

Simulation technology allows users to safely practice phacoemulsification cataract surgery

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Phacoemulsification cataract surgery is one of the most frequently performed eye surgeries in the United States, with 1.5 million procedures performed each year. It is also one of the most complex procedures to learn. A new, highly innovative, computer-based simulation tool, the Mass. Eye and Ear Cataract Master, bridges the learning gap that residents and ophthalmologists new to phaco must navigate prior to performing actual surgery.

Ophthalmology residents typically train in wet labs and on phacoemulsification simulators that supplement motor skills training before moving on to live patients. This is a challenging leap for surgeons-in-training, even with the most careful oversight by attending physicians. The Cataract Master offers a unique approach for making the transition more successful.

Nearly a decade in the making, the Cataract Master was co-developed by Bonnie An Henderson, MD, F.A.C.S., Harvard Medical School Ophthalmology Residency Training Program Director, John I. Loewenstein, M.D., Adam Neaman, Ph.D., and several colleagues. The English version of the program is available worldwide through the American Society of Cataract and Refractive Surgery Foundation, the research and charitable arm of a 9,000-member international society dedicated to improving the education and skill sets of anterior segment surgeons.

"The Cataract Master aims to minimize clinical risk while providing

residents and practicing ophthalmologists with the most authentic cataract surgical experience possible outside the OR," Dr. Loewenstein said. "The goal is to boost skills and confidence, to better prepare residents for the surgical experience, and to raise the quality of patient care everywhere."

Computer-based simulation technology has been used in medical training since the early 2000s, but these tools often did not take into account the hundreds of decision-making requirements that arise during surgery. The Cataract Master is different in that it offers a self-guided, self-correcting curriculum that requires trainees to make decisions based on realistic surgical situations. The simulator, which can be accessed from any personal computer, contains realistic animations along with videos of actual surgeries – complete with expert discussions of each phase of the procedure. The interactive program includes frequent pop-up questions relating to the various surgical steps, with user answers then animated on-screen. If the user makes a serious error, videos provide immediate feedback explaining how the problem occurred, what to do to fix it, and how to avoid making the same mistake again.

"This essentially allows new phaco surgeons to learn from their mistakes and to master life-like surgery without risking injury to a patient," said Dr. Henderson. "This type of immersion learning is simply not possible any other way, and provides an excellent transition to the operating room."

To test its effectiveness, the developers conducted a multicenter, randomized trial at eight residency programs, which compared the Cataract Master to traditional teaching tools. Results showed that residents enjoyed using the program and preferred its method of learning. The study results were published in the journal, *Ophthalmology*, in February 2010.

"The Cataract Master is a unique and original instructional tool for phacoemulsification cataract surgery. The animated simulation provides a realistic interactive experience, with advice along the way via video clips of experts in the field, based on trainee surgical decisions during the exercise. It is an outstanding tool to teach thought processes and decision-making during [cataract surgery](#), highly recommended for ophthalmology resident training," said Anthony Arnold, M.D., Residency Program Director, Jules Stein Eye Institute, UCLA Dept. of Ophthalmology.

More information: A demonstration of The Cataract Master, along with a free trial, is available at www.cataractmaster.org

Provided by Massachusetts Eye and Ear Infirmary

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