

Packaging as a Driver of Patient Adherence in Ophthalmic Therapy

Why usability, safety and evolving regulation are reshaping preservative-free eye care

In ophthalmic therapy, the package is no longer a passive container. It has become an integral part of treatment performance, patient experience and regulatory strategy. Across global markets, manufacturers are facing rising expectations not only to deliver effective formulations, but also to ensure that the therapies can be administered safely, consistently and conveniently by patients in real-world conditions. This is particularly true in eye care, where many treatments are self-administered, often over long periods of time, and where successful outcomes depend heavily on correct application of treatment. The EU Medical Device Regulation (MDR) reinforces this trend by placing greater emphasis on safety, performance, risk reduction, usability and information supplied with the device.

How Packaging Influences Patient Adherence

For companies with deep expertise in dispensing and drug-delivery systems like

Silgan Dispensing, this evolution confirms something long understood in practice: packaging design can directly influence adherence. In self-administered ophthalmic therapies, packaging affects whether patients can aim correctly, apply one drop at a time, generate sufficient squeeze force, avoid contamination and remain confident throughout treatment. When administration is difficult, inconsistent or stressful, the risk is not simply dissatisfaction: it is missed doses, incorrect dosing and ultimately poorer treatment adherence.

This point is especially important in ophthalmology because correct eye-drop instillation can be difficult outside controlled settings. Real-world studies suggest that correct eye-drop instillation is uncommon: in one observational study, only 3 % of users performed all administration steps correctly, while difficulties such as getting a drop into the eye, squeezing the bottle, or avoiding bottle-eye contact were frequently reported.¹

Physical difficulties such as aiming, squeezing and visibility can lead patients to skip doses or delay use, especially in chronic conditions such as dry eye disease or glaucoma. These observations are aligned with broader industry recognition that poor usability in ophthalmic delivery systems can

contribute to unintentional non-adherence when medication is not administered correctly.

The Growing Shift Toward Preservative-free Multidose Systems

At the same time, the market is moving decisively toward preservative-free multidose solutions. This shift is driven by growing demand for preservative-free products, especially among patients with sensitive eyes or chronic conditions requiring prolonged use, combined with the convenience and cost-effectiveness of multidose formats compared with unit-dose systems. This direction also reflects clinical concerns around prolonged exposure to preservatives in ophthalmic formulations and a corresponding need for safe multidose systems that protect the formulation without compromising patient usability.

However, moving to preservative-free multidose delivery introduces a new design challenge: the package must maintain sterility and microbiological safety while remaining easy to use. Silgan's consumer research highlighted several recurring frustrations associated with some packaging formats: lack of dosage control with unit-dose vials, perceived waste, poor portability, aiming difficulties caused by short nozzles, inconsistent drop formation, jetting or streaming, and squeeze forces that interfere with control. These types of issues matter because the more effort patients must invest in using the package correctly, the greater the risk of use error and reduced adherence over time.

Four Ways Packaging can Improve Patient Adherence

This is where packaging can make a measurable difference. Well-designed ophthalmic packaging can support adherence through four main mechanisms:

1. Improving Dosing Accuracy

It can improve dosing accuracy. In eye-drop therapy, patients need confidence that they are administering a single, controlled drop. Packaging that produces jets, streams, multiple drops or highly variable actuation can create uncertainty, waste and frustration. By contrast, systems designed for one-drop



Packaging design plays a critical role in supporting accurate and convenient eye-drop instillation; an important factor in patient adherence, particularly in chronic ophthalmic

control support the consistency that chronic therapies require. Silgan's Iridya® has an advanced flow-control system with "NO-JET" technology intended to deliver precise single drops, even across challenging formulations and a broad viscosity range.

2. Supporting Aiming and User Confidence

Packaging can improve aiming and user confidence. Eye-drop administration is a visual and motor task. If the nozzle is too short, difficult to see, or poorly aligned with typical patient habits, users may need to bring the bottle uncomfortably close to the eye or may miss the target altogether. Silgan's qualitative testing found that users favoured designs with an elongated, familiar tip, reporting that it improved targeting and ease of application compared with competing systems. In a broader regulatory context, this type of design choice directly supports usability engineering objectives, which seek to minimise use error through ergonomics and intuitive user interfaces.

3. Reducing the Physical Burden of Administration

Packaging can reduce the physical burden of administration. Many ophthalmic patients are older adults or chronic users who may have reduced hand strength, dexterity limitations or simply less tolerance for complex administration routines. A bottle that requires excessive or inconsistent squeeze force can interfere with aiming, provoke over-compression and increase the likelihood of multiple-drop delivery. In practical terms, lower and more predictable actuation effort can make therapy easier to repeat correctly day after day: a key component of adherence in chronic treatment.

4. Building Trust through Safety and Tamper Evidence

Packaging can build trust through safety and tamper evidence. Patients are increasingly



Silgan's Iridya® range of preservative-free multi-dose eye droppers in 5, 10 and 15 ml.

aware of formulation sensitivity, contamination risk and the benefits of preservative-free products. A dispensing system that visibly supports microbiological protection, includes tamper-evident features and maintains ease of use over the product lifecycle can strengthen confidence in the treatment. Patients adhere better to therapies they trust and can use with confidence. Regulatory frameworks increasingly mirror this expectation by requiring manufacturers to consider the full user experience, from first opening to repeated daily use and post-market surveillance.

Packaging Strategy Should Begin Earlier in Development

The implications for pharmaceutical and device developers are significant. In ophthalmology, packaging selection should not be treated as a late-stage industrial decision. It should be integrated earlier into development strategy, especially for preservative-free therapies and products targeting chronic self-administration. Packaging ergonomics, drop-control performance and compatibility with different formulation viscosities should all be assessed not only as technical specifications, but as contributors to adherence and real-world therapy success.

For companies active in healthcare dispensing, this represents both a challenge and an opportunity. The challenge is to design packaging systems that meet higher regulatory expectations while remaining intuitive for everyday use. The opportunity is to help pharmaceutical partners move beyond a narrow view of packaging as protection alone and toward a broader model in which packaging supports therapeutic effectiveness, brand trust and patient persistence over time. Silgan's development approach for Iridya® was patient-centric, with research focused on squeeze force, first-use opening, overcap handling, drop behaviour and ease of instillation. That mindset reflects the direction the industry is heading: from packaging as a component to packaging as a contributor to adherence.

The Future of Ophthalmic Adherence

In conclusion, as ophthalmic therapies become more specialised and regulatory requirements more demanding, packaging will play an increasingly strategic role in treatment success. Ease of use, precise dosing, intuitive handling and microbiological protection are not isolated design features; together, they shape whether patients can and will use a therapy correctly. For chronic eye conditions in particular, the future of adherence may depend as much on how a



product is delivered as on the formulation itself. Packaging that is designed with the patient in mind can therefore become a powerful enabler of better outcomes.

REFERENCES

1. Mehuys, E., Delaey, C., Christiaens, T. et al. Eye drop technique and patient-reported problems in a real-world population of eye drop users. *Eye* 34, 1392–1398 (2020).



**Klervi
Le Marre**

Klervi Le Marre, Strategic Marketing Manager – Silgan Dispensing Healthcare, With over two decades of experience in the global packaging industry, combines strategic marketing expertise with international account management for leading healthcare, beauty, and home care brands. Based in Frankfurt, Klervi brings a cross-cultural perspective on innovation, sustainability, and Consumer/Patient-driven packaging solutions.