Siemens Competition
Math : Science : Technology
National Finalist

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Mentor: Dr. Kimberly Vogt, Marian University
Project Title: *Engineered Intraocular Injection Guide (IIG): Pain Reduction in Ophthalmic Disease Treatment*

Purpose: I developed a novel device, the Intraocular Injection Guide (IIG), to improve patient comfort during intraocular injections (30 million/year) by eliminating the need for a painful eyelid speculum.

Methods: Using Autodesk Inventor software, I designed over 30 successive prototypes of the IIG1, tested on a model eye with a variety of needle/syringe complexes. The IIG1 vs. speculum was tested on 50 subjects needing bilateral injections with a standardized Visual Analog Scale (VAS) to determine pain levels. I subsequently modified the device based on surgeon feedback, and repeated the study.

Results: IIG1 had a mean pain score of 14.76mm (range 0-100mm) vs. 32.22mm for the lid speculum. In Part 2, IIG2 had a mean pain score of 9.94mm vs. 27.65mm for the speculum. 95% confidence intervals for pain score in Part 1 [IIG1:(9.37,20.15); Speculum:(24.65,39.79)] and in Part 2 [IIG2:(6.52,16.02); Speculum:(24.65,39.79)] do not overlap for each Part, suggesting significant reduction in pain with the IIG1 and IIG2.

Conclusions: Patients find the IIG to be less painful than the traditional speculum, and decreased discomfort generally leads to better compliance with treatment. There is interest in large scale production via injection molding.