hygiene
  - <46% clean their lens case after each use
- Topping Off – Using Fresh Solution
  - >44% always or occasionally top-off (re-use) their contact lens solutions
What We Recommend to Patients

- Alcon 71%
- Private Label 0%
- B&L 7%
- AMO 6%
- Ciba 15%

Contact Lens Solution Market Share

- Alcon 37.9%
- Private Label 25.0%
- B&L 15.2%
- AMO 6.6%
- Ciba 15.3%
Wetting Agents

BioTrue
- Hyaluronic acid (HA)
Complete
- poloxamer 237
Opti-Free Replenish
- TearGlyde (Tetronic 1304 + C9-ED3A)
Opti-Free Express
- Tetronic 1304
ReNu Fresh
- Tetronic 1107
RevitaLens OcuTec
- Tetronic 904

Don’t Trust what Patients Tell You When They Tell You How They Care For Their Lenses!
Patient and Practitioner Compliance With Silicone Hydrogel and Daily Disposable Lens Replacement in the United States


Uncomfortable lenses make me more likely to follow the recommended replacement schedule

85% Compliant Wearers
83% Non-compliant wearers

Discuss Contact Care Habits Emphasizing Comfort

Silicone Hydrogels
Overnight Wear (min. Dk/t)
- Holden & Mertz (1984) = 87
- Harvitt & Bonanno (1998) = 125

Daily Wear (min Dk/t)
- Harvitt & Bonanno (1998) = 35
- Ostrem, Fink & Hill (1996) = 90
“Failure to rub/rinse does not appear to significantly contribute to increased exposure to pathogens.”

“Regardless of compliance from patients observed in this study, each lens insertion provides the key source of microorganisms”
Role of patient compliance

Patient Compliance to Hand Washing Before Lens Handling

<table>
<thead>
<tr>
<th>Action</th>
<th>Percent of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not wash hands before lens handling</td>
<td>35%</td>
</tr>
<tr>
<td>Wash hands and leave wet with tap water</td>
<td>42%</td>
</tr>
<tr>
<td>Handle lenses during the day without disinfection</td>
<td>34%</td>
</tr>
</tbody>
</table>

Microorganisms on Lenses After Handling

<table>
<thead>
<tr>
<th>Condition</th>
<th>Microorganisms Recovered (CFU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unwashed Hands</td>
<td>71,000</td>
</tr>
<tr>
<td>Washed Hands, Not Dried</td>
<td>9,200</td>
</tr>
<tr>
<td>Washed and Dried Hands</td>
<td>3,600</td>
</tr>
</tbody>
</table>

Healthy Hand Washing Habits

Healthy Handwashing

- Wash hands with soap and water
- Use alcohol-based hand sanitizer when soap and water are not available
- Dry hands thoroughly with a clean towel or air dryer

Microorganisms:

- Colonies on lenses range from 71,000 to 3,600 CFU.

Unwashed Hands have the highest number of microorganisms, followed by Washed Hands, Not Dried, and Washed and Dried Hands.
A Case for the Case

- **Contact Lens Case Contamination**
  - 70% of contact lens cases are contaminated
  - Bacteria shows up about 7 days after case replacement

- **Glycoalyx - Biofilm**
- **Case Materials**
- **Preventing/Reducing Contamination**

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**Don't Trust what Patients Tell You When They Tell You How They Care For Their Lenses!**

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**Infiltrates – Infectious vs. Inflammatory**

- **Microbial Keratitis**
  - Moderately severe symptoms, (+) corneal staining, (+) A/C reaction, (+) stromal edema, single infiltrate, purulent discharge

- **Sterile Corneal infiltrates**
  - Minimal to moderate symptoms, minimal corneal staining, minimal to no A/C reaction, little edema if present, multiple infiltrates, (-) purulent discharge

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Diagnostic and Treatment Algorithms for Ocular Surface Disease States; Supplement To Review of Optometry; Oct 2006.)
Bacteria leach toxins and by-products.

Build-up of toxins

Irritation of surface

Risk Factors for Microbial Keratitis with Contemporary Contact Lenses
J.K.G. Dart, DM, FRCPsyh, C.F. Radford, PhD, D. Minassian, FRCPsyh, MSc(Epidem), S. Verma, MD, FRCPsyh, F. Stapleton, PhD

2 year prospective case-control study (Dec 2003)

Microbial Keratitis Defined:
“was defined by either a positive corneal culture or a corneal infiltrate and overlying epithelial defect with >= 1 of the following features:
(I) any part of the lesion being within the central 4 mm of the cornea
(II) Uveitis
(III) Pain

Wear Schedules:
(I) Daily Wear - no overnight use admitted

(II) Occasional Overnight Wear - overnight use less often then once per week

(III) Overnight Wear - habitual overnight use of once per week or more
Risk Factors for Microbial Keratitis with Contemporary Contact Lenses

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Contact Lens Hygiene Compliance:
(I) Disinfection or lens disposal (0-20)
(II) Storage case replacement (0-4)
(III) Storage case hygiene (0-8)
(IV) Hand washing before lens handling (0-8)

367 Cases
2075 Controls

Daily Disposable - 1.56
Occasional overnight wear - 1.87
Overnight Wear - 5.28
Handwashing (not always) - 1.49
Greater than 49 years of age - 0.45
Male - 1.48
What about hygiene scores?

Excellent (33-40)
Good (27-32)
Moderate (22-26)
Poor (0-21)

Insignificant?
The Incidence of Contact Lens-Related Microbial Keratitis in Australia

12 month prospective study:
Similar criteria to previous study

O/N wear: 3.96
Poor storage case hygiene: 3.70
Current smoker: 2.96
Purchase of CL’s via internet: 4.76
Higher socioeconomic class: 2.66

Overnight Wear: <6 months of wear: 2.76
Understand solutions
Compliance
Silicone Hydrogels / Daily Disposables
Overnight wear
Hygiene
  hand washing
  case hygiene

Smoker
Internet Purchase
<6 months of wear
The cornea defense
Outstanding Service is key!
1) Phone Call
2) Year Supply
3) Dispensing from stock

CPT Frequency
99213 - most frequently billed of all office visits
99212 and 99214 next most common
99211 and 99215 - least common

E&M Coding
Evaluation & Management visit depends on three things:
1) History
2) Examination
3) Medical Decision Making
E&M Coding

History
1) History of present illness (HPI)
   1) Location, 2) Quality, 3) Severity, 4) Duration, 5) Timing, 6) Context, 7) Modifying factors, 8) Associated signs and symptoms
2) Review of Systems (ROS)
3) Past, Family and Social History (PFSH)
   1) Patient's Past History, 2) Family History, 3) Social/Occupational History

E&M Coding

Examination
1) VA's  
2) EOM's  
3) Visual fields  
4) Averse  
5) Bulbar/palpebral conjunctiva  
6) Cornea  
7) Pupil and Iris  
8) Anterior Chamber  
9) Lenses  
10) IOP  
11) Optic Nerve  
12) Posterior Segment  
13) Orientation  
14) Mood/Affect

Medical Decision Making
Uncomfortable Lens Wear

- 32 year old female in for first visit at our office
- Currently wears etafilcon A
- Replaces 2 week disposable contacts lenses every month
- OD 8.3 / 14.0 / -3.50
- OS 8.3 / 14.0 / -3.75
- Meds: Buspar, Xanax, Welbutrin, Neurontin, Artane, Navane
- Allergies: None
- Chief Complaint:
  1) Her eyes always feel dry
  2) Her vision is blurry at dist and near with the contact lenses – describes vision as fluctuating

Uncomfortable Lens Wear

- Frequency – most of the time
- Onset – 5 years
- Location – OU
- Duration – comes and goes
- Associated Symptoms – sometimes vision gets blurry
- Relief - blinking sometimes helps
- Quality – moderate dryness

Uncomfortable Lens Wear

- Refraction:
  - OD –3.25 – 0.75 x 080  20/20 (fluctuating)
  - OS -3.75 – 0.25 x 140  20/20 (fluctuating)
- Posterior Segment – Healthy and normal OU
- TBUT: OD 2 seconds, OS 3 seconds
- Solutions: Store Brand Solution
Uncomfortable Lens Wear

- Patient has 6 boxes of contact lenses left
- What’s the next step?
- Address dryness using current contact lenses
- 1 gt HP Guar containing artificial tear OU before puts contact lenses in the eyes
- Switch to polyquad/aldox based lens care system
- Patient says is better but still dry and vision still fluctuates – What next?

Uncomfortable Lens Wear

- Try toric OD to address the uncorrected astigmatism
- Patient says the vision is about the same with toric contact lens OD — What next?
- Try galyfilcon A
- Some relief…refit into senoficon A
- Start cyclosporine 1 gt bid OU
- Improved but still feel dry sometimes…punctal plugs inserted
The Non-Compliant CL’s Wearer

• 27 y.o. Female
• Wears etafilcon A CL’s for 2 months – continuous wear
• Never had any problems in the past
• Last night woke up because her left eye hurt so much – was very red - ++ discharge
• Not wearing CL’s today
The Non-Compliant CL’s Wearer

- VA OS (glasses) 20/40
- **SLE**
- L/L – mild swelling
- Conj- injection
- Cornea - + infiltrates
- A/C - + cells
- Iris – clear (pupil slightly miotic)

The Non-Compliant CL’s Wearer

VA OS (glasses) 20/40

The Non-Compliant CL’s Wearer

- Treatment
- 1 gt moxifloxacin q 1 hr OS while awake and q2hrs overnight
- 2 gtts 1% Atropine instilled in office
- No CL’s wear
- Return to office next day
- Continue with moxifloxacin
- VA after 1 week 20/20
Thank You
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