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# What Pharmacists Should Know About Caring for Contact Lenses

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## INTRODUCTION

The original recommendation for a contact lens care system comes from eye care professionals at the time of lens fitting. However, once that process is complete, many contact lens wearers seek advice from their pharmacist about contact lens solutions. This publication provides an overview of the technical and practical issues that factor into a patient's choice of contact lens care products. Unlike a prescription for contact lenses, the recommendation by an eye care practitioner to use a certain contact lens care system is not controlled by a prescription. Patients are free to choose from a variety of lens care systems once they need to repurchase, and this is where pharmacists can offer patients much-needed guidance. The pharmacists' well-informed recommendations can help

keep patients safe and comfortable wearing their contact lenses while strengthening their patient relationships.

For contact lens patients, comfort during lens wear is likely the most important factor influencing continued success with lenses. Discomfort is relatively common among soft lens wearers and is associated with abandonment of lens wear.<sup>1,2</sup> Research shows that the patients' choice of lens care product can significantly impact comfort during and toward the end of each wearing day.<sup>3-6</sup> In addition, the way in which patients use lens care products over the life of their lens (typically 2 weeks to 1 month replacement for most lenses) may influence overall comfort toward the end of the lens replacement cycle. Except for daily disposable lenses that are discarded after each use, all lenses require cleaning and disinfection prior to reuse.

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## INTRODUCTION TO LENS CARE SYSTEMS: MULTIPURPOSE AND HYDROGEN PEROXIDE SYSTEMS

Multipurpose disinfection solutions (MPS) and one-step hydrogen peroxide systems ( $H_2O_2$ ) are the two main categories of soft contact lens care systems and there are similarities and important differences between them. Both MPS and  $H_2O_2$  systems provide the patient with an easy way to care for their contact lenses. Both are used for cleaning, disinfecting, and storing lenses. Additionally, when used properly, MPS and  $H_2O_2$  systems require similar volumes of solution each time lenses are disinfected. MPS users purchase 4.7 bottles of solution per year while patients who use the main one-step  $H_2O_2$  system purchase an average of 5.4 bottles per year.<sup>7</sup> This market data, as well as research studies on patient compliance<sup>8</sup>, indicate that MPS patients are more likely to cut corners in care steps.

The most obvious difference is that MPS solutions use a flat lens case, while most  $H_2O_2$  systems use a clear cylindrical case with a lens basket and neutralizing disc. The differences in lens cases are not just about appearance however. The cases are different because product usage differs for each system, and product directions should be closely followed by the patient. Overall, MPS systems allow for a flexible lens care regimen and the ability to quickly clean contact lenses, although most rely on a minimum 4-hour soak to complete the disinfection.  $H_2O_2$  systems, on the other hand, provide exceptional cleaning and disinfecting with the requirement of at least a 6-hour soak to ensure neutralization of peroxide.

### Multi-Purpose Disinfection Solutions

MPS disinfecting solutions contain disinfecting ingredients, surfactants and wetting agents in one solution. Active disinfecting ingredients work by killing the micro-organisms on the contact lens surface. Surfactants assist in cleaning the lens surface of other debris. Wetting agents are designed to enhance lens comfort.

This combination of ingredients is designed to clean lenses during a rinse step and to disinfect lenses during a 4 to 6 hour soak. "No-rub" systems have been designed to be easy to use, but as a result can be easily misused. Misuse and inefficacy of some MPS systems has been associated with an increased risk of corneal infections.<sup>8-11</sup> Two recent outbreaks of MPS-related corneal infections resulted in FDA

recalls of Bausch & Lomb ReNu<sup>®</sup> with MoistureLoc<sup>12</sup> and American Medical Optics COMPLETE<sup>®</sup> with Moisture-Plus<sup>13</sup>, prompting the agency to reassess the testing required before lens care systems are approved. This regulatory process is ongoing.

### One-Step Hydrogen Peroxide Systems

The leading one-step hydrogen peroxide system, CLEAR CARE<sup>®</sup>, contains 3% hydrogen peroxide in an isotonic form, stabilized at a normal pH to enhance biocompatibility and lens comfort. Unlike household hydrogen peroxide, after it is neutralized with platinum catalytic disc, CLEAR CARE is well tolerated by the ocular surface. It also has a small amount of surfactant to aid in cleaning the lens surface. CLEAR CARE disinfection system includes a clear case with a platinum-coated neutralizing disc on the stem of the lens basket. As the platinum disc comes in contact with fresh CLEAR CARE solution, an oxidizing reaction takes place that neutralizes the hydrogen peroxide over a 6-hour period, leaving lenses in saline with trace surfactant and amounts of hydrogen peroxide in the parts per million range. From the patients' point of view, the vigorous bubbling is a key feature that allows them to see the solution at work. This visual feedback is an intrinsic part of the neutralizing reaction, and it works as an excellent means to encourage compliance. Recommendation of Clear Care by eye care practitioners has increased rapidly over the past few years.<sup>14</sup>

Two extensive reviews on the affect of topical hydrogen peroxide on the internal and external ocular physiology have been published.<sup>15,16</sup> Those literature reviews provide a detailed description of the eye's physiological response to topically applied  $H_2O_2$ . Neutralized CLEAR CARE has  $H_2O_2$  in concentrations at the 40 to 60 parts per million range. This extremely low concentration of hydrogen peroxide is undetectable and well tolerated on the eye. It is also neutralized within seconds by at least three naturally occurring catalytic enzymes on the ocular surface.<sup>16,17</sup>

If full strength, non-neutralized CLEAR CARE is mistakenly applied to the ocular surface, the patient will experience a strong stinging sensation as the hydrogen peroxide

is neutralized by the enzymes on the ocular surface. This may take a few minutes to subside. Although this is very uncomfortable and alarming, years of CLEAR CARE use by millions of lens wearers have demonstrated an excellent safety record for the product, even with the



Examples of Multipurpose Disinfectant Solutions and Hydrogen Peroxide Systems

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potential for misuse. As a precaution against inadvertent in-eye installation, CLEAR CARE solution is packaged with a red stopper tip and clear labeling. ***The pharmacist should emphasize that patients not use CLEAR CARE as a rinsing or saline solution.***

## ISSUES IN LENS CARE

### Corneal Epithelial Staining and MPS Systems

The active ingredients in MPS solutions retain chemical activity on the lens surface at the end of the disinfection cycle. As a result, each ingredient has the potential to interact with the ocular surface to either enhance or diminish comfort with lens wear. During wear, the contact lens is in constant physical contact with the tear film that covers the corneal epithelial cells. If residual chemicals in the lens care system are irritating, the corneal epithelial cells may become damaged. Eye care practitioners can detect these epithelial changes with a simple clinical test using topically applied sodium fluorescein dye. Sloughed, damaged or discontinuous cells will fluoresce after application of the dye. The combination of silicone hydrogel lenses with some MPS solutions causes varying amounts of corneal epithelial fluorescein staining for a few hours once lenses are placed on the eye.<sup>18,19</sup>

Although the clinical significance of low levels of corneal fluorescein staining associated with use of lens and lens care product combinations is not known, product-related staining has been the topic of much scientific research and literature in the past few years. One research model makes an assessment of corneal staining after 2 hours wear of new silicone hydrogel lenses that have been soaked overnight in either MPS or H<sub>2</sub>O<sub>2</sub> disinfecting solutions.<sup>18,19</sup> In this experiment, MPS solutions that contain the preservative polyhexamethylene biguanide (PHMB) were associated with higher amounts of corneal staining, those with the preservative Polyquad® caused little staining, while the H<sub>2</sub>O<sub>2</sub> system tested was not associated with corneal epithelial staining. The amount of staining that occurs after normal patient use over a month has also been tracked by other researchers who have reported the amount of staining with Polyquad is higher than in the previously mentioned 2 hour test, but the CLEAR CARE system, a H<sub>2</sub>O<sub>2</sub> system, is again not associated with epithelial staining.<sup>20,21</sup>

Beyond tracking epithelial disruption, analysis shows that deeper corneal inflammatory response such as asymptomatic corneal infiltrates are associated with the presence of this solution-related corneal staining.<sup>22</sup> In addition to showing that H<sub>2</sub>O<sub>2</sub> systems are very well tolerated by patients, newer research from Australia confirms the link between MPS systems and corneal inflammation and corneal epithelial stain-

ing.<sup>6</sup> Contact lens researchers are still trying to determine the clinical importance of some of these subtle clinical signs, but their research to date agrees that H<sub>2</sub>O<sub>2</sub> care systems like CLEAR CARE are among the most easily tolerated on the market today.<sup>18-22</sup>

### Private Label MPS Products

Contact lens patients often shop for alternative solutions to lower the cost of lens care. Private label lens care solutions may be less expensive, but the savings come at the risk of confusion and perhaps drifting into a lens material and lens care combination that may be more irritating than others. Private label products often change formulation without change in brand name, adding another source of confusion. Because of the complexity in design of the neutralization system, there are few private label H<sub>2</sub>O<sub>2</sub> systems on the market.

### IMPORTANCE OF EACH STEP IN LENS CARE

In the past 5 years, there have been two major FDA recalls of contact lens solutions. Each was recalled because of a spike in serious corneal infections associated with misuse of the lens care systems.<sup>12,13</sup> In the process of researching those outbreaks, contact lens researchers learned which steps contribute the most to safe lens wear.<sup>12,23</sup> Proper lens care includes the cleaning and rinsing of the lens surface, lens disinfection, and proper lens case hygiene.

### Cleaning and rinsing the lens surface

With MPS systems, the contact lens surface is cleaned either actively by rubbing with fingers or rinsing for 5 to 10 seconds, or passively with surfactants in “no-rub” MPS systems. With a one-step H<sub>2</sub>O<sub>2</sub> system such as CLEAR CARE, rinsing and intrinsically agitating bubbles during neutralization clean the lens surface. Cleaning the lens surface with digital rubbing or rinsing not only cleans physical debris from the lens surface; it is an important step in removing microbes from the surface as well.<sup>23,24</sup> In the lens care systems that tout “no-rub”, rinsing the lens for 5 to 10 seconds is meant to take the place of rubbing the lens between the fingers.

### When patients skip cleaning and rinsing...

Most direct observation of contact lens patient behavior indicates that they are very unlikely to perform a 10-second rinse before disinfection. When patients do not digitally clean or thoroughly rinse lenses before disinfection, they may leave more microbes on the lens surface than can be handled by the disinfectant, leaving them at higher risk for a corneal infection.<sup>23,24</sup>

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## Disinfecting the lenses

With MPS and one-step H<sub>2</sub>O<sub>2</sub> lens systems like CLEAR CARE, lens disinfection takes place when the empty lens case is filled with the recommended volume of fresh disinfecting solution. Refilling the empty lens case with fresh solution is required in order to provide lenses with enough active ingredients to kill pathogenic microbes that may cause corneal infections. The recommended soaking time in a disinfecting solution is 4-6 hours for MPS and 6 hours for one step H<sub>2</sub>O<sub>2</sub> systems like CLEAR CARE.

## When patients “top off” or skip disinfection

Skimping on disinfecting solution by “topping off” yesterday’s solution is one of the most common and serious gaps in lens care compliance.<sup>12</sup> With MPS solutions, there is no indication to the patient when the solution is fresh and working. In the recent outbreak of *Fusarium* keratitis corneal infections associated with one MPS solution, epidemiologists from the Center for Disease Control found that failure to dump and replace the MPS solution in the case was a highly significant risk factor for developing those infections.<sup>12</sup>

A main advantage for patients who use the CLEAR CARE H<sub>2</sub>O<sub>2</sub> system is that the patient is able to see the vigorous bubbling that occurs immediately when the correct procedure is followed. With CLEAR CARE, if a patient “tops-off” their lens case, they will not see significant bubbling action. The unique bubbling action that occurs when the CLEAR CARE system is used correctly serves as a visible reinforcement of good compliance with the instructions for CLEAR CARE.

## Lens Case Hygiene and Replacement

With MPS or H<sub>2</sub>O<sub>2</sub> systems, most contact lens cases should be left open to dry each time lenses are removed for wear, however, each manufacturers’ instructions should be carefully followed. Lens cases should also be replaced regularly to avoid the development of biofilm on the inside surfaces. Biofilm inside lens cases can retard the efficacy of disinfection solutions.

## When patients don’t replace or dry their lens case

Lens storage cases are the most likely element of the care system to harbor pathogens.<sup>25</sup> Infrequent replacement of the contact lens case can allow biofilm formation and lead to subsequent eye infections. The best way to avoid use of an aged lens case is to provide a case with each package of disinfection solution, as is the case with many MPS and H<sub>2</sub>O<sub>2</sub> systems. CLEAR CARE has the added advantage that the fresh neutralizing disc provided in the each new lens case will bubble vigorously on contact with the H<sub>2</sub>O<sub>2</sub> disinfecting solution.

## The Pharmacist’s Important Role in Contact Lens Care

After contact lens wearers receive their contact lenses, they typically purchase their lens care solutions in the community setting at a pharmacy, grocery or large discount store. With the proper information, the pharmacist has the opportunity to strengthen their relationship with patients who wear contact lenses through appropriate counseling. By relaying evidence-based “reasons to comply” to contact lens wearers, pharmacists will help keep those wearers successful in achieving both comfort and safety when wearing contact lenses. Recommending the use of a well-designed product like CLEAR CARE may enhance patient comfort with lens wear, provide comfortable wearing time, and help insure compliance with the proper disinfection procedures. ■

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