

Getting to grips with soft contact lens handling

Neil Retallic and **Dr Manbir Nagra** discuss the results of a major survey of patients concerning their challenges in handling soft contact lenses and consider how this may influence our initial instructions to patients to ensure future successful wear (C-101101, completion can be used for logging one distance learning CPD point suitable for optometrists, dispensing opticians and contact lens opticians)



SPECIALTY:
CONTACT LENS
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CLINICAL
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Contact lenses provide visual, practical, and psychological benefits¹ for an estimated 140 million wearers.² Despite this, some individuals experience handling-related issues, such as frustrations can lead to ceasing lens wear. Sulley *et al* reported that handling-related reasons were given by one in four new soft lens wearers who discontinued lens wear within their first year.³

A literature review of contact lens dropout research by Pucker and Tichenor found a pooled mean contact lens drop out frequency of 21.7%. For established wearers the most common reason provided was discomfort, and for new wearers it was dissatisfaction with vision. On a positive note, around three quarters (74%) of drops outs can successfully resume contact lens wear.⁴

Although there is awareness of handling-related dropout issues, there is surprisingly little published on what specific aspects of handling cause the most difficulties or have the greatest influence on contact lens retention. Wearer experiences are likely to differ between lens materials, lens types and modalities. That is even before personal motivation, expectation and mind set factors are taken into consideration.

As clinicians, some of the guidance provided is based on logic assumption rather than peer reviewed research findings. For example, the requirement for a new wearer to demonstrate application and removal techniques a specific number of times prior to allowing the patient to experience lens wear in their own environment, appears to stem from a general clinical consensus.

Fortunately, inappropriate lens handling, a modifiable behaviour, rarely causes long term consequences, although there have been reports of long-term lens retention in the eye⁵⁻⁷ and increased risk of ptosis.⁸ Most practitioners are likely to agree that short term lens retention and damaged or broken lenses, often a result of vigorous handling techniques, are more commonplace.

Nevertheless, the more unusual cases are the ones that tend to generate media interest. For example, the case of Good Morning Britain presenter Kate Garraway who had a contact lens stuck in her eye for six days⁹ and a surgeon reporting removing 27 contact lenses from a woman's eye during a consultation for cataract surgery. She had been wearing disposable lenses for 35 years, with no complaints of any irritation¹⁰ (figure 1).

This article focuses on patient reported outcomes from a survey exploring the handling experiences and wearing habits of 1,031

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FIGURE 1 27 lenses that had accumulated in a patient's eye without reported irritation



soft daily disposable contact lens wearers in the context of current literature and accepted clinical practice.¹¹

SURVEY OVERVIEW AND WEARING PATTERNS

The questionnaire was conducted online in Japan. The respondents were aged between 12 to 49 years old, amongst whom a variety of different daily disposable soft contact lens materials were worn.

Reason for using daily disposables

The most common reasons for wearers preferring disposable lenses, over reusable soft lenses, related to safety, hygiene and convenience related (figure 2). From a handling perspective, factors such as shorter lens care times, and a potential for lower costs if lenses were torn, were also considered important (69% and 37% of wearers respectively).

CONTINUING DEVELOPMENT

FIGURE 2 Top reasons for using daily disposables (wearers could select multiple answers)

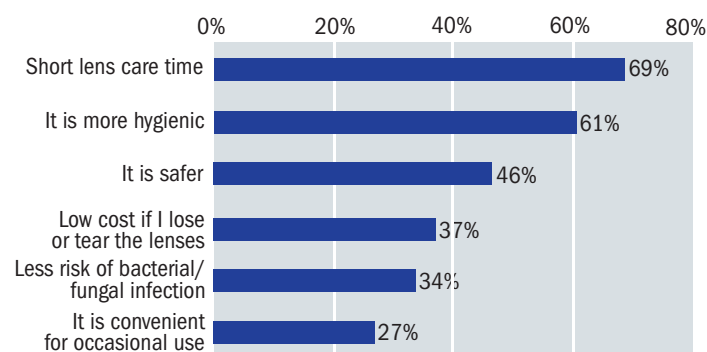


FIGURE 3 Number of lenses used per month by wearers

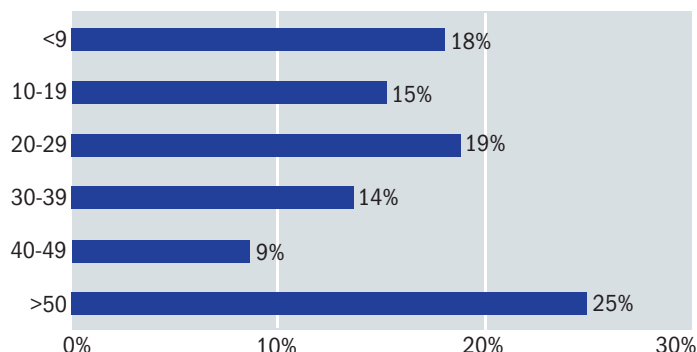
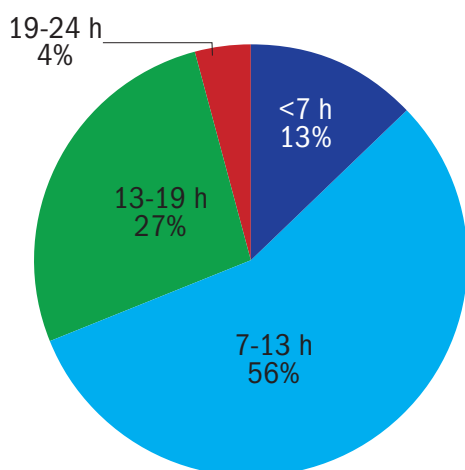


FIGURE 4 Wearing times per day (in hours, h)



Wearing schedules

A quarter of respondents wore their lenses most days (using 50 or more lenses a month) and less than one in five (18%) wore lenses the equivalent to a day a week or less (figure 3).

Just over a half the wearers (56%) wore lenses on average between seven and 13 hours around a third (31%) wore lenses longer and few (13%) wore their lenses less (figure 4).

Speed of lens handling

The survey asked respondents about the time taken to apply both lenses following removal from the blister packs (figure 5). This varied from an impressive < 1 minute for just over half (51.3%) of the respondents through to a minority (0.2%) needing 10 minutes or longer. Most respondents (98.4%) spent up to 5 minutes on lens handling, about the same amount of time it takes to make a cup of tea.

The findings show that even among established wearers, there is variation in the time spent on lens handling. The results highlight the importance of questioning and observing lens handling and compliance aspects during routine contact lens reviews, doing so may help identify any problem areas that could hinder performance.

Handling related challenges

The good news is that nearly a third (31%) of the wearers who

FIGURE 5 Speed of lens application (in minutes, mins)

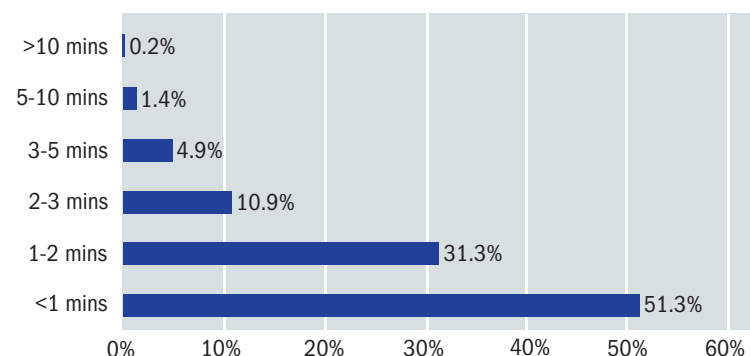
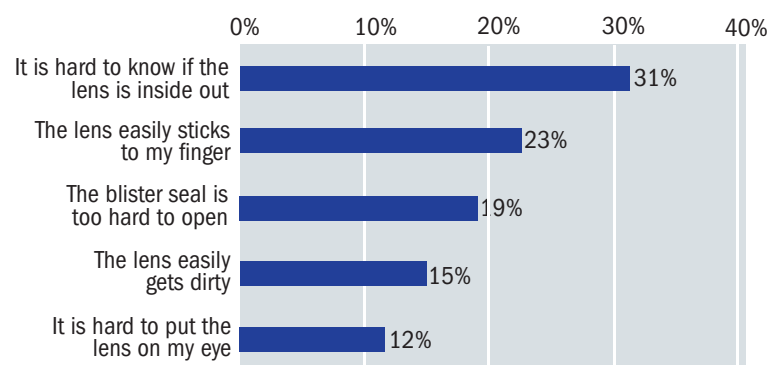


FIGURE 6 Lens handling related challenges (wearers could select multiple answers)



responded to the survey reported no handling difficulties. The top five handling related issues (figure 6) were:

- Difficulty determining if their lenses were inside out
- Lenses easily sticking to the finger
- The blister seal being perceived as hard to open
- Lenses becoming contaminated
- Challenges applying the lens onto the eye

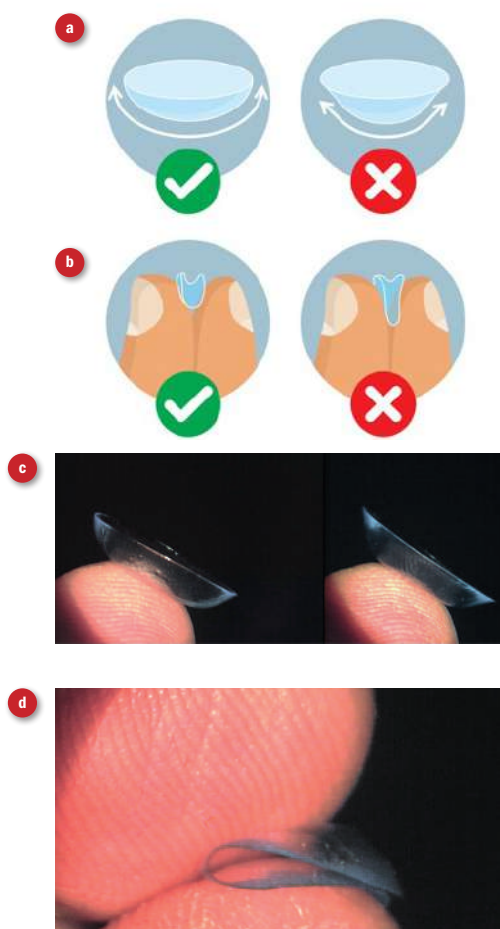
OVERCOMING HANDLING FRUSTRATIONS

Correct orientation and avoiding mixing up lenses

To aid visibility soft lenses may have a handling tint incorporated. For soft reusable lenses, the habit of removing the same lens first →

CONTINUING DEVELOPMENT

FIGURE 7 Orientation checks; schematics showing (a) naked eye appearance and (b) the 'taco' test. Real-life views of orientation are shown in (c), left correct and right inside out, and (d) the 'taco' test

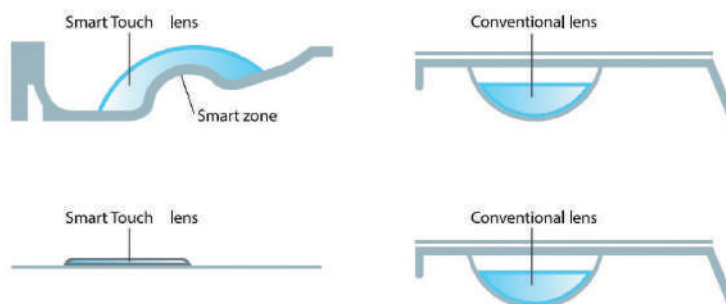


(usually the right) followed by the contralateral lens, can a void confusion. For daily disposables, explicit labelling of boxes as 'right' and 'left' may also help patients avoid mixing up lenses.

Traditionally to help identify the correct orientation of a soft lens, the wearer is advised to view the shape profile in good lighting and check if it is bowl-shaped with the edges pointing straight up while on the finger. The alternative saucer-shape appearance, where the edges turn downwards, indicate the lens is inside out. Another technique is the 'taco' test: if the lens edges easily fold towards each other when flexed, the lens is the correct way around, but if there is resistance and curling outwards at the top of the lens edge then it is likely inside out (figure 7).

Manufacturers have taken various approaches to overcome the challenge of ensuring whether the contact lens is the correct way around. These includes lens marker engravings, for example 1, 2, 3 or OK indicators or innovative lens packaging focusing on the contact lens positioning within the blister packet. Smart Touch technology (from Menicon) achieves this by raising the lens within the blister packet, allowing it to be pinched from the packaging while maintaining the correct orientation on the finger prior to application. This differs from the traditional approach of scooping the lens out of the bowl-shaped blister packet which risk lens inversion (figure 8).

FIGURE 8 Two Smart Touch technology design concepts compared to conventional packaging. The Flat Pack in the lower image also has less solution (0.2mls versus 0.8mls¹²) to reduce the chance of reuse as a storage device



Lens interaction with wearer's finger and hand hygiene

The issue of lenses that seem to stick to the finger (figure 9) was the second most frequently reported issue reported in the survey.

Prior to handling lenses, it is important to ensure hands are clean and thoroughly dried. Yet, in this survey, whilst just under two-thirds of respondents (62%) reported always washing their hands prior to lens handling, less than a third (27%) reported usually doing so and a small number (11%) admitted they rarely or never complied with this requirement.

The finding is consistent with the BCLA CLEAR reports, which indicate 50 to 60% of lens wearers admit to a lack of proper hand-washing.¹³ This is despite handwashing being one of the most regularly discussed, promoted and emphasised compliance points by clinicians.¹⁴

Blister opening

The third most reported issue in the survey related to the effort required to open blister packaging. A quick search of the research literature reveals little information on the ideal force needed to open a blister packet. The tendency to produce harder to open contact lens blister packaging than may be optimal stems from a desire to guarantee sterility. During the manufacturing process, the blister package is sealed with heat and pressure before being subjected to sterilisation via autoclave. The autoclave process uses heated steam to sterilise the internal contents of the blister package and introduces a high level of heat and pressure whilst doing so. The seal needs to be capable of withstanding these forces and maintain hermetic integrity for a suitable shelf-life period (typically five years). Unique sealing systems and packaging materials are required to guarantee a low peel force characteristic.

Figure 10 highlights in-house data from a contact lens manufacturer showing the opening force requirements of traditional packaging compared to an innovative flat pack foil blister design. Overall, the force required for the flat pack version is much lower.¹⁵

Lens contamination

Contamination of the contact lens with either pathogenic micro-organisms; debris; make up or other particles the lens encounters, can occur during lens handling or wear. The eye's own natural defence mechanisms may help remove deposition and support with preventing infection,¹⁶ but an obvious starting



FIGURE 9 Lenses sticking to the finger is seen as a problem for many



point is to encourage good hygiene principles and provide advice with respect to the patient's environment and lifestyle.

Rather surprising was the finding that nearly a third (30%) of respondents to this survey reported being unaware of infection risks associated with contact lenses.

One approach to minimise the risk of daily disposable lens contamination during handling is to utilise innovative packaging aimed at avoiding the need to touch the inner contact lens surface, ie the part that comes into direct contact with the eye. A recently published randomised control trial by Tan *et al* (2021) evaluated the efficacy of such technology in minimising lens contamination. Compared to Smart Touch packaging, conventionally packaged lenses with EDTA and without EDTA had increased risks of contamination on the inner surface of the contact lens of 3.38 and 3.4 times respectively.¹⁷ Reinforcing the findings of an earlier study where 3x lower contamination of lenses was also reported when using the Smart Touch packaged lenses.¹⁸

Application and removal

The fifth most common reason indicated by respondents, related to time spent applying the contact lens to the eye (figure 11). When asked where they typically apply their lenses, most respondents indicated lens application is usually at their home (85%) with around half (52%) of the respondents revealing they stored their lenses near the washbasin. Bizarrely, some reported keeping their lenses in their fridge, some 2% of respondents.

Observing the wearer's behaviours and the use of fluorescein may reveal evidence of poor removal techniques. While many devices have been marketed to facilitate contact lens application and removal, there has been little research published to establish their efficacy.

Damaged and retained lenses

Inappropriate handling may result in contact lens shape retention changes, which could influence the contact lens fitting behaviour and performance. Aggressive handling techniques can lead to lenses becoming damaged, with the potential for lens fragments to be retained in the eye. The eye's anatomical features make it unlikely for lenses to move 'behind' the eye, although there have been reports of lenses becoming trapped in the fornix.⁶ This may be difficult to visualise with the naked eye without manipulation of the lids during slit lamp examination. The use of vital stains such as fluorescein can aid locating dislocated lenses. →

FIGURE 10 Force required to open contact lens blister packaging (N = Newtons)

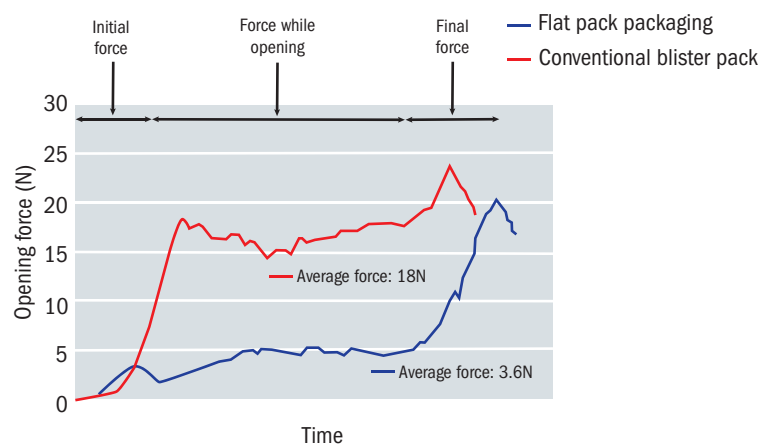
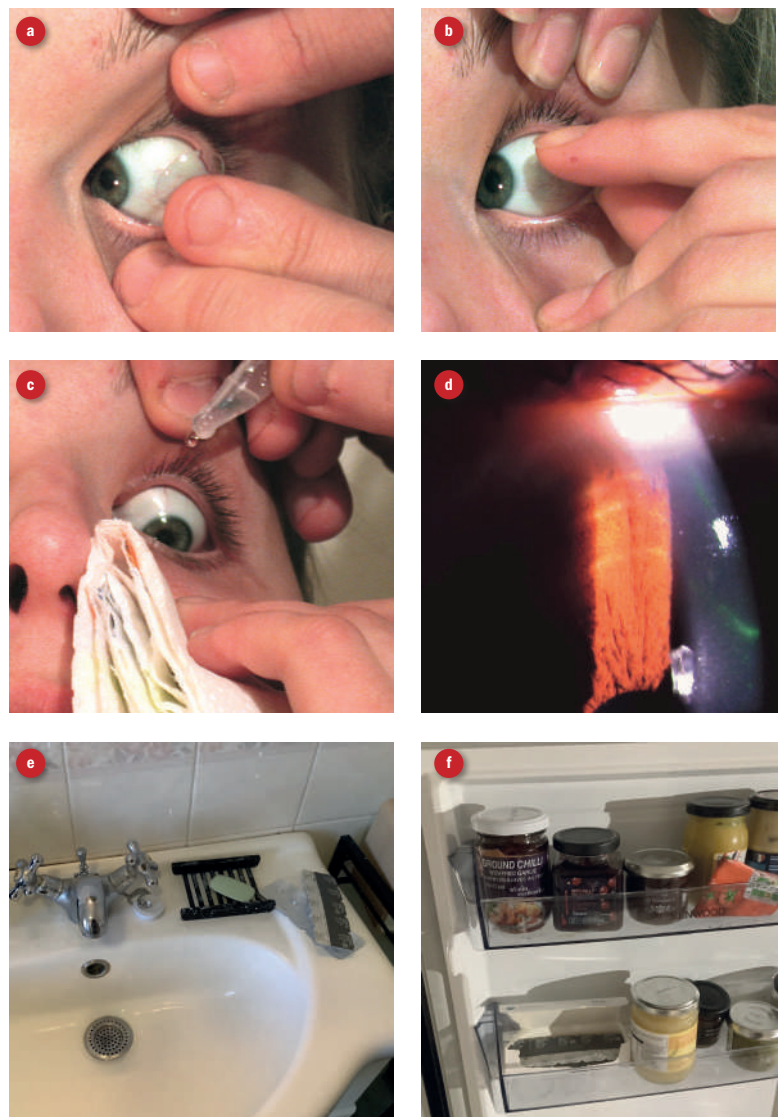


FIGURE 11 (a) Time spent applying lenses was the fifth most reported challenge. (b) Lens removal was more challenging for a tight, dry lens. (c) Instillation of topical lubricant may facilitate lens removal. (d) Lens removal damage to the epithelium is revealed by fluorescein assessment. (e) 52% of wearers store and handle their lenses near wash basins. (f) 2% of wearers store their lenses in the fridge



Practitioner approach and digital influences

The BCLA CLEAR report on evidence-based contact lens practice concluded that while practitioners may provide relevant advice, this can be poorly recalled by patients.¹⁹ Factors such as patient anxiety, which is linked to poor attention, may hinder recall of instructions.²⁰ Additionally, recent work by Hind *et al* found that while practitioners often provided verbal advice, this was not always supported by written information.²¹ In the absence of such information recall, patients may seek advice elsewhere: in our ever-evolving digital world the influence of social media and use of the internet for health advice is increasing. Yildez *et al* reported that while useful online contact lens video resources exist, a large proportion have insufficient information or are poor quality.²³ Directing patients to reliable more sources, or an investment in digital offerings either via the practice website or practice app, may help safeguard against erroneous advice.

CONCLUSION

While handling related issues are more frequently associated with new wearers, this survey highlights that even some established daily disposable wearers may harbour frustrations, including problems such as difficulties with opening lens packaging.

Consideration of all aspects of lens handling at each contact lens review may facilitate earlier detection of non-compliance and inappropriate handling technique. The availability of remote care offers an opportunity to review contact lens handling and compliance in the wearer's own 'real world' environment.

Maintaining a proactive approach, keeping up to date with new technology and product innovation, may also help maximise contact lens performance and reduce the likelihood of dropout.

Neil Retallic is an optometrist working as the Global Professional Services Manager for Menicon and is the current President of the British Contact Lens Association.

Dr Manbir Nagra is an optometrist, educator, and researcher. She works as an independent consultant within the optical sector.

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