

Advantages of Virtual Reality Training for Fighting Blindness

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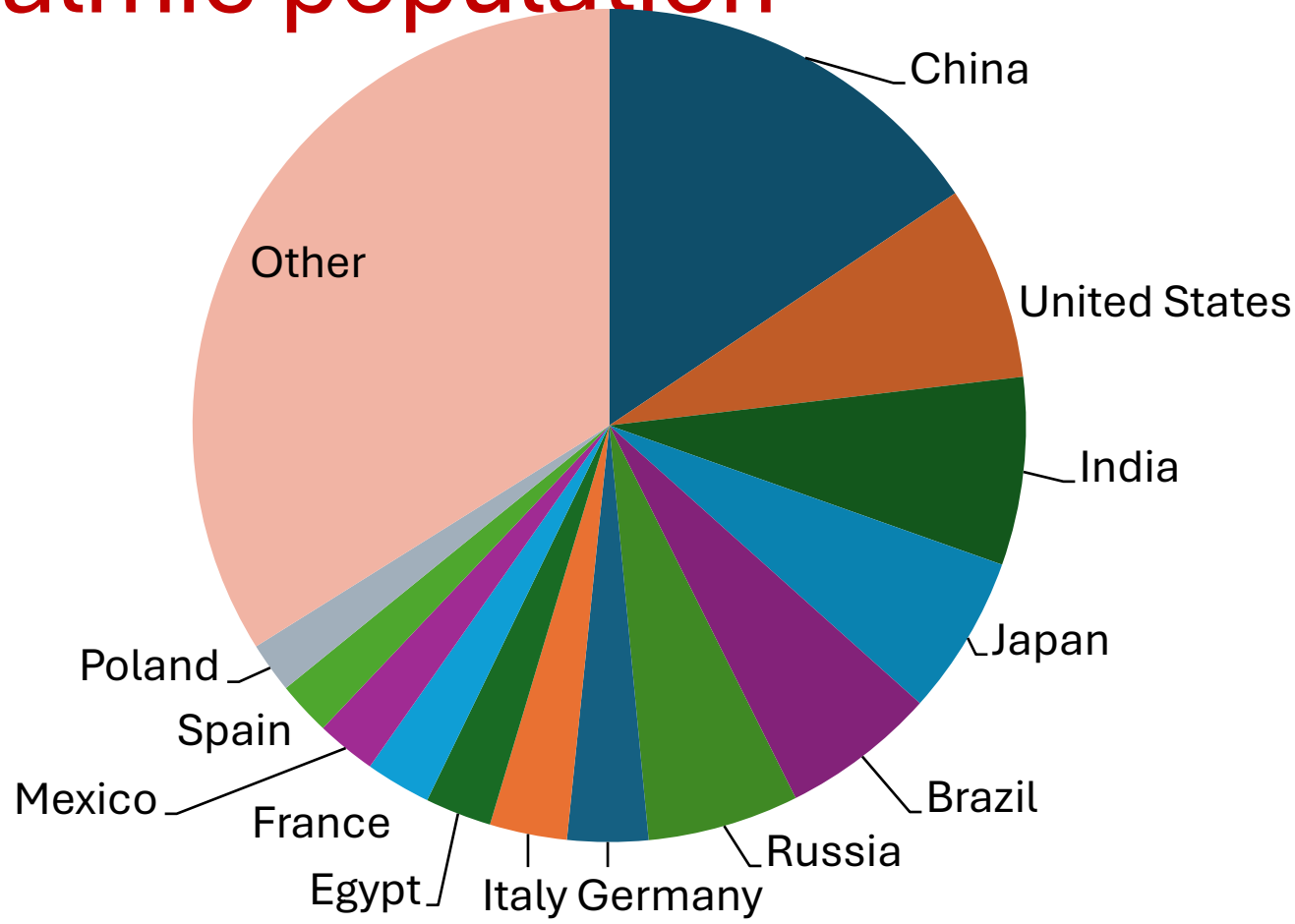
Financial disclosures

CMO with HelpMeSee.

Where is the ophthalmologist?



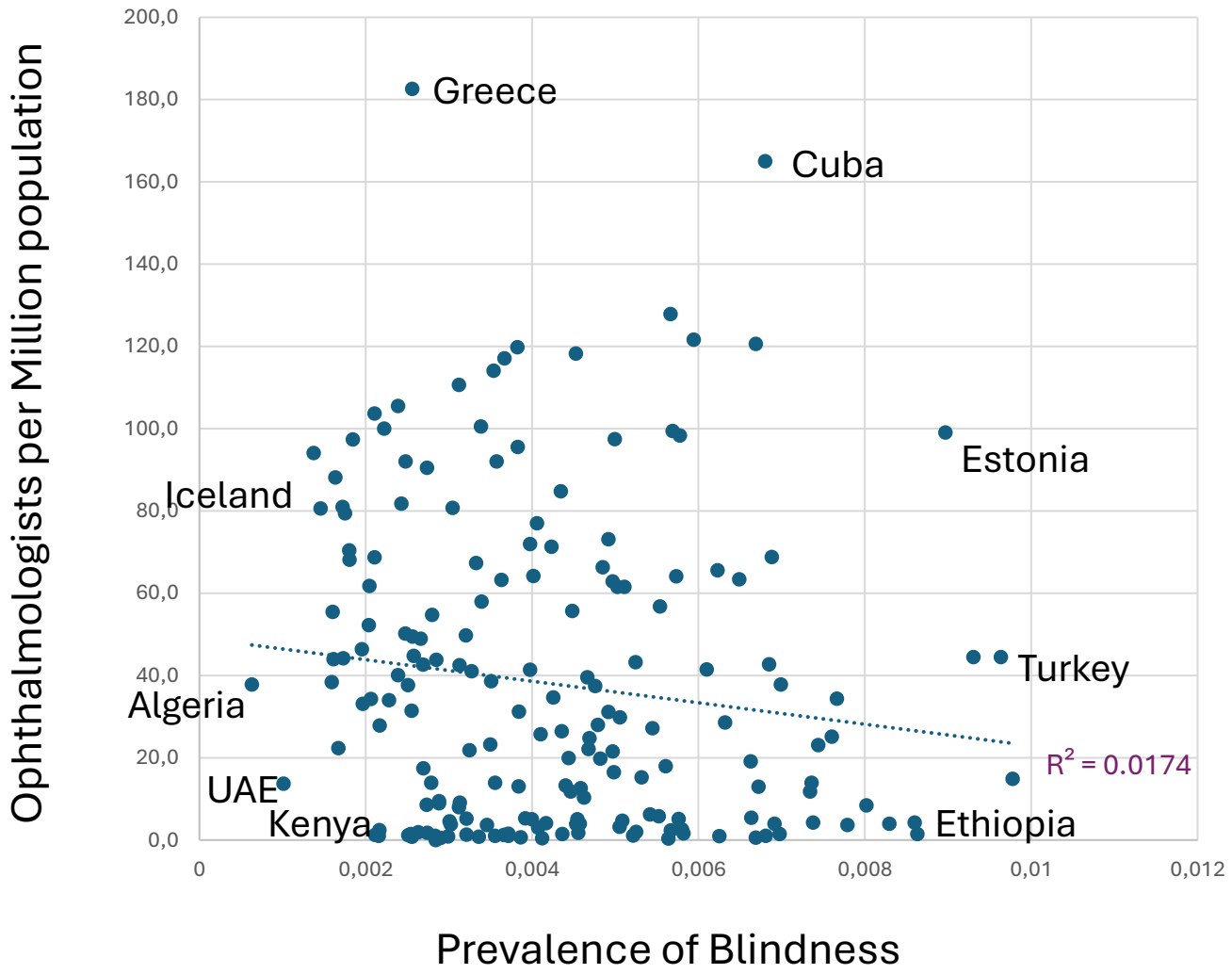
13 countries* concentrate 2/3 of the ophthalmic population



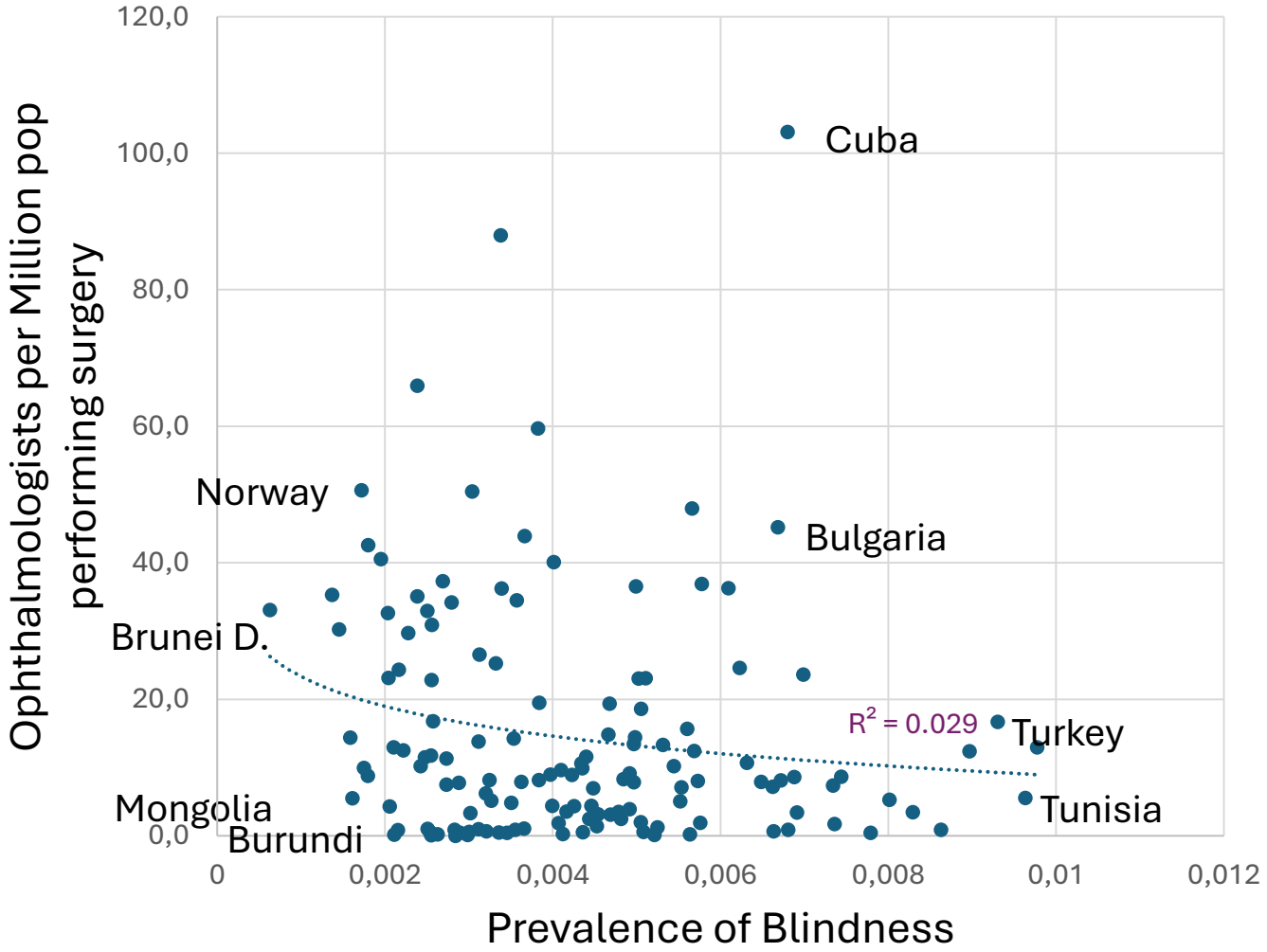
Next slides courtesy of Professor Serge Resnikoff

* these 13 countries represent only 54% of the global population

Number of ophthalmologists per Million pop and prevalence of **Blindness**: a very weak correlation (R^2=0.02)

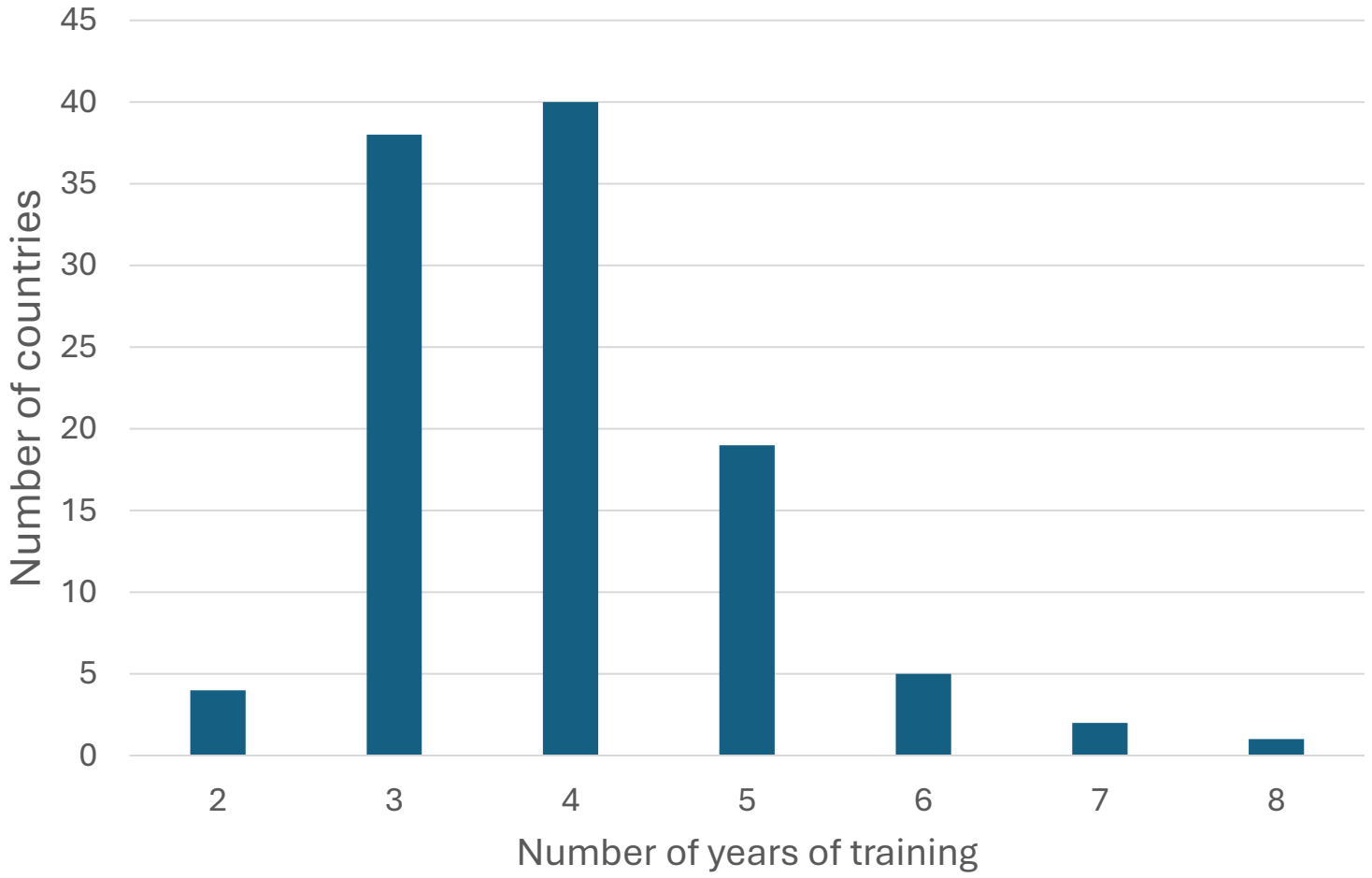


Number of ophthalmologists performing **surgery** and prevalence of **blindness**: a very weak correlation (R^2=0.03)



Training

Number of years of training: data reported from 109 countries.



Ophthalmic population growth

- Compared to previous estimate, the global ophthalmic population has **increased by 2.6% per year** since 2010, i.e. faster than originally estimated (1.2%)
- Overall, growing faster than the population but **still not picking up with ageing rate (2.9%)**

Conclusions

- The absence of “expected correlations” demonstrate the importance of appropriate and deployment and actual access

High numbers do not imply

appropriate services are provided

- appropriate skills – especially surgical – and appropriate equipment, infrastructure and consumables are critical
- appropriate deployment, incentives and regulations (including task shifting) are also critical,
- **target ratios are irrelevant**

Can Simulation Based Training bridge the Gap?





The HelpMeSee Simulator.

The ONLY MSICS SIMULATOR available out there

It is

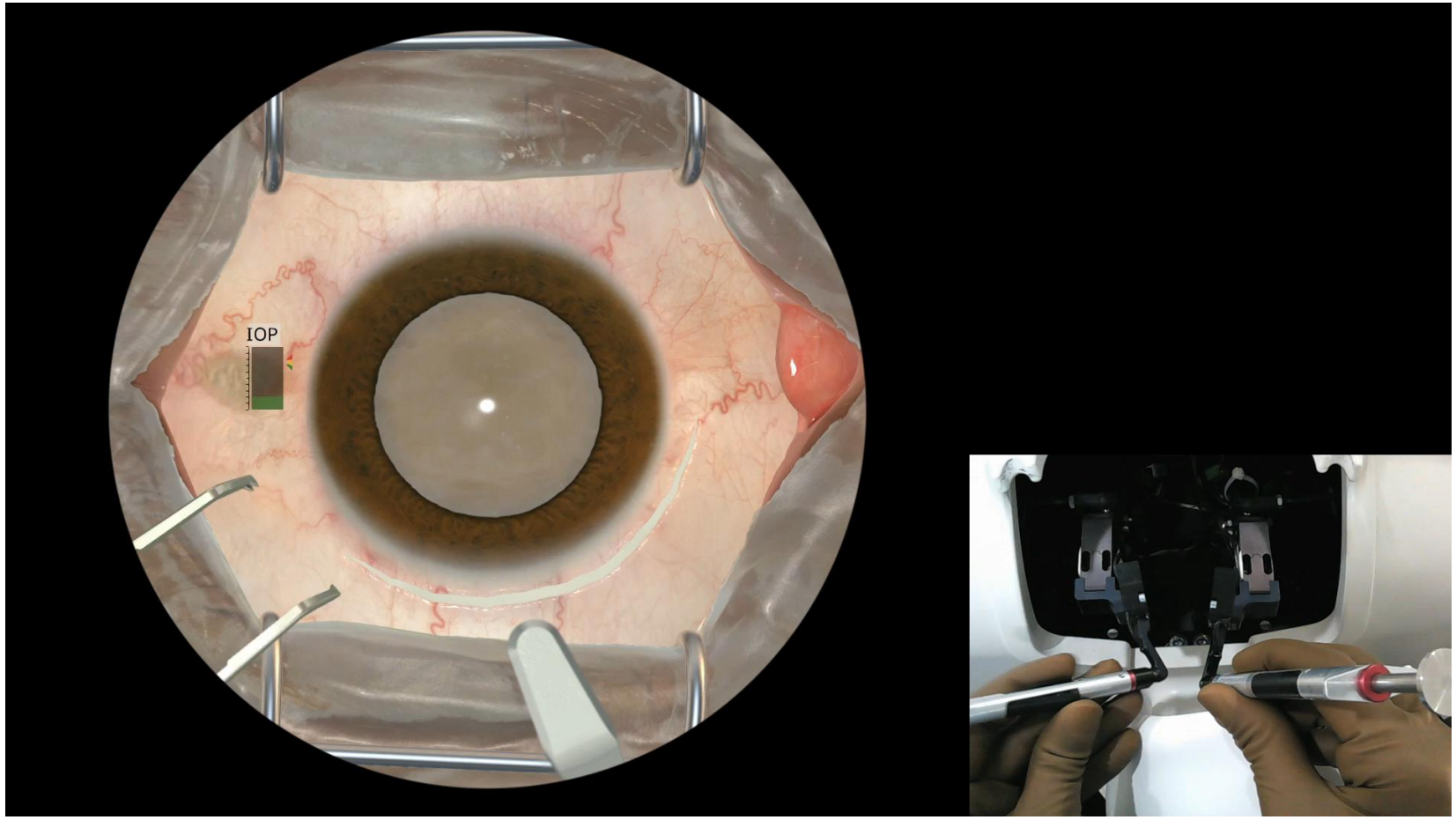
- High fidelity
- 3D Virtual reality

Intuitive Simulation Software

Tactile Feedback



3D, High fidelity, Virtual reality with Tactile feedback.





Advantages of Simulation based training!

- Teaches proper handling of instruments
- Allows repeated practice & reduces complications
- Trainer & trainee both without stress
- Standardized teaching procedure
- Start & pause in mid-procedure
- Ability to introduce complications & practice how to manage
- Helps learn from mistakes
- Objective measurements from the performance data
- Video review for each attempt

scientific reports

OPEN

Effectiveness of simulation-based training for manual small incision cataract surgery among novice surgeons: a randomized controlled trial

Akshay Gopinathan Nair[1,7], Chetan Ahiwalay[1,7], Ashish E. Bacchav[1,7], Tejas Sheth[1,7], Van Charles Lansingh[2,7], S. Swaroop Vedula[1,7], Venudhar Bhatt[1,7], Jagadesh C. Reddy[3,7], Pravin K. Vadavalli[3,7], Smita Praveen[4,7], Nikhilesh Anil Wairagade[5,7] & Jeff Pettey[6,7]

This study was designed to determine the effect of a novel simulation-based training curriculum for scleral tunnel construction in manual small incision cataract surgery (MSICS) compared with traditional training. In this multicenter, investigator-masked, randomized clinical trial, resident surgeons within 3 months of matriculation with minimal or no prior experience with MSICS were assigned either to simulation-based training, the Experimental Group (EG), or to conventional training, the Control Group (CG). EG residents were trained to perform scleral tunnel construction using a simulation-based curriculum (HelpMeSee Eye Surgery Simulator), while residents in the CG followed institution-specific curriculum before progressing to live surgery. Surgical videos of the first 20 attempts at tunnel construction were reviewed by masked video raters. The primary outcome was

Original Article

Assessment of a high-fidelity, virtual reality-based, manual small-incision cataract surgery simulator: A face and content validity study

Akshay Gopinathan Nair, Chetan Ahiwalay, Ashish E Bacchav, Tejas Sheth, Van Charles Lansingh[1]

Purpose: To establish the face and content validity of the HelpMeSee Eye Surgery Simulator – a virtual reality-based cataract surgery simulator for manual small-incision cataract surgery (MSICS). **Methods:** The face and content validity were assessed on the sclero-corneal tunnel construction course. A questionnaire with 11 questions focused on the visual realism, with resemblance to real life surgery, and the training value of the simulator was developed. Thirty-five experienced MSICS surgeons participated in the study. Responses were recorded using a seven-point scoring system. **Results:** Overall, 74.3% (26/35) of the respondents agreed that the overall visual representation of the eye and the instruments in the simulator were realistic. The task of injecting a visco-elastic through the paracentesis was reported to be the most visually realistic task with a mean score of 5.78 (SD: 1.09; range: 2–7). With regard to content validity, 77.1% (27/35) of the subjects felt agreed that the errors and complications represented throughout the entire tunnel construction module were similar to those encountered in real life; the task of entering the anterior chamber with the keratome had a mean score of 5.54 (SD: 0.98; range 1–7), being rated the highest in that aspect. Overall, 94.3% (33/35) of the subjects agreed that the simulator would be useful in developing hand–eye co-ordination. A similar number of 94.3% (33/35) agreed that based on their experience, they would recommend cataract surgical training on this simulator. **Conclusion:** The results suggest that the HelpMeSee Eye Surgery Simulator appears to have sufficient face and content validity for cataract surgical training.

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DOI: 10.4103/ijo.IJO_1593_22
Quick Response Code:

Key words: Augmented reality, medical education, residency, training, virtual reality

Original Article

An objective evaluation of simulated surgical outcomes among surgical trainees using manual small-incision cataract surgery virtual reality simulator

Sankarananthan R, Senthil Prasad R, Tony Alex Koshy, Padam Dharani, Ashish Bacchav, Van Charles Lansingh, Chetan Ahiwalay, Balagiri K, Madhu Shekhar

Purpose: The purpose of this study was to evaluate trainee performance across six modules of a virtual reality (VR) simulator. **Methods:** A retrospective observational study was conducted on 10 manual small-incision cataract surgery (MSICS) trainees who practiced cataract surgery on an MSICS VR simulator for one month. They were assessed in six major steps which included scleral groove, tunnel dissection, keratome entry, capsulorhexis, nucleus delivery, and intraocular lens (IOL) insertion under a trainer's supervision. The information included in their score metrics was collected, and their overall performance was evaluated. **Results:** Thirty attempts were evaluated for scleral groove, tunnel dissection, and capsulorhexis and 15 attempts for keratome entry. Candidates had varied results in the dimensional aspects and their rates of complications with a mean satisfactory score of 3.1 ± 4.17, 6.8 ± 5.75, 5.8 ± 7.74, and 1.8 ± 2.57, respectively. Nucleus delivery (n = 5) had more of iris pull and IOL insertion (n = 5) had more of lost IOL as complications but both had a higher satisfactory outcome. **Conclusion:** A VR simulator is a useful tool for training surgeons before their entry into live surgery. It is an effective method for evaluating objectively the structural characteristics of each phase in MSICS and their associated complications, helping them anticipate it earlier during live surgery by giving them a near real world experience.

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DOI: 10.4103/ijo.IJO_1600_22
Quick Response Code:

Key words: HelpMeSee simulator, MSICS, trainee surgeons, VR simulator

Education and Training

Embracing technology in cataract surgical training – The way forward

Van C Lansingh[1,2,3], Ravilla D Ravindran[4], Prashant Garg[5], Merle Fernandes[6], Akshay Gopinathan Nair[2,7,8], Parikshit J Gogate[9,10,11], Sundaram Natarajan[7], Meenakshi Swaminathan[12], Ashish E Bachhav[2,13], Rashmin A Gandhi[14]

While ophthalmology as a surgical branch itself has evolved technologically with newer instruments, techniques and procedures; ophthalmic surgical training appears to have stagnated in terms of how it is delivered and how trainees' learning and performance are assessed. This collaborative editorial attempts to identify the lacunae in ophthalmic residency training and highlight how technological tools such as surgical simulators can be incorporated into ophthalmic training even in limited-resource settings with good results.

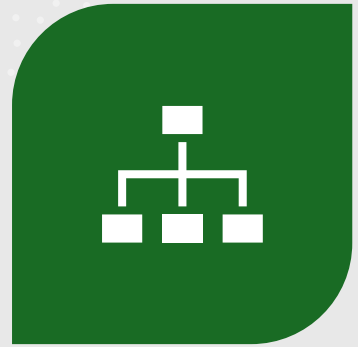
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Quick Response Code:

Key words: Blindness, MSICS, residency, SICS, training

How is HelpMeSee's Training Different than Traditional training!



PROFICIENCY BASED TRAINING.



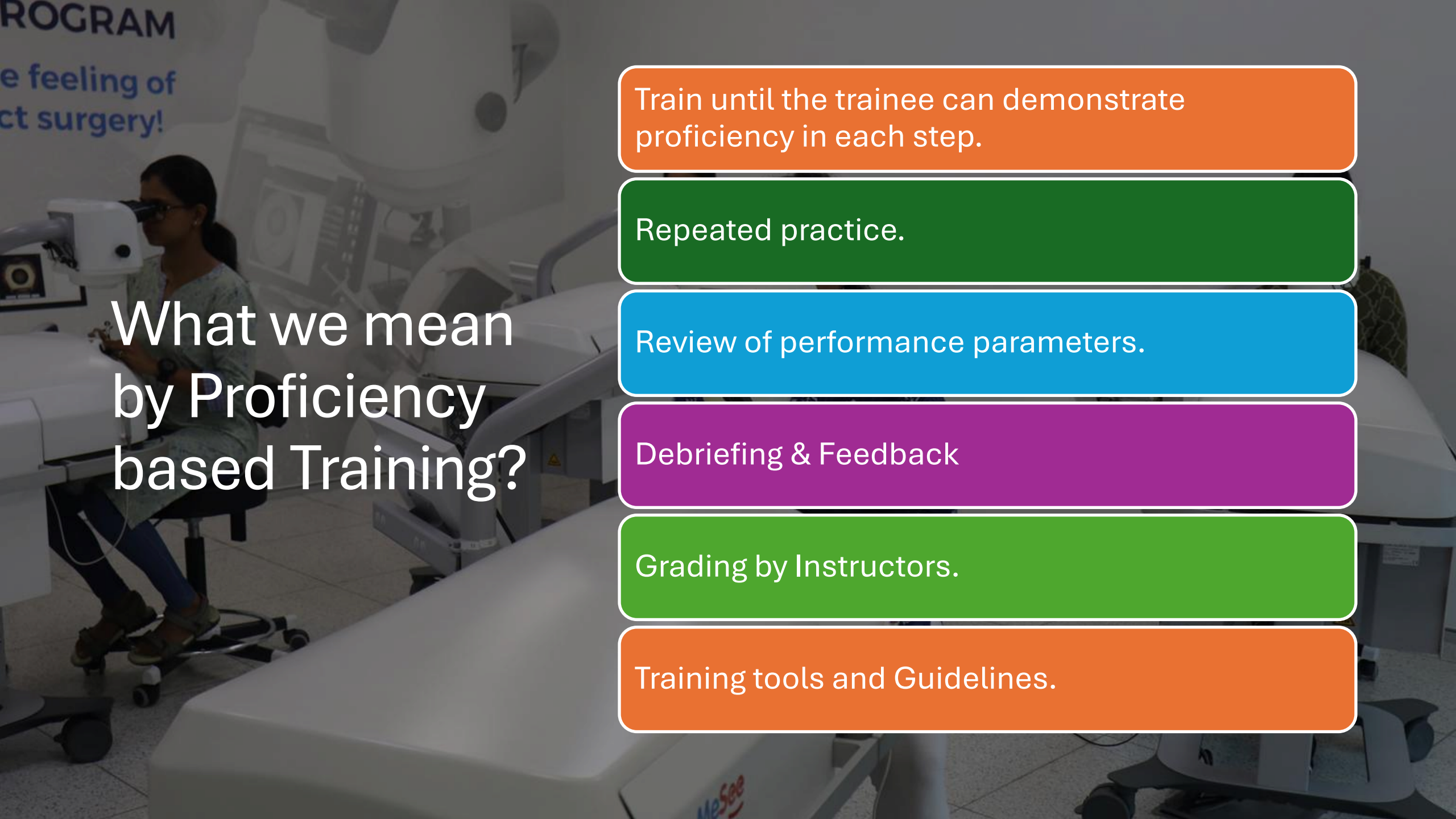
STRUCTURED PROGRAM.



OBJECTIVE ASSESSMENTS.

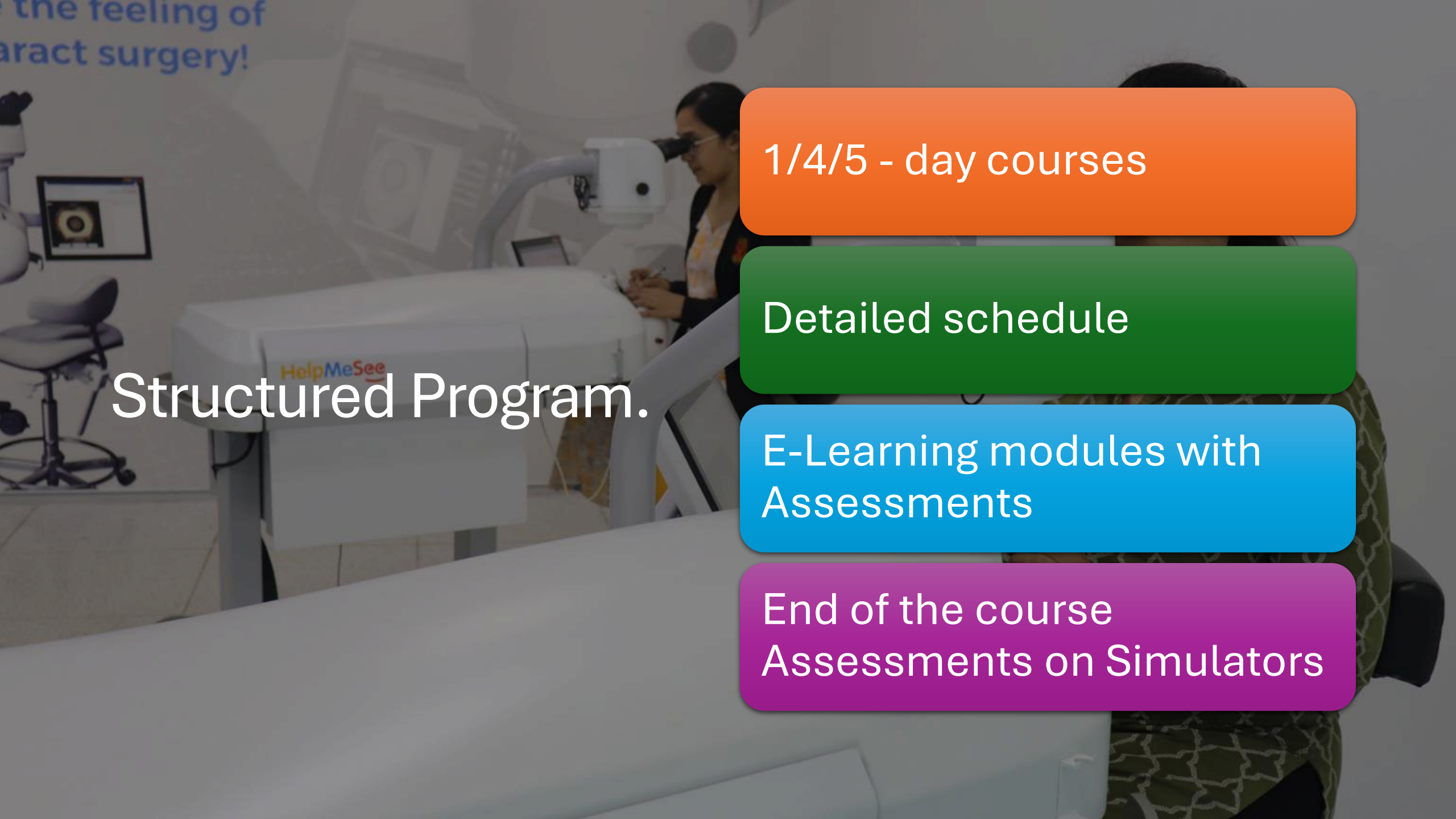


INSTRUCTOR-LED TRAINING.



What we mean by Proficiency based Training?

- Train until the trainee can demonstrate proficiency in each step.
- Repeated practice.
- Review of performance parameters.
- Debriefing & Feedback
- Grading by Instructors.
- Training tools and Guidelines.



Structured Program.

- 1/4/5 - day courses
- Detailed schedule
- E-Learning modules with Assessments
- End of the course Assessments on Simulators



Objective Assessments

End of the course Assessments

5 attempts in each step

No training tools or guidelines.

Pass Criteria – Min 3/5 Satisfactory.



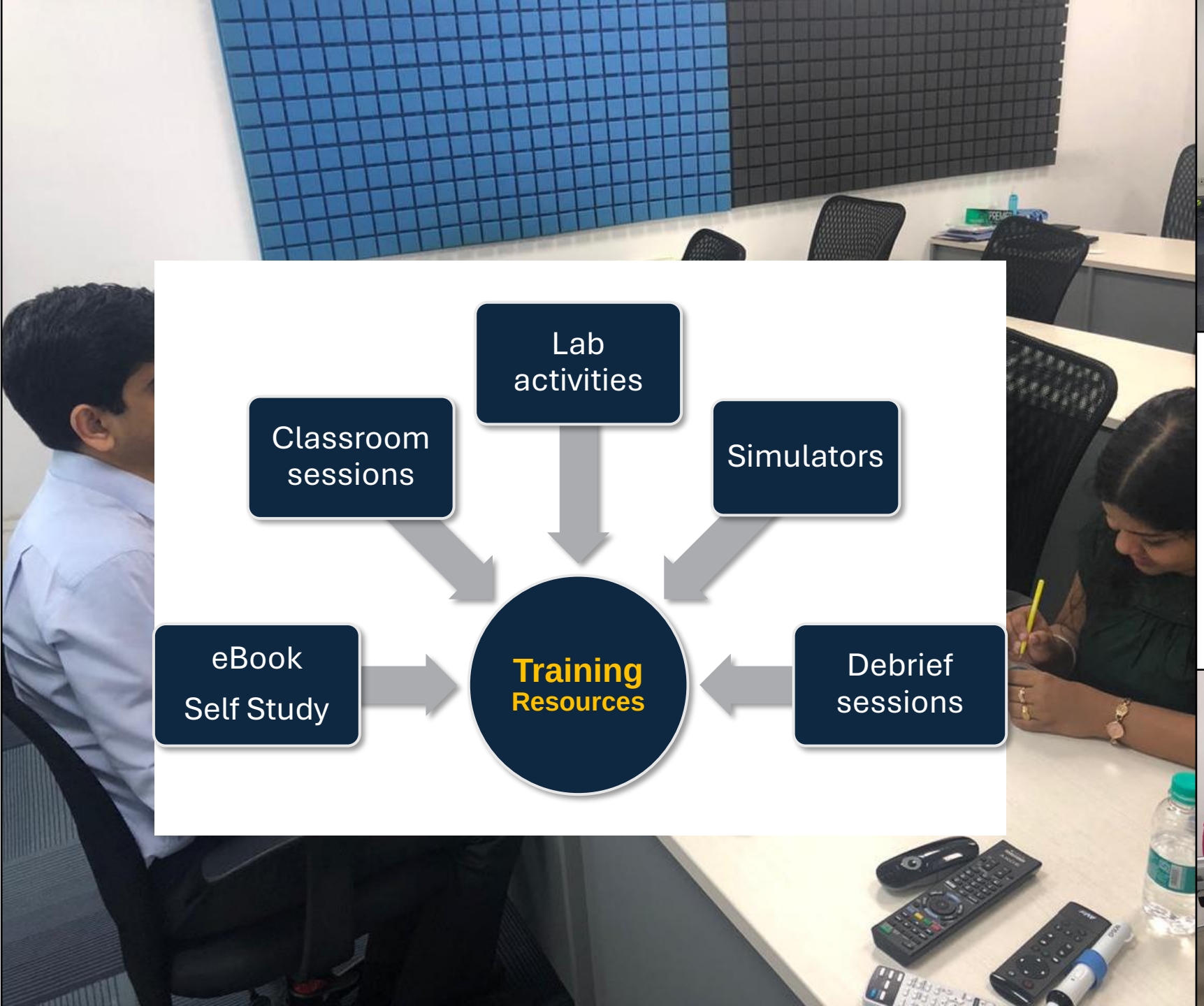
Instructor Led

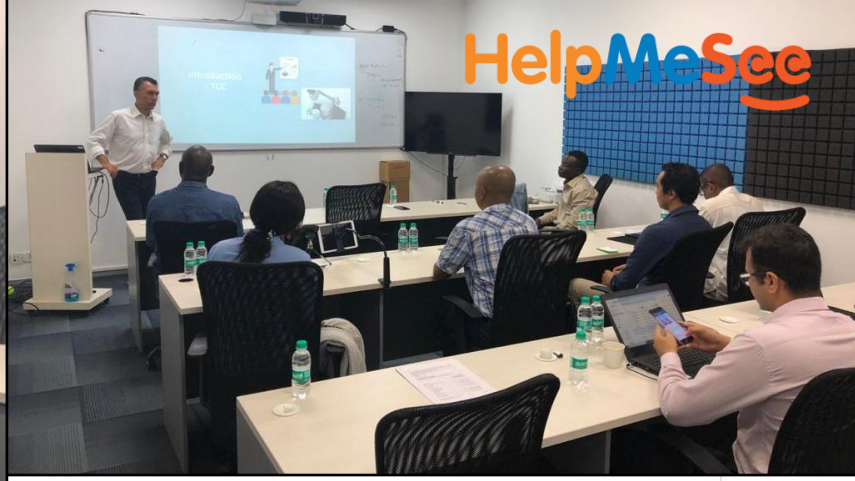
Unique advantage

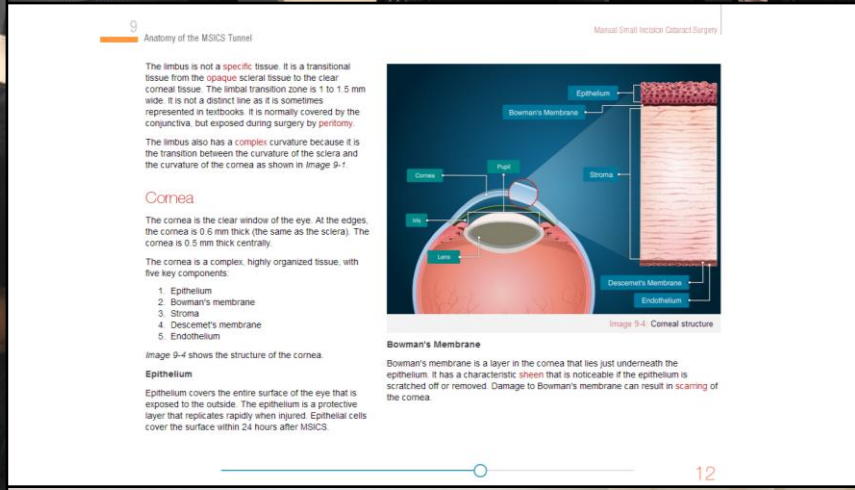
Qualified ophthalmologists as trainers

Other Surgical Procedures

- Suturing the Tunnel
- Sphincterotomy
- PCIOL in sulcus
- Vitrectomy –Anterior & Pars Plana Vitrectomy
- Phacoemulsification







9 Anatomy of the MSICS Tunnel

Manual Small Incision Cataract Surgery

The limbus is not a specific tissue. It is a transitional tissue from the opaque scleral tissue to the clear corneal tissue. The limbal transition zone is 1 to 1.5 mm wide. It is not a distinct line as it is sometimes represented in textbooks. It is normally covered by the conjunctiva, but exposed during surgery by peritomy.

The limbus also has a complex curvature because it is the transition between the curvature of the sclera and the curvature of the cornea as shown in *Image 9-1*.

Cornea

The cornea is the clear window of the eye. At the edges, the cornea is 0.6 mm thick (the same as the sclera). The cornea is 0.5 mm thick centrally.

The cornea is a complex, highly organized tissue, with five key components:

1. Epithelium
2. Bowman's membrane
3. Stroma
4. Descemet's membrane
5. Endothelium

Image 9-4 shows the structure of the cornea.

Epithelium

Epithelium covers the entire surface of the eye that is exposed to the outside. The epithelium is a protective layer that replicates rapidly when injured. Epithelial cells cover the surface within 24 hours after MSICS.

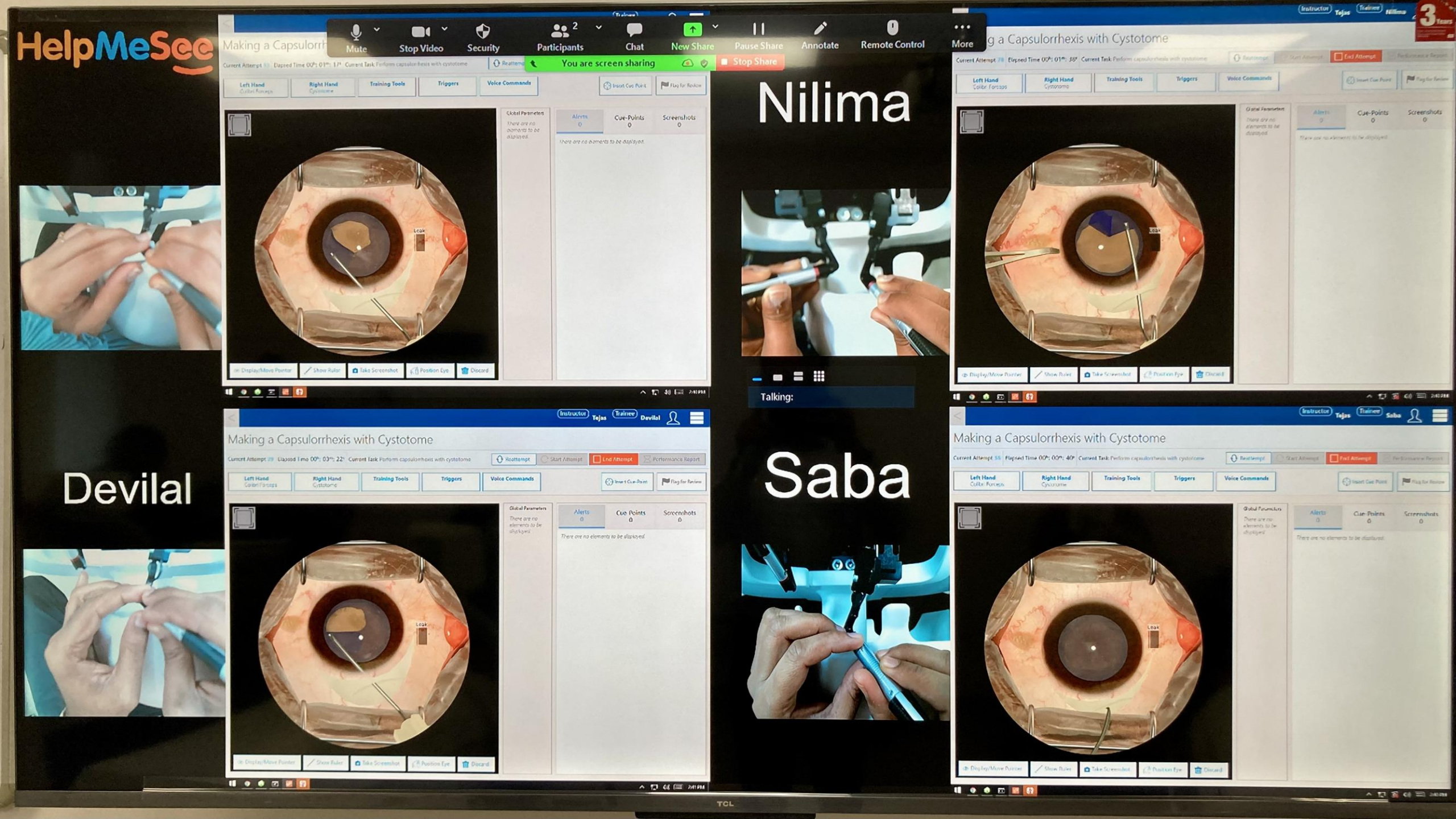
Image 9-4: Corneal structure

Bowman's Membrane

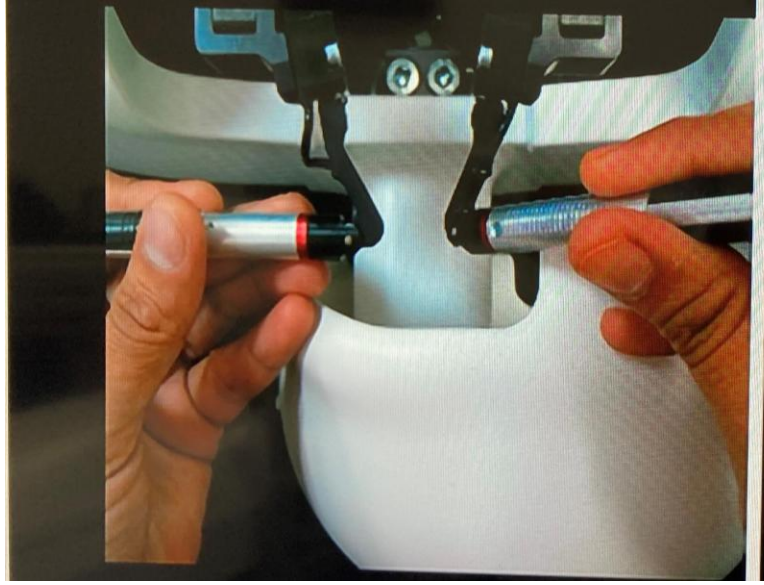
Bowman's membrane is a layer in the cornea that lies just underneath the epithelium. It has a characteristic sheen that is noticeable if the epithelium is scratched off or removed. Damage to Bowman's membrane can result in scarring of the cornea.

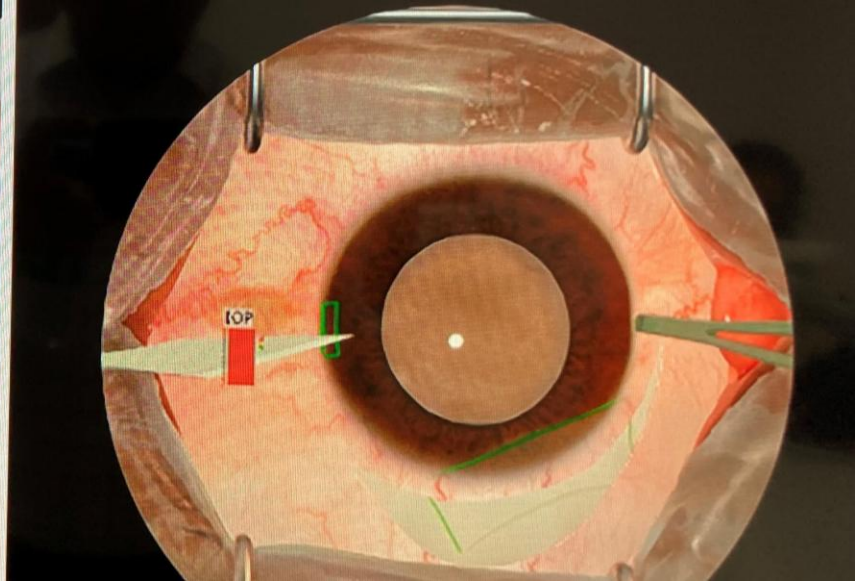
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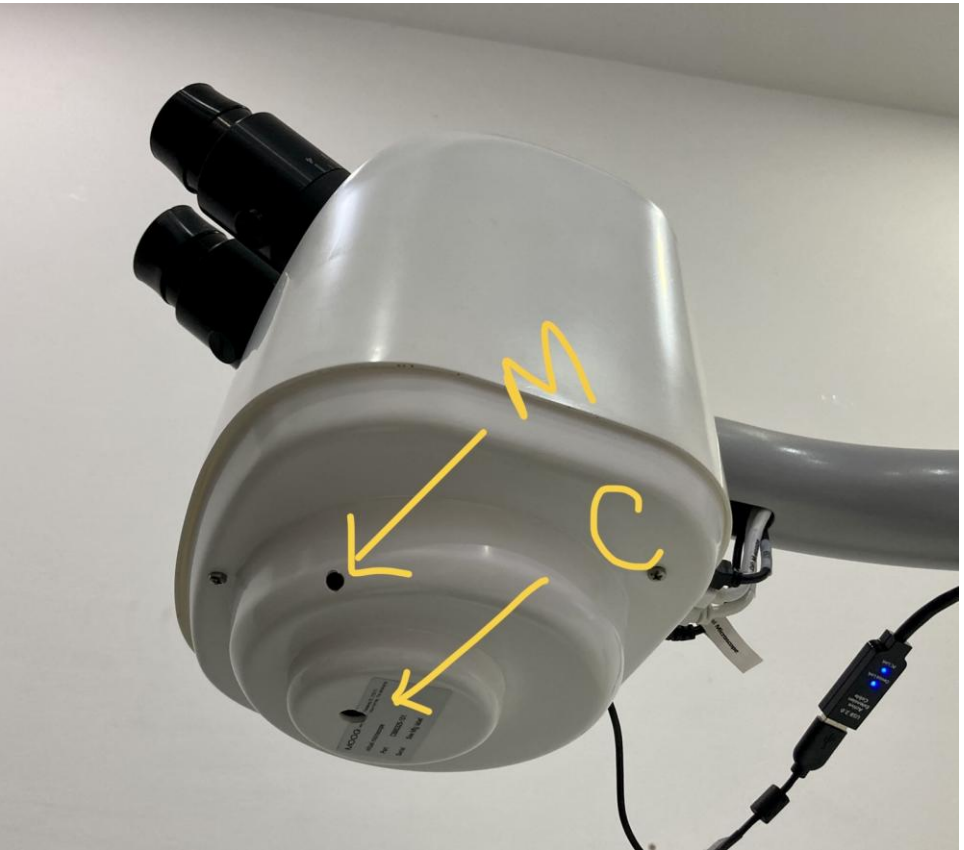



HelpMeSee
Mute
Stop Video
Security
Participants
Chat
New Share
Pause Share
Annotate
Remote Control
More
You are screen sharing
Stop Share
Nilima
Talking:
Devilal
Saba
Making a Capsulorrhexis with Cystotome
Instructor
Tejas
Trainee
Devilal
Saba
Left Hand
Right Hand
Training Tools
Triggers
Voice Commands
Alerts
Cue-Points
Screenshots
Leak
TCL

Integrated Camera to capture hand positions and grasp of the instruments







Partners Worldwide

- Wenzhou Medical University, China
- He Specialist Eye Hospital, China
- Zongzton Ophthalmic Centre, China
- IMO, Queretaro, Mexico
- HelpMeSee SimLab, New Jersey, USA
- Bascom Palmer Hospital, USA
- Gepromed Civil Hospital, Strasbourg, France
- La Polyclinique, Madagascar









Summary

- Simulation based training in Ophthalmic surgery is a game changer.
- Innovation with great potential.
- Improves patient safety.
- Shortens learning curve.
- May have a role in certifications of surgical skills.

Thank You