

# Contact Lens Update

CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

## Revisiting rates of adverse events with various types of contact lenses

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Wearers of all types of contact lenses expect high levels of safety and that their lenses will deliver good vision with a comfortable wearing experience and few complications. Soft contact lenses (SCLs) have evolved from early HEMA materials with heat disinfection and weekly enzyme treatments to current daily disposable (DD) lenses with no disinfection required. What is the current safety profile of the modalities available today?

### Added safety with daily disposable lenses

In addition to being highly convenient, avoidance of the need for disinfection and the lens storage case with DD lenses may also contribute added safety, as shown in recent studies. A retrospective case control chart review showed that wearing DD lenses lowered the risk of corneal infiltrate events by 12.5 times compared to daily wear reusable SCLs and by 4.0 times when all wearing schedules were included. The use of DD lenses compared to reusable SCLs is associated with as much increase in safety as switching from overnight wear to daily wear.<sup>1</sup> A large post-market surveillance registry of wearers of two brands of DD lenses found an incidence of corneal infiltrative events with DDs about 10 times lower than with reusable SCLs.<sup>2</sup> The benefit of DD lenses was also confirmed in a small prospective case control study that showed reusable SCLs as the largest risk factor for corneal infiltrative events compared to DDs.<sup>3</sup>

### One-time use extended wear?

The DD single use regimen improves the rate of corneal infiltrative events substantially, and I consider it the “low hanging fruit” of contact lens safety. The field has yet to establish whether single use extended wear SCLs (without handling, disinfection or overnight storage in a lens case) would likewise reduce the risk of corneal infiltrative events. But if the easily contaminated SCL case environment is the culprit in reusable daily wear SCLs, perhaps we could think differently about more careful prescribing of extended wear SCLs for one-time use.

### Soft contact lenses and children

There is another reason to revisit contact lens safety. We are at the threshold of increased SCL use among children, when a larger segment of eye care practitioners begins to prescribe SCLs for myopia control in children as young as six or seven years of age. Soft contact lenses for myopia control, regardless of optical design, must be worn most of the waking hours in order to deliver the optical dose designed to retard myopia progression. Thus, myopia control SCLs will require decades of regular use as these youngsters grow to adulthood, hopefully without any serious complications.<sup>4,5</sup> In order to assess the safety of child SCL wearers the Contact Lens Assessment in Youth study team conducted a series of studies to measure the adverse event rate among children, teens and adults. They found that children aged eight to 14 who wore a wide variety of SCLs had a significantly lower rate of corneal infiltrative events and other adverse events compared with wearers aged 15 to

25.<sup>6,7</sup> Responses to the Contact Lens Risk Survey also showed that children's compliance to best practices with lens use was also better than their teen and young adult peers.<sup>8</sup>

### **Incidence of microbial keratitis: 30 nights, 6 nights and daily disposable**

The largest epidemiology efforts on microbial keratitis in SCLs occurred as silicone hydrogel contact lenses were seeking approval for 30 nights of continuous wear in the early 2000s, with large post-market surveillance studies of microbial keratitis in the United States, United Kingdom, Australia and New Zealand.<sup>9-12</sup> These studies found that silicone hydrogel lenses worn for up to 30 nights in a row had a similar incidence of microbial keratitis as hydrogel lenses that were worn for up to six nights in a row, and that wearing silicone hydrogel SCLs for a longer number of days in a row reduced the risk of microbial keratitis. Subsequent studies on microbial keratitis have not altered the risk factors described by Stapleton in 2012: that DD lenses did not change the risk of occurrence of presumed microbial keratitis cases, but that the severity of cases among DD lens wearers was milder.<sup>13</sup>

### **Ortho-keratology**

The contact lens safety literature has many studies on another myopia control lens type, the rigid gas permeable ortho-keratology lenses designed to flatten the central cornea and reduce myopia after lens removal. The early safety results with orthokeratology lenses were poorer than expected, in particular among young wearers in Asia.<sup>14-15</sup> Since that time a post-market surveillance study in the United States found that the rate of microbial keratitis with these lenses was similar to the rate with overnight wear of SCL lenses.<sup>16</sup> One hopeful report by Fang and co-workers showed that the bacterial contamination in the lens storage case was significantly reduced six months after patients were trained on proper cleaning of the lens storage case, although not for *Pseudomonas aeruginosa*.<sup>17</sup> The orthokeratology patient gets the benefit of lower myopia during daytime hours when the lenses are not worn, but perhaps at some compromise of safety due to the need for overnight wear, that may be improved by extra training at the fitting and follow-up visits.

### **Consider individual needs**

In summary, the most important thing for contact lens wearers is that their practitioner fit them individually into the risk factor matrix. In a recent registry of 1,171 DD wearers, 94% of them cited the recommendation by their eye care practitioner as the primary reason to choose that type of lens, cited even more often than ease of use of DD lenses.<sup>2</sup> We study populations, but eye care practitioners treat one patient at a time. The safety considerations for seven or 17 year-old myopes differ, and they differ yet again from those for a 45 year-old hospital worker. But eye care practitioners who implement the knowledge that DD lenses have reduced risk of complications can improve safety outcomes for any SCL wearer. As DD designs become more widely available they seem to be a first step toward safer SCL wear. While avoiding reuse of any extended wear SCL lenses has not been proven to lower rates of microbial keratitis, it may add some margin of safety for those who use extended wear. Lastly, improving training and safe handling of all types of reusable contact lenses (including orthokeratology lenses) and their lens storage cases is key to improved safety for those wearers.

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