

402 Tong Executive Summary - Eye Guide

Kasia Klotz, Anabelle Olson, Eva Coughlin, Jenna Krause, Tevis Linser, Thomas Kriewaldt

Eye drops are the leading therapeutic option for the treatment of ophthalmic diseases. Many patients, especially those with reduced dexterity, experience difficulty administering eye drops. One example is the release of too many eye drops, depleting their medication supply before the prescription refills. The team proposes an eye drop assistive device, which will ease the administration of eye drops, minimize eye drop waste, and increase medication adherence.

The team identified two main competitors in this space. The Droppy eye drop dispenser includes a cup that fully surrounds the eye with wing-like extruded arms to provide a wide squeeze interface. This device lacks aspects that prevent contamination, reduce eye drop waste, and allow for proper eye drop technique. The second competitor is the Gentle Drop. This device features a silicone sleeve that fits around varying eye drop sizes and shapes connected to a nose bridge extrusion that aims to provide accuracy and stability. However, this device does not provide a mechanical advantage to accommodate dexterity issues or allow for proper eye drop technique.

The team's design targets a significant market segment of individuals with reduced dexterity, addressing widespread challenges in accurate eye drop administration. Furthermore, this device can reach additional demographics such as caregivers and pediatrics. According to the Global Eye Dropper Market Report, there are approximately 117.5 million eye drop users in the United States. With millions worldwide facing these issues, this device can significantly impact the therapeutic outcomes of eye drop users. After consultation with the CEO of Harrow, an ophthalmic pharmaceutical company, the market size was determined to be 5% of eye drop users. The team hopes to reach 1% of eye drop users, 1.18 million people, within the first year of sales. With an estimated cost per unit of \$2.46 and a competitive sales price of \$24.99, the estimated first-year profit is \$2.65 million. This highlights the significant demand for eye drop assistive devices in this area. With millions worldwide facing these issues, this device can significantly impact the therapeutic outcomes of eye drop users.

There are two models of the prototype device that prospective users can choose from, which offer different stabilization methods. The first design is a nose clip, which is the most secure. A second option is a rounded eyebrow rest, which accommodates different patient anatomies. Users can place this version in distinct locations on their faces and adjust the device's angle to their preference. The final device also features a ring that secures the end of the eye drop bottle and allows the bottle cap to screw into place while connected to the device. Ergonomic handles provide a more comfortable grip, especially for patients with reduced grip strength. The squeezing mechanism, which protrudes from the handles, offers additional support and applies forces directly to the bottle. There are multiple-sized squeezing mechanisms to accommodate different bottle sizes. Together, these design features simplify the administration of eye drops, making it easier to secure and squeeze any eye drop bottle.

Preference testing was conducted at a retirement community in Madison. After receiving IRB approval, the team surveyed 37 participants over the age of 65. The results showed that 81% of participants reported they would use the eye drop assistant device. Another test validated that a single drop of eye drop solution was dispensed with each use. This test further supported that the device ensures a more consistent drop size compared to dispensing drops from the eye drop bottle alone.

The device successfully meets the design requirements given by the client. Ease of administration is improved by providing a mechanical advantage through utilizing an individual's full hand grip rather than individual fingers which is beneficial for people with reduced dexterity. The device provides a stability component that helps users guide the eye drops into the correct location in their eye, promoting proper treatment and preventing contamination. The use of the device reduces eye drop waste by promoting a more consistent drop size, reducing the cost of treatment. The team's unique design addresses critical limitations found in existing methods, enhancing user experience and optimizing treatment outcomes.