AAO KTEF Virtual Reality Center ROP Module

Pediatric Ophthalmology Education Through Simulators

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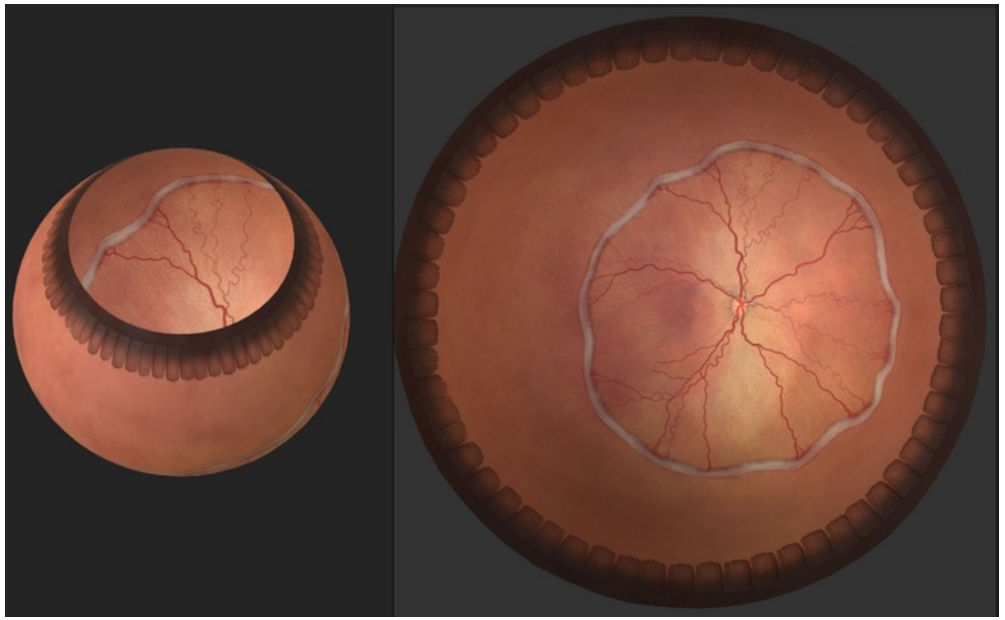
American Association for Pediatric Ophthalmology and Strabismus

Advisory Board Chair

International Pediatric Ophthalmology and Strabismus Council

Editor in Chief

KTEF POEC – AAO ONE Network



Relevant Financial Disclosure

None for this talk

I do have a vested interest in IPOSC's Mission:

"To work together to preserve and restore eye health and enhance visual function in children, and ocular alignment and binocularity in children and adults throughout the world."

IPOSC
International Pediatric Ophthalmology & Strabismus Council

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“AAO KTEF Pediatric Ophthalmology Education Center”
About the Editors

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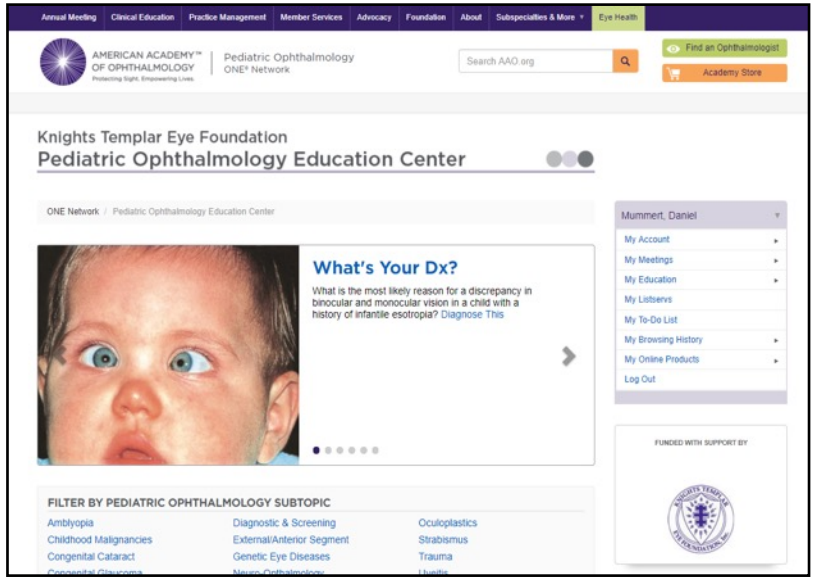

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Pediatric Ophthalmology Education Center

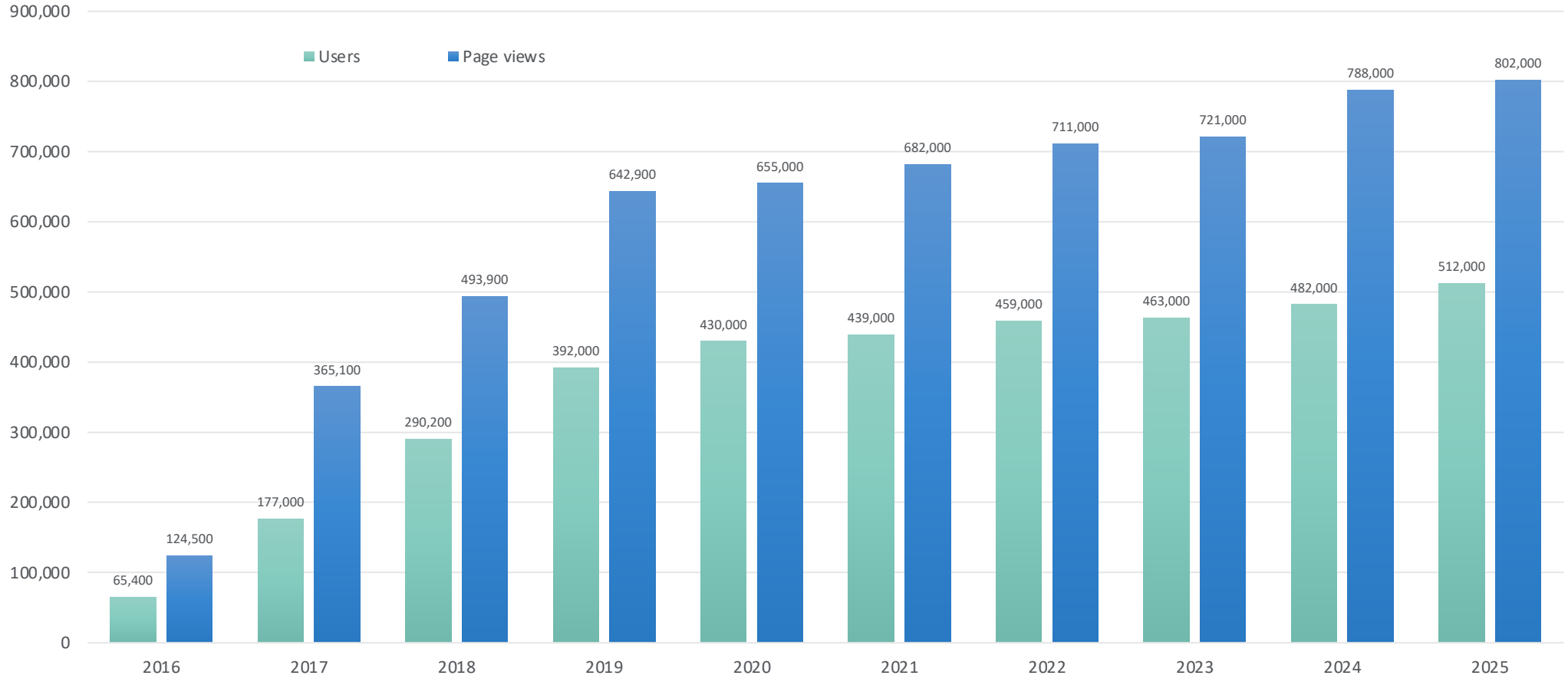
10-Year Success

- Unique interactive content and incorporation of all pediatric content on the ONE Network have produced regular annual traffic growth through 2025
- In November 2025, the center is expected to eclipse 6 million lifetime page views

10-YEAR TRAFFIC OVERVIEW	TOP 10 COUNTRIES
TOTAL VIEWS (PROJECTED): 6 MILLION	United States - 34%
	India - 11%
TOTAL VISITORS: 3.7 MILLION	Canada - 5%
	Brazil - 5%
WORLDWIDE COVERAGE: 215 COUNTRIES	United Kingdom - 4%
	Mexico - 3%
	Turkey - 3%
	Egypt - 2%
	Italy – 1%
	Spain - 1%

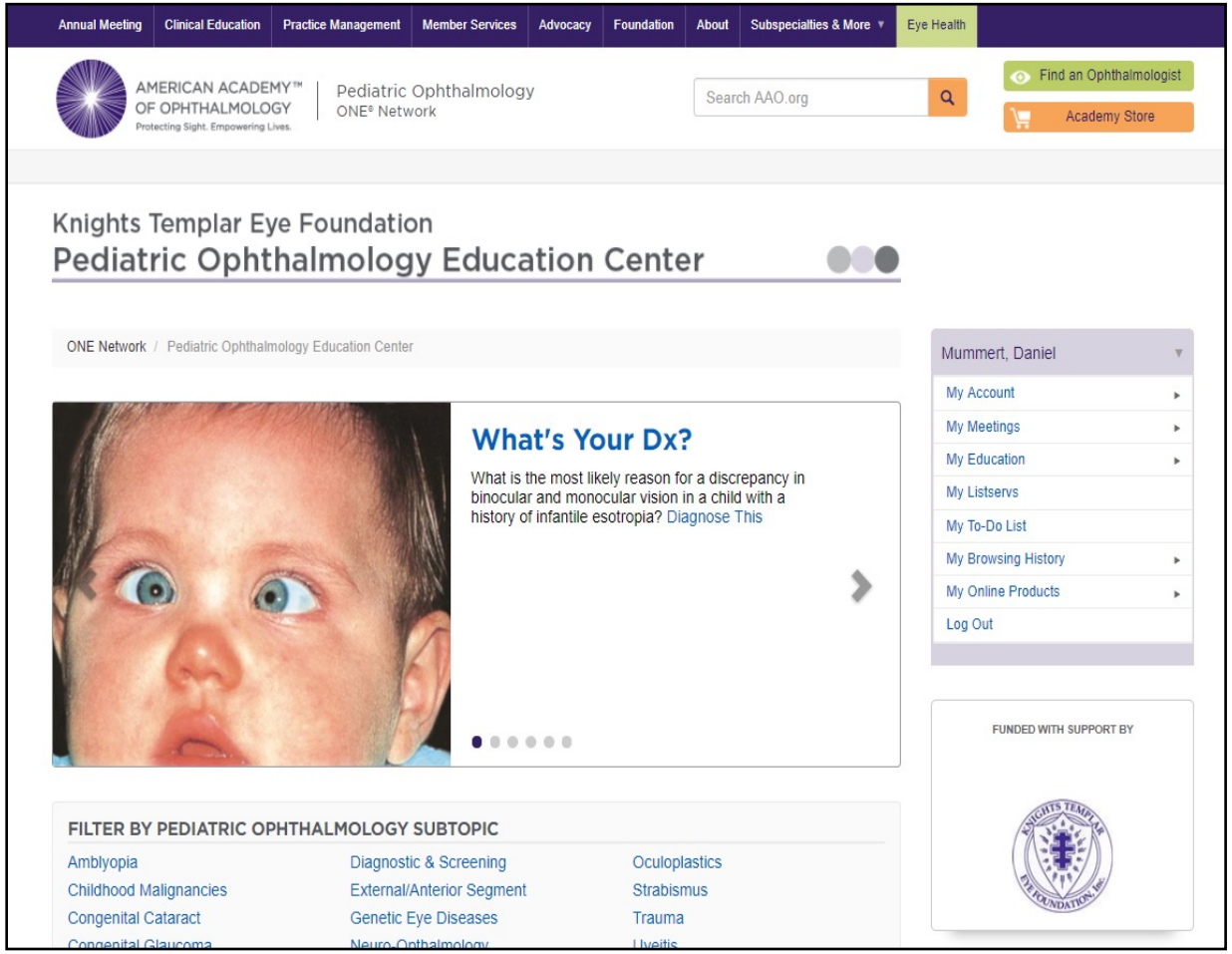
Pediatric Ophthalmology Education Center

Page Views and Visitors



Pediatric Ophthalmology Education Center

- Pediatric Ophthalmology Education Center on the Ophthalmic News and Education (ONE®) Network
- Developed by more than 200 volunteer pediatric ophthalmologists, clinicians, and researchers
- Launched in November 2015
- Two innovative interactive features:
  - A case-based trainer for Retinopathy of Prematurity (ROP)
  - Strabismus Simulator



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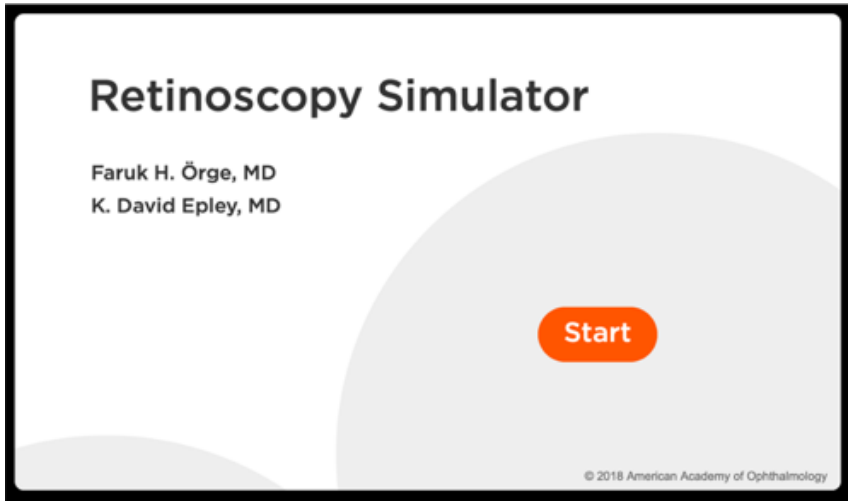
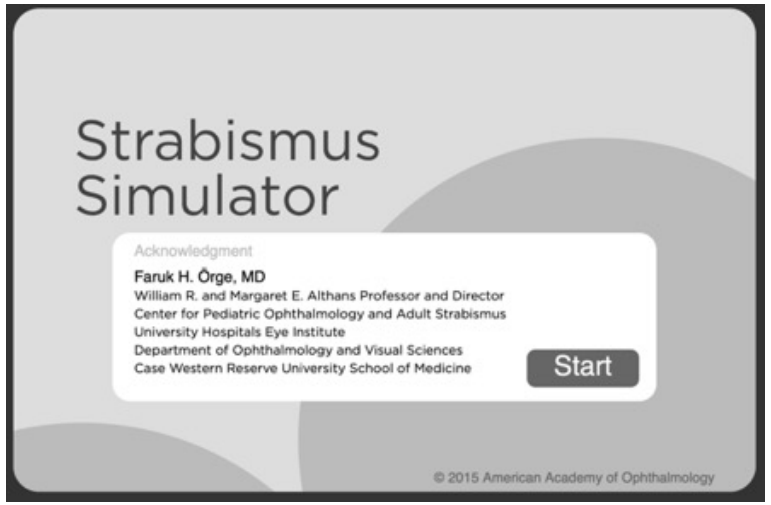
Pediatric Ophthalmology Education Center

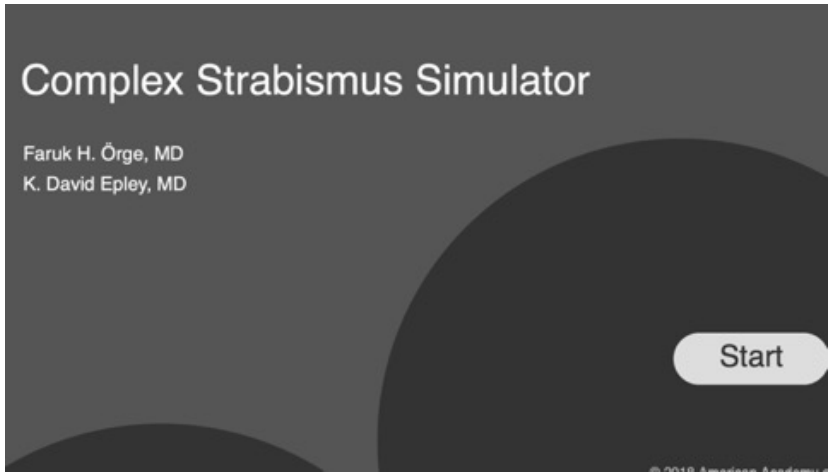
Content through June 2025

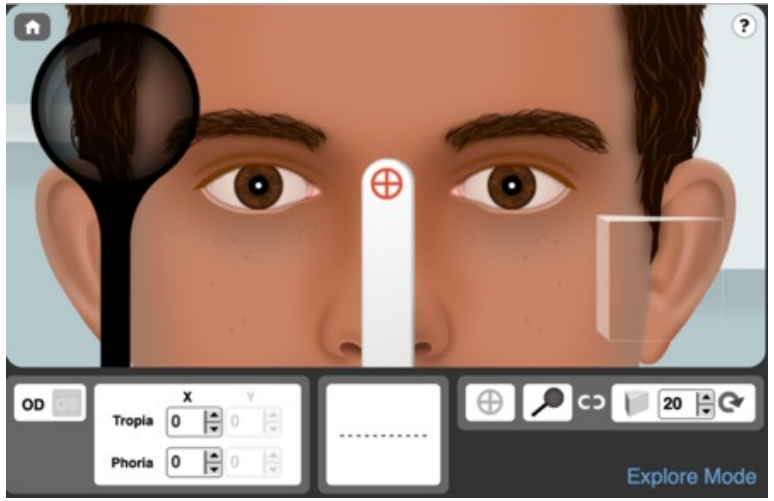
- 102 disease chapters and multiple licensed book titles
- 700+ new surgical videos, lectures, and interviews on advances in pediatric eye care
- Simulators:
  - ROP Case-Based Training (updated 2024)
  - Strabismus Simulator (updated 2018)
  - Retinoscopy Simulator (updated 2019)
  - Complex Strabismus Simulator (updated 2022)
- Incorporation of CME activities and news articles on ONE Network (~2,000 discrete pieces)
- Quarterly IPOSC webinar series with ~2,500 annual attendees

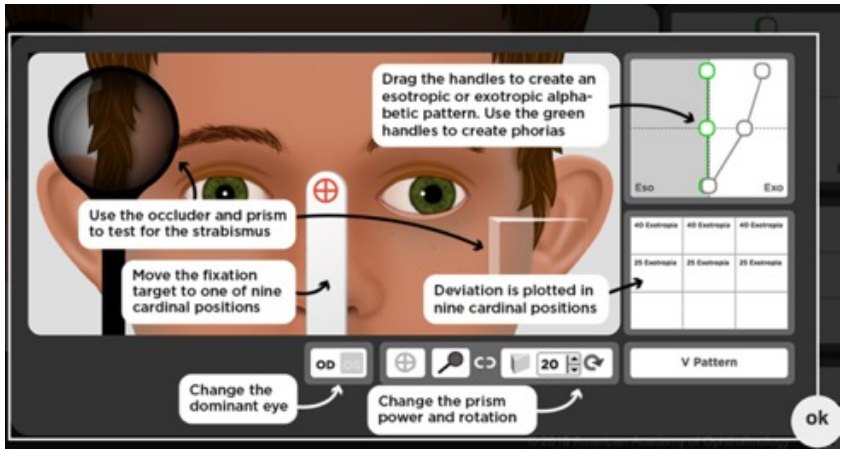
Simulators – Where Art Meets Science











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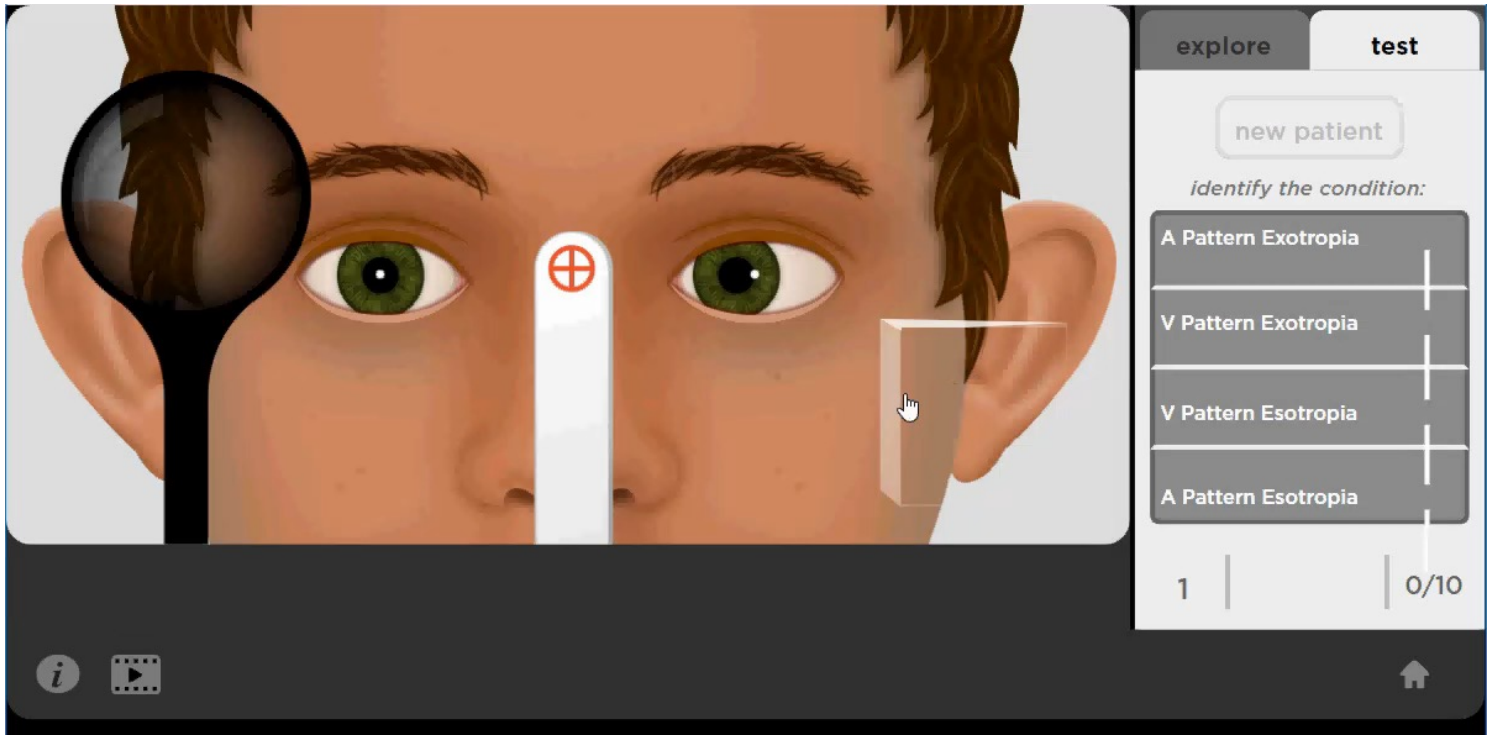
Pediatric Ophthalmology Education Center

Simulators and Case-Based Training

- Four simulated activities on site:
  - Retinoscopy
  - Strabismus
  - Complex Strabismus
  - ROP (Updated 2024)
- 620,000+ unique visits



and the Future…

- The KTEF education center grant has produced a leading destination for education in pediatric ophthalmology and strabismus.
- Past success has led to an exciting new program for VR simulation.

Knights Templar Eye Foundation (KTEF)
VR Simulation Program

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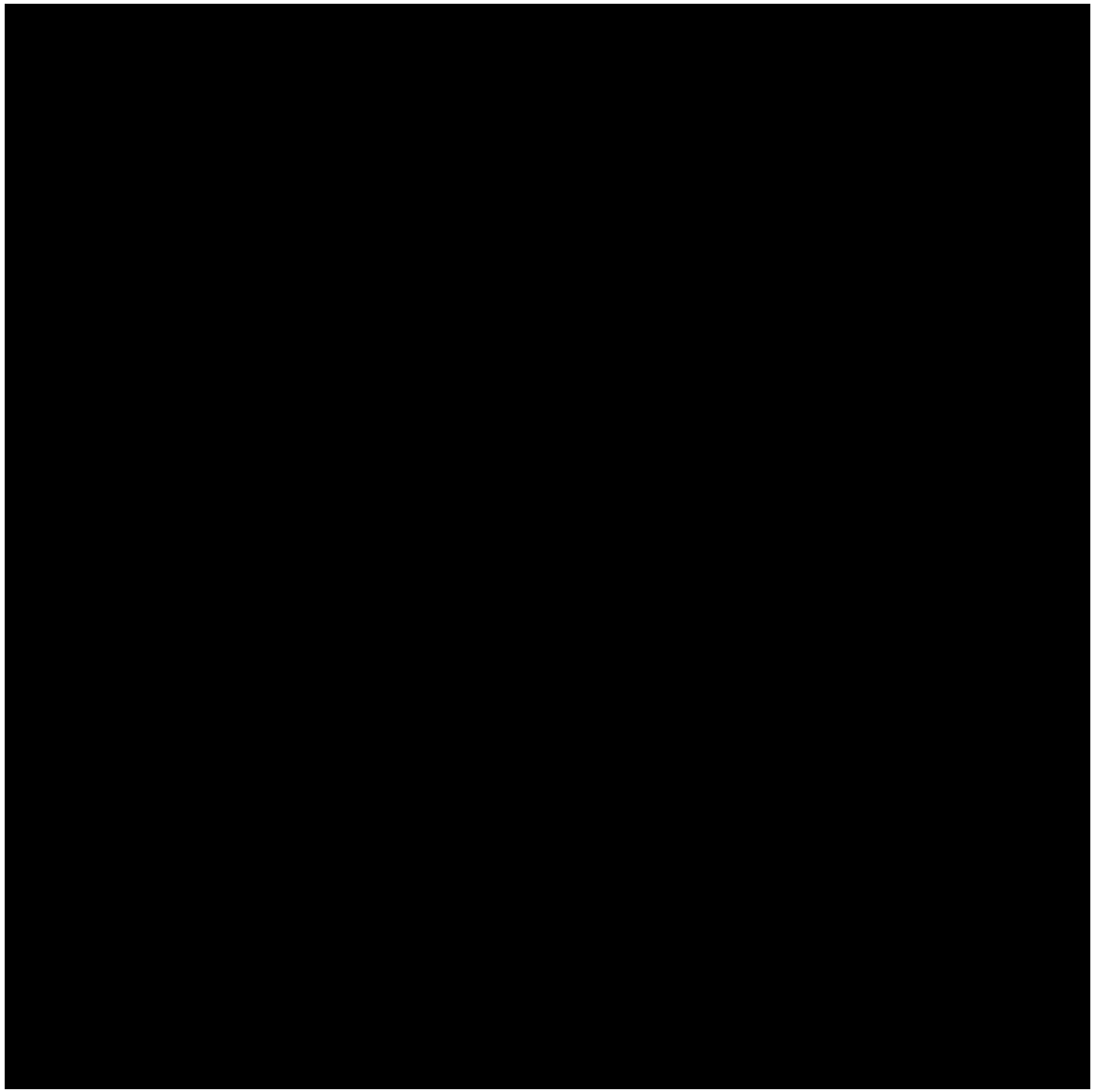
- Simulation training
  - $5 million multiyear sponsorship
  - Knowledge and skills assessment
  - Surgical decision-making
- Build to scale
  - VR headsets (3D) and Web (2D)
- Pediatric Ophthalmology
  - ROP Simulator
- Launch Fall 2024



AAO VR Platform: ROP Module Goals

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- The goal is to disseminate the program around the world (by end of 2025 aim to establish utilization by 200+ countries)
- Access to the program will be free for ophthalmologists and residents/fellows
- **IPOSC/SIBA** will be the source of distribution for free AAO credentialling to login to the system (initial application through AAO VR site)
- The **IPOSC member societies** and **their members** will be eligible to receive

IPOSC

International Pediatric Ophthalmology & Strabismus Council

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Initial steps

- Initial step was to gather the needed photos, resources, information to allow the Fundamental team to understand what ROP is, how things look, all the details of the ROP screening and disease management process
- Photos from NICUs, actual NICU babies, fundus photos, ROP module from the AAO/KTEF Pediatric Ophthalmology Education Center
- Photos of indirects, lenses, specula, depressors, how we hold things
- Training a group of designers, engineers, illustrators and programmers from scratch about ROP

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Setting Goals and Priorities

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Setting priorities

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miro | [EXT] ROP Backlog

AAO Prioritised Backlog

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Editing

Themes:

Core surgical skills

- Boosting realism in the steps to core skills
- interactable steps requiring user input
- Teaching good habits and repeat use of the procedure

Procedural accuracy

- Updating the step flow and simulation with added assessment and supporting and areas in which trainees can further their learning

Educational Content

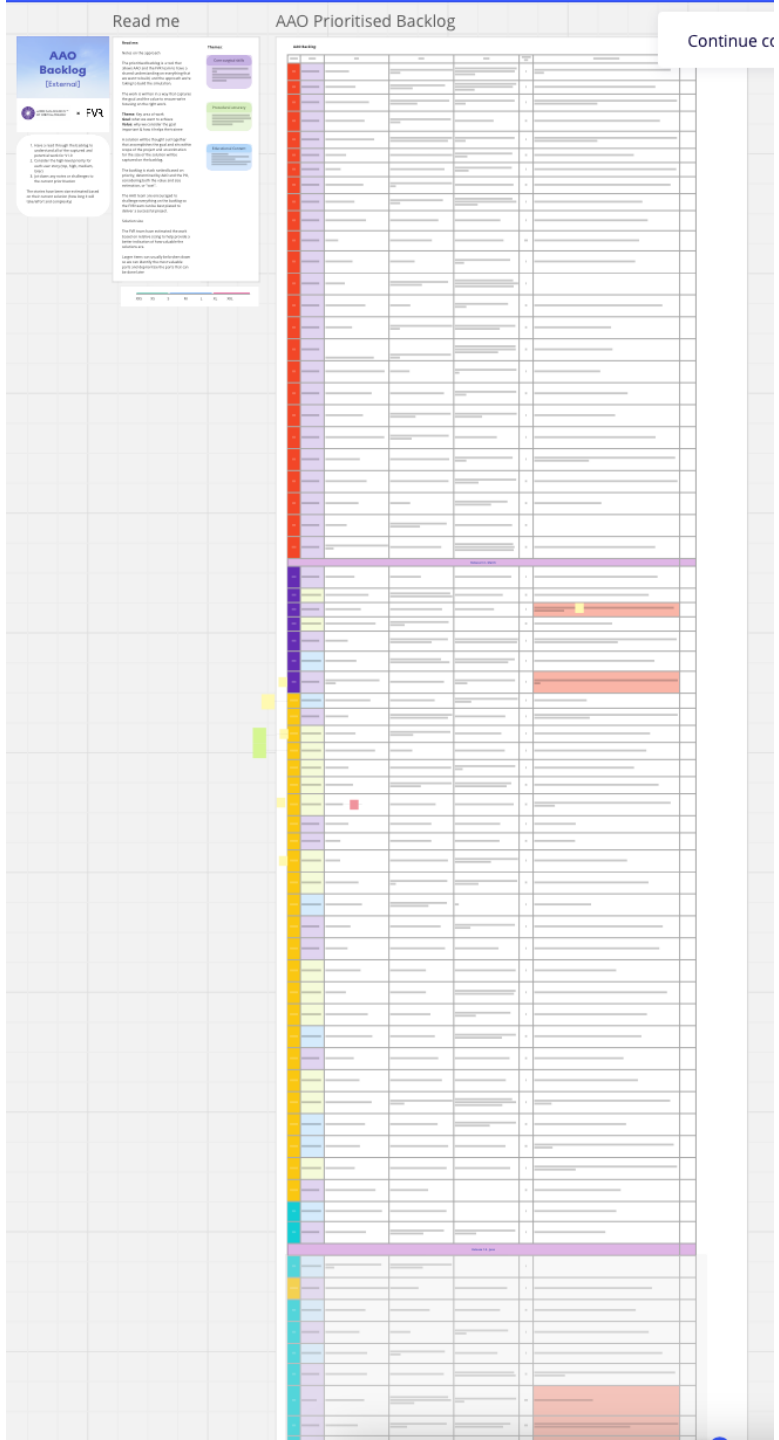
- Refining animations
- Supporting educational content to teach the trainee about the procedure
- support, guide and inform the trainee through an educational and informative simulation

AAO Backlog:

Priority	Theme	Goal	Value	Detail	Solution size	
Top	Core surgical skills	Patient case information	User can visualise patient information and begin immersion into simulation	User will be in the NICU environment and will be able to see the core and relevant information of the patient before beginning any procedural steps	S	Central UI in style of 'Patient File' that is observed and users h disappear
Top	Core surgical skills	Using indirect ophthalmoscope	Trainee becomes accustomed to core interactions within simulated environment	User can pick up and enter into the simulated ophthalmoscope view and also exit from this view - user will enter into a **2.5X magnification view**	L	Ophthalmoscope is a grabbable object that can be picked up l
Top	Core surgical skills	Instilling Pupil Dilating eye drops - Animation	Normal processes are adhere to and observed by trainees so procedure remains accurate	User will observe correct eyedrop amount being added to the patient eye	L	Animation will be triggered when eyedrop bottle is selected, th user has to confirm that they are happy to procedure to next s
Top	Core surgical skills	Introducing lid speculum - UI instruction	Trainee does not witness insertion but instead can see optimal placement	Speculum is preinserted in relevant step	M	During the transition between steps we will add in the specul
Top	Core surgical skills	Instilling topical anaesthesia eye drops - Animation	User can witness effect of correct eyedrop choice and maintains immersion for procedural accuracy during examination step	User will observe correct eyedrop amount being added to the patient eye	L	Animation will be triggered when eyedrop bottle is selected, th user has to confirm that they are happy to procedure to next s
Top	Core surgical skills	Selecting diopter lens	User can interact with **diopter 28D lens** as they would in real life	Diopter lens is a grabbable object that can be picked up by primary user	M	28D lens modelled on supplied images and can be picked up a
Top	Core surgical skills	illuminating eye	Spatial positioning in VR that is representative of real-life	Users indirect ophthalmoscope will have light turned on at relevant times	L	Ophthalmoscope light will be on during the relevant steps, us
Top	Core surgical skills	scleral depressor to rotate and stabilise	impact / relationship between movement of the eye and view of retina	Using the scleral depressor to move eye within feasible limits	M	Ghost tracking allows eye to be 'touched' without haptics / pus
Top	Core surgical skills	exam eye (singular) and retina	Examination of singular retina to gain core skills of the procedure	Patients right eye will be exposed and will have all available retina maps applied - fll procedure (including management) will only be on the right eye	L	Users positions will be on the patients right will all UI and inst
Top	Core surgical skills	remove lid speculum - step (no animation)	Screenshot dvancing through procedure steps	Speculum will be removed at appropriate stage	S	When users have completed the examination procedure / diag

Define the scope.

The list of priorities, ranked.



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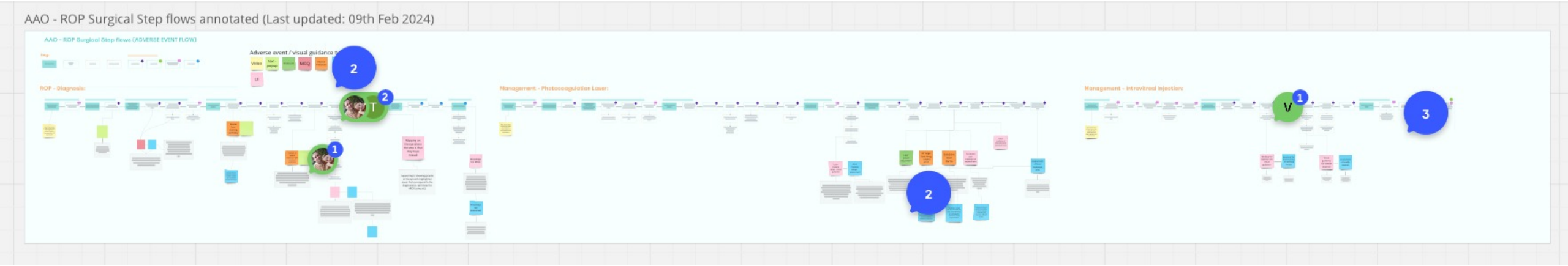
Steps in Exam and Treatment



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Flow chart for steps in the process

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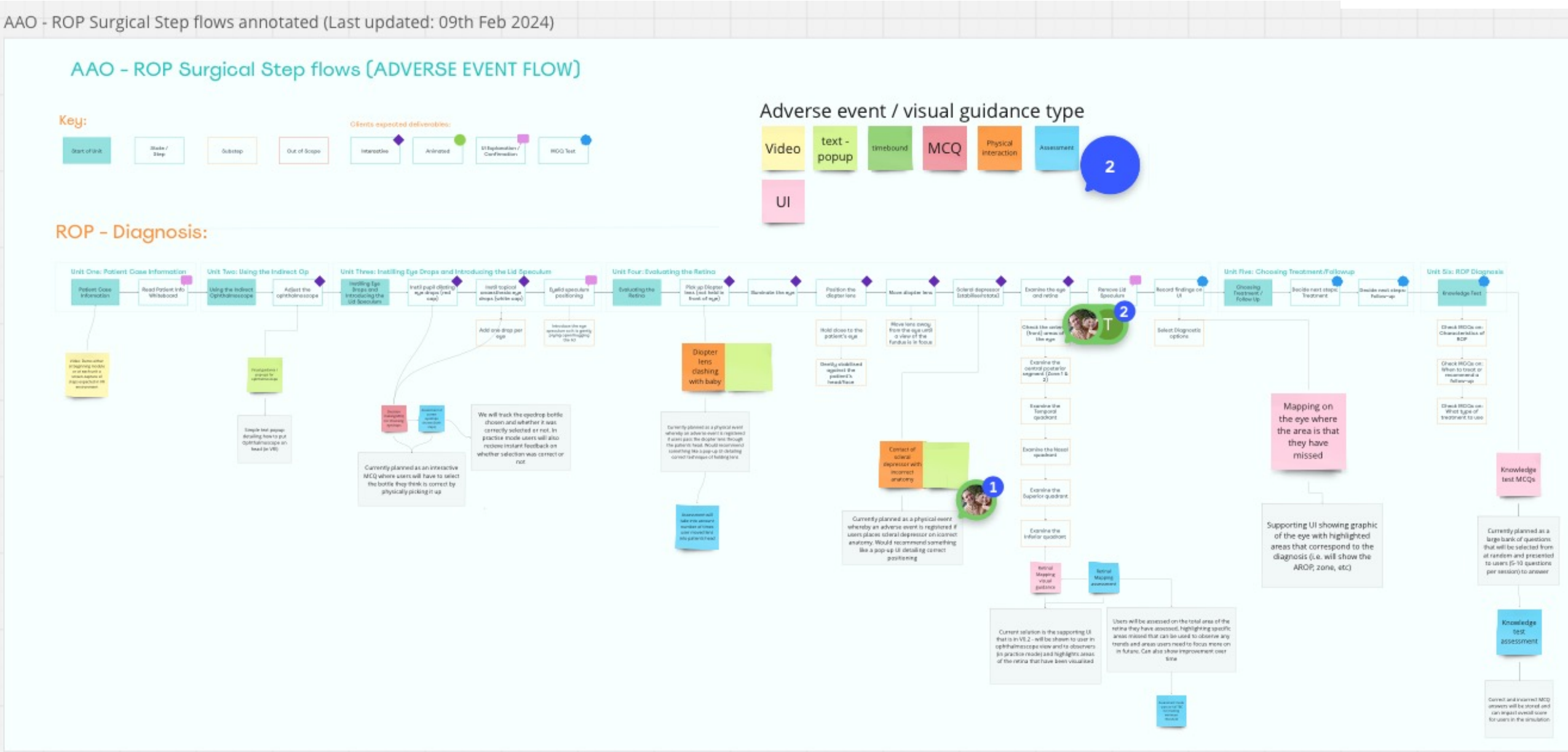

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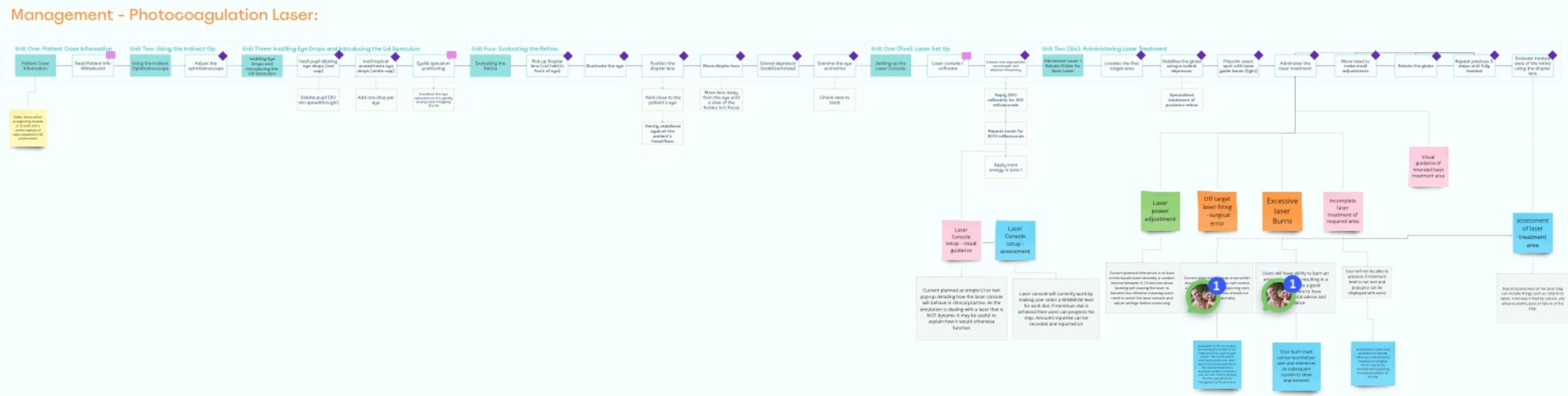
Photocoagulation flow chart



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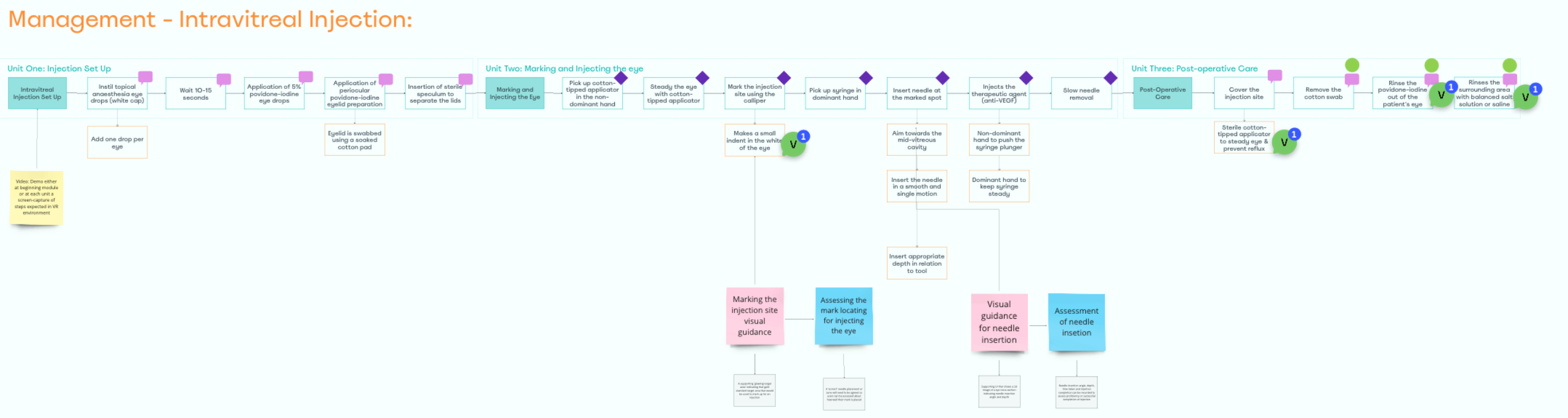
Intravitreal injection flow chart



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Building Cases

- 30 cases developed for different stages, zones, and treatment scenarios
- Artist rendering of the different stages and zones
- Design of the look and feel of the indirect, speculum, depressor, drops, laser panel, injection paraphernalia, etc.

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AAO ROP

ROP Case Feedback & Sign Off

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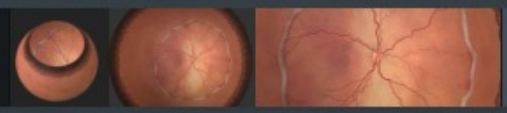
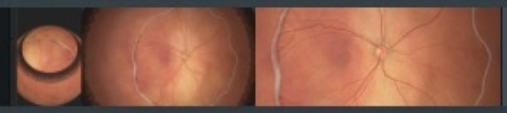
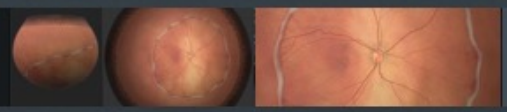
Case Overview	4 items	
Final Cases and Treatment options review	1 item	
C026 Stage 3 Zone 2 Plus disease	2 items	
C020 Stage 2 Zone 2, Mix with Stage 3	2 items	
C028 Stage 3 Zone 2 No pre plus	2 items	
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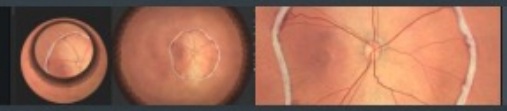
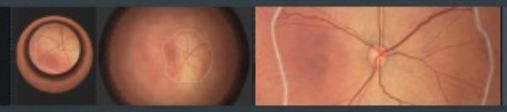
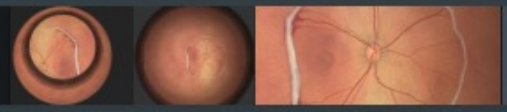
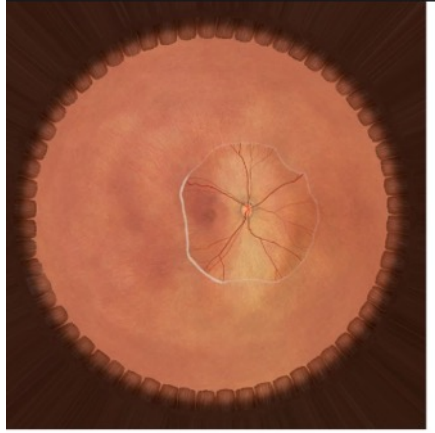
C025 Stage 3 Zone 1 No Pre Plus	2 items	
C016 Stage 2 Zone 1 Pre Plus	2 items	
C018 Stage 2 Zone 1, Mix with Stage 3 review01	2 items	



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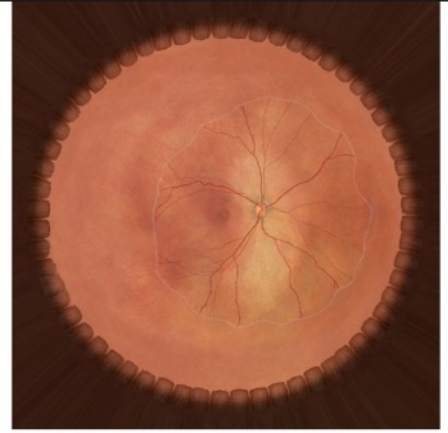

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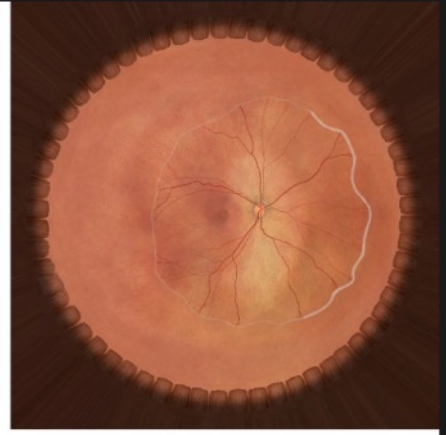

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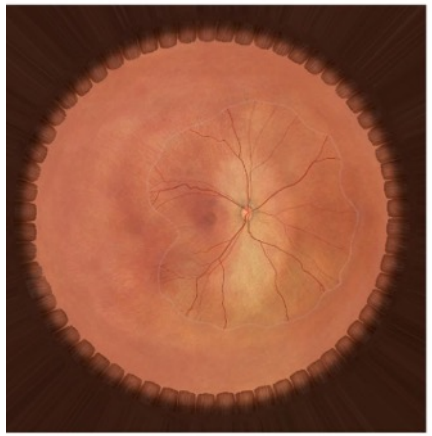

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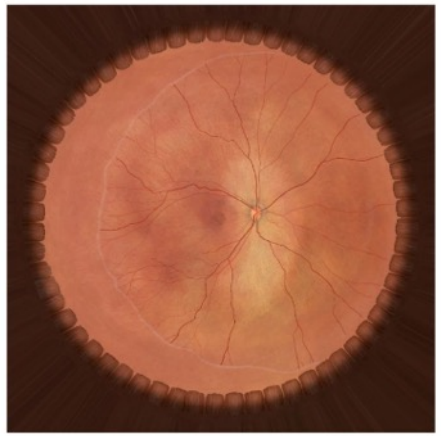

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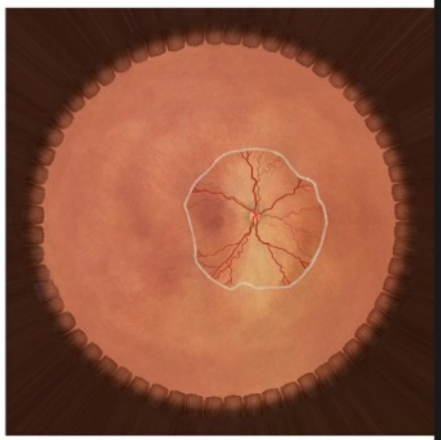

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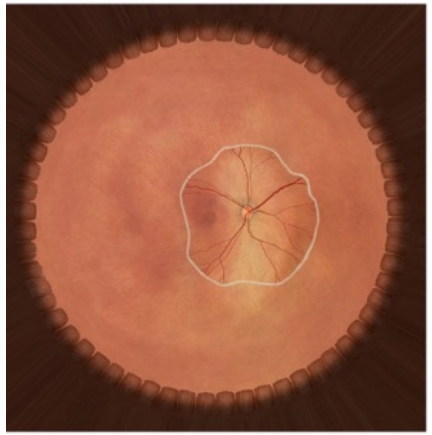

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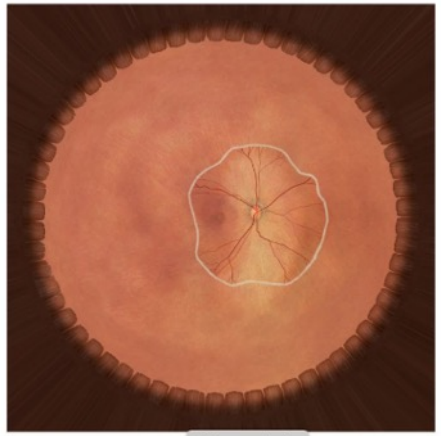

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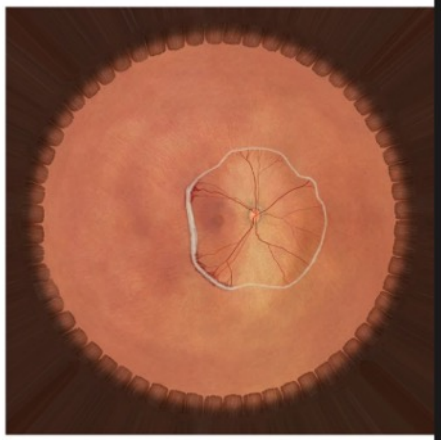
Screenshot



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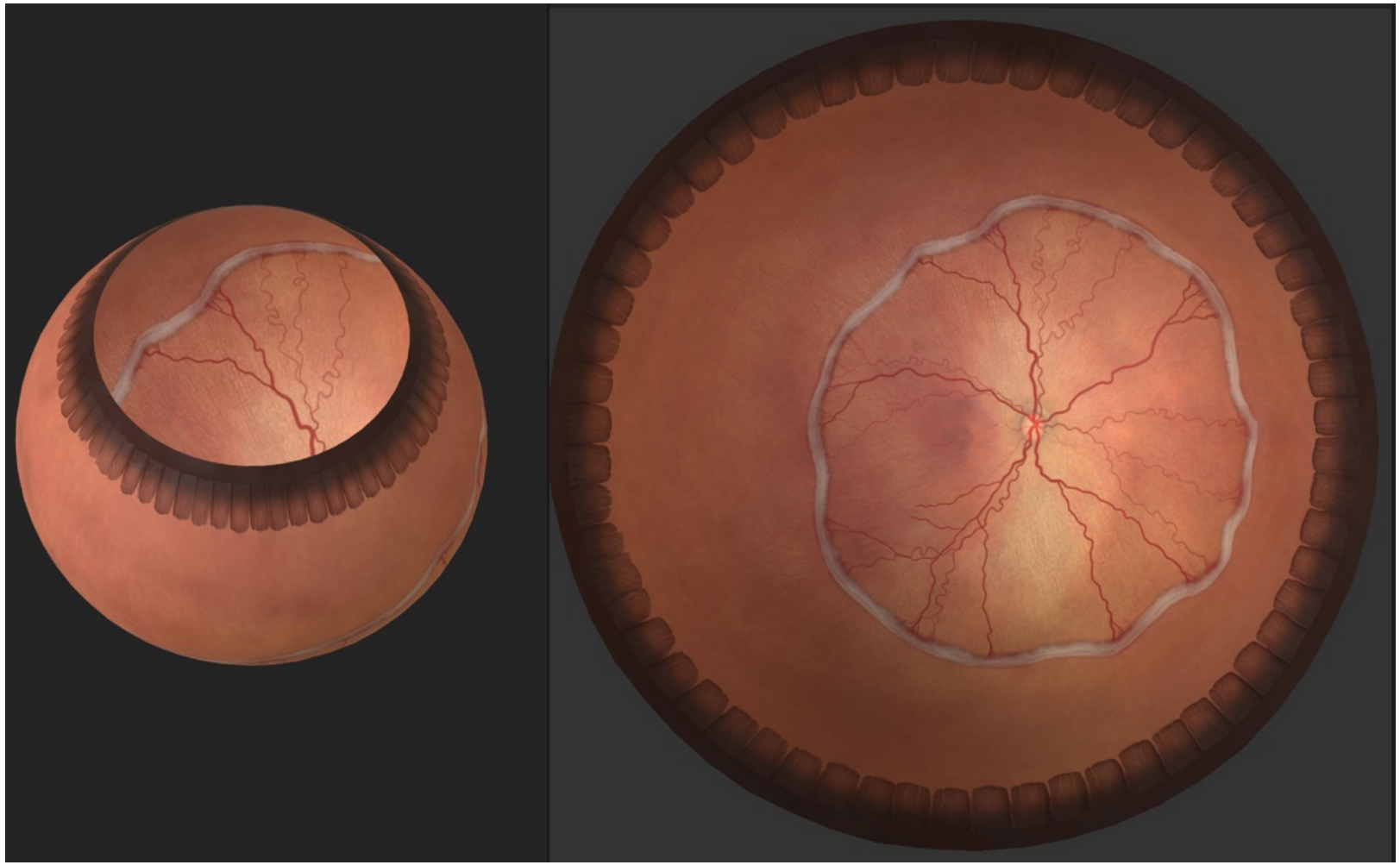
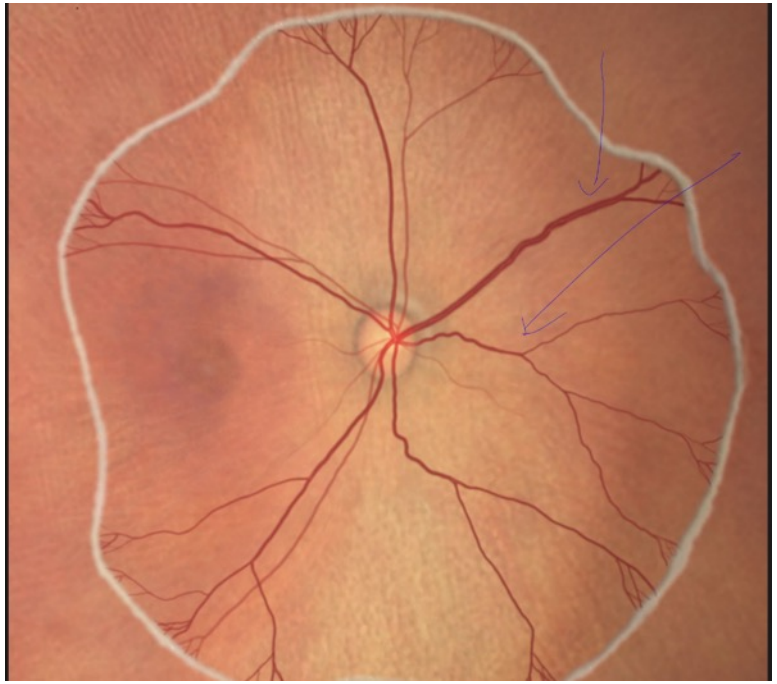
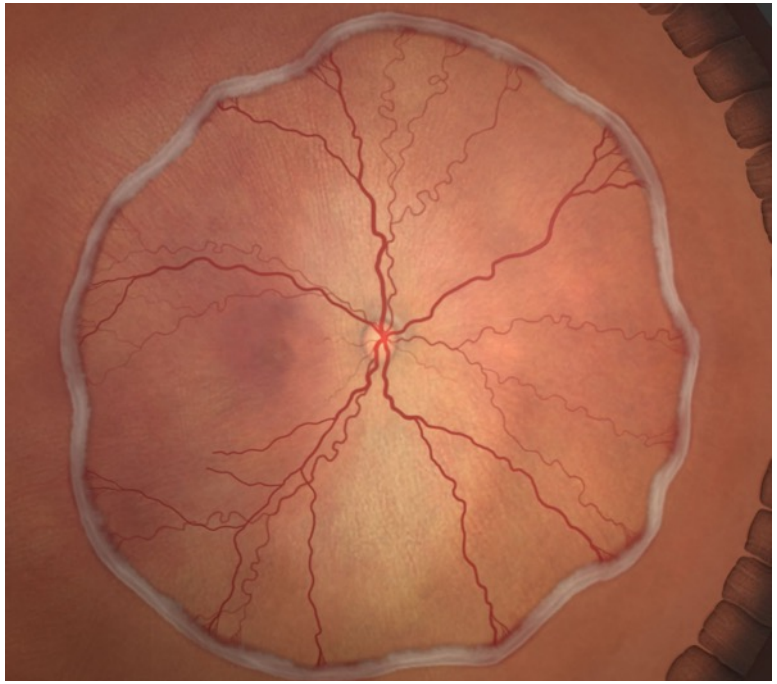
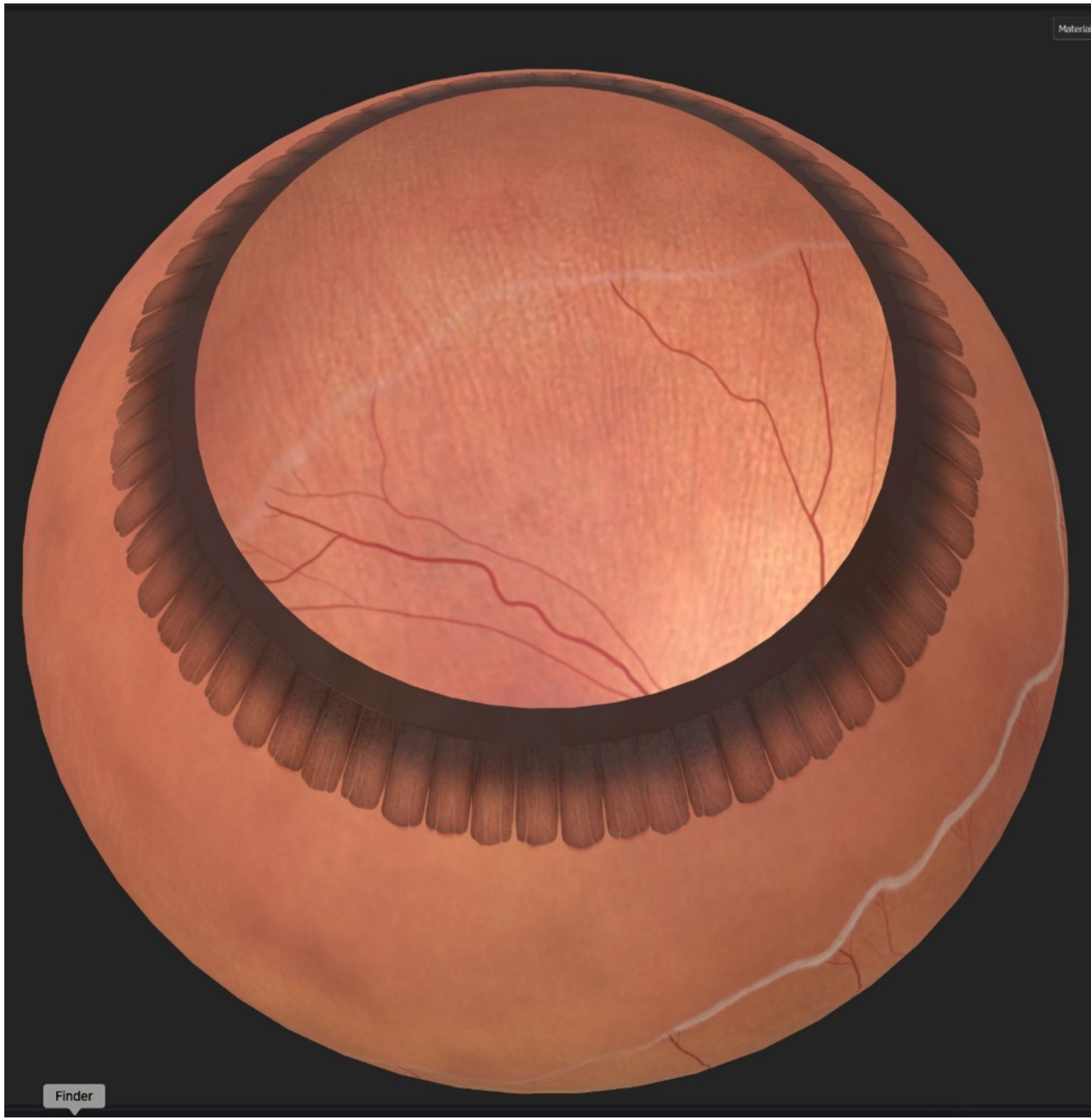
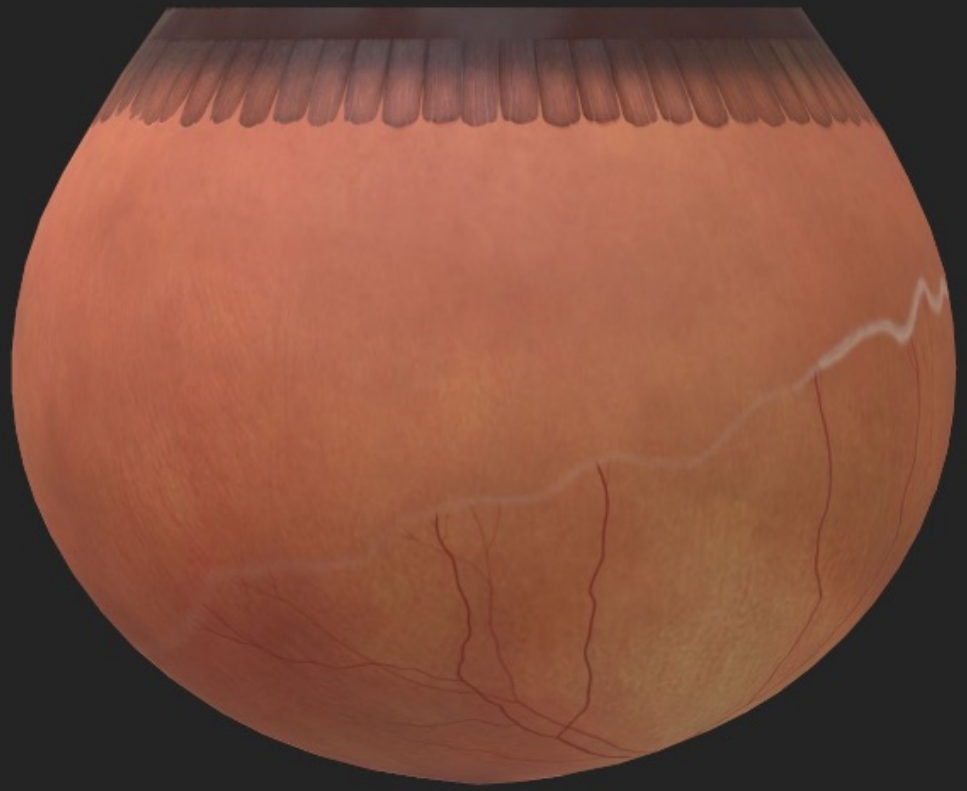


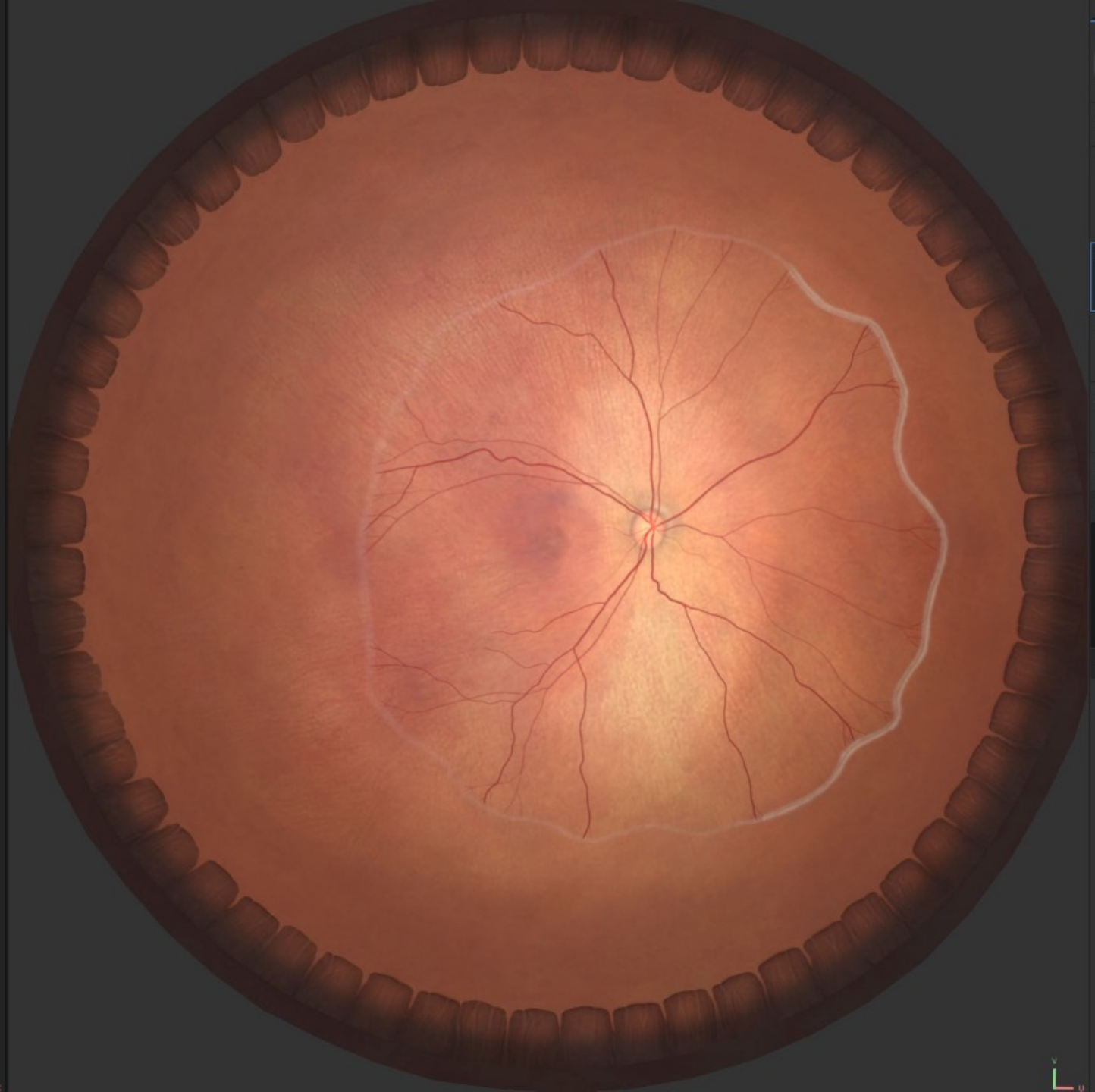




3-D modeling







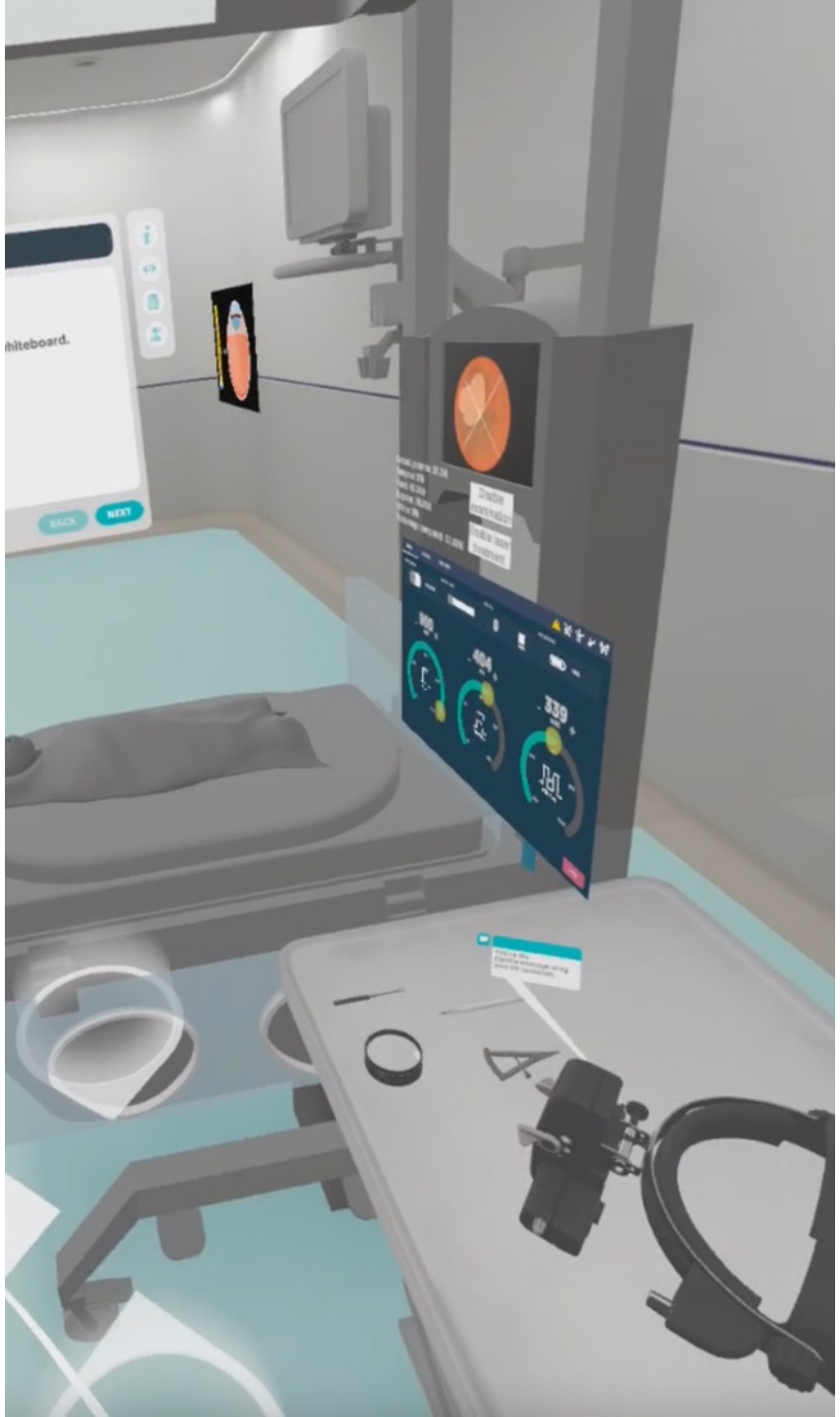
Release/Review

Timeline for intermediate and final release

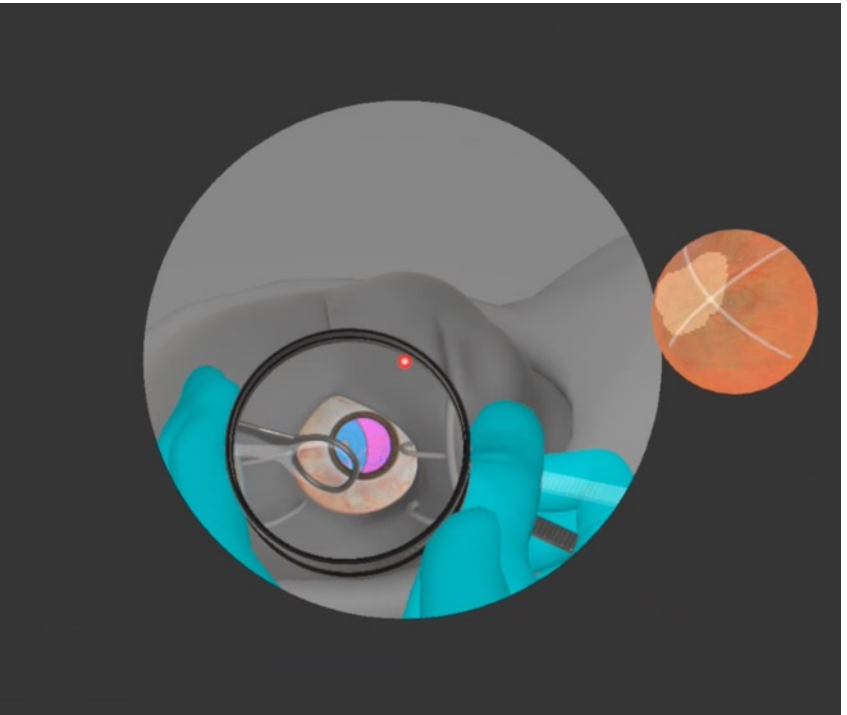
- After each release, review of the status of the simulation
  - What's accurate
  - What needs adjustment
  - Glitches
  - Text review and revision
  - Gaming/testing process

AAO VR Platform: ROP Module - Desktop

Adjust the ophthalmoscope: Step not played
Introducing lid speculum: Not


hiteboard.
BACK
NEXT

Enable examination
Enable laser treatment
1000
0
404
339



Disable examination
Disable laser treatment
900
404

AAO VR Platform: ROP Module - Desktop

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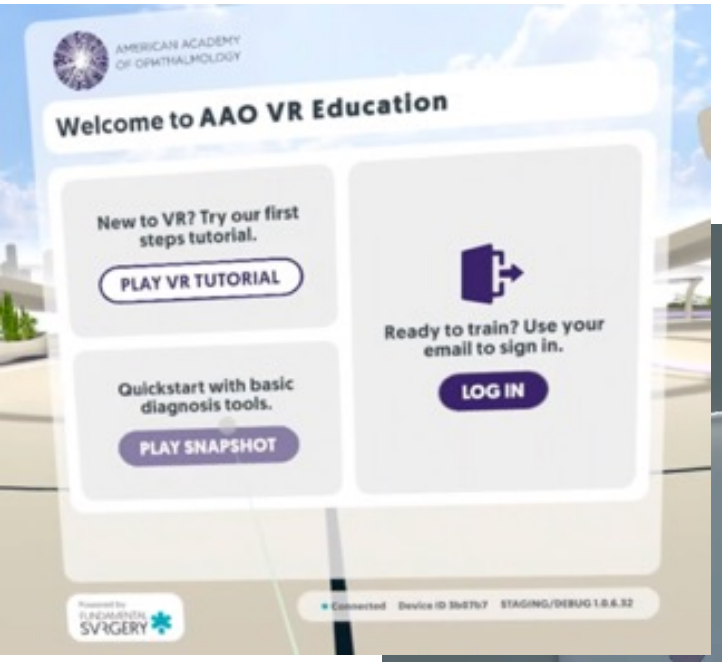
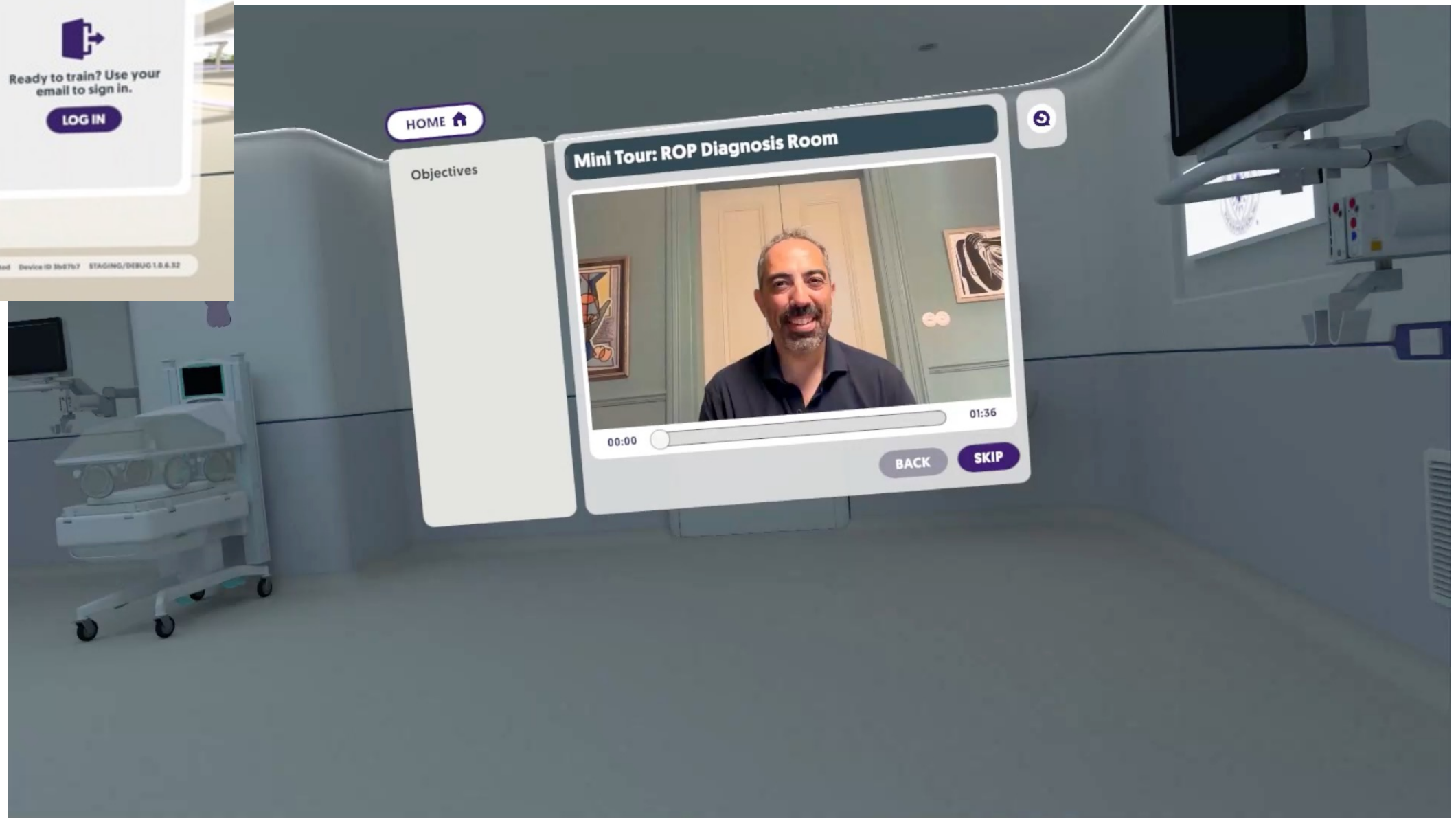
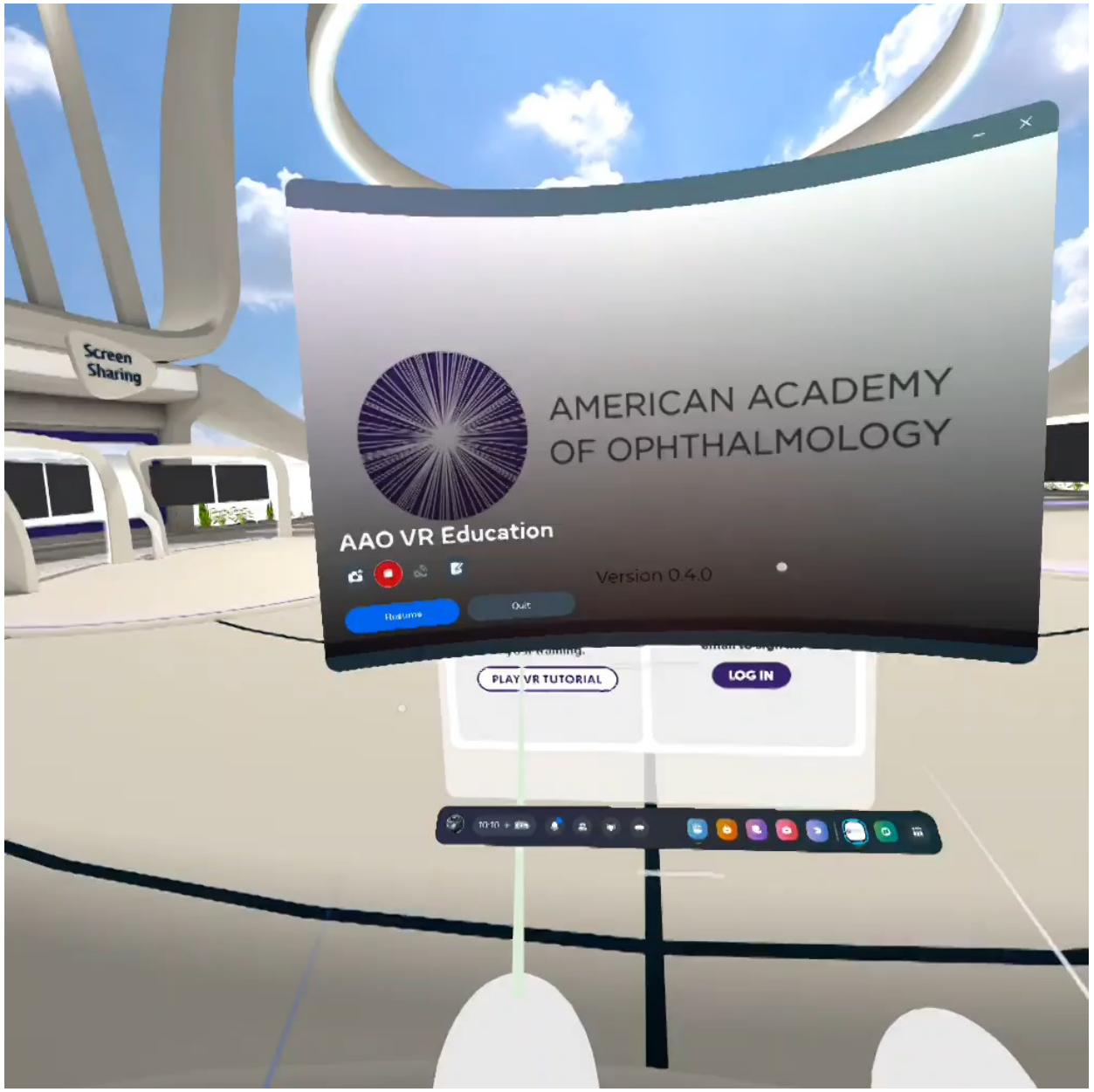
AAO VR Platform: ROP Module - Minitour





AAO VR Platform: ROP Module – Tutorial



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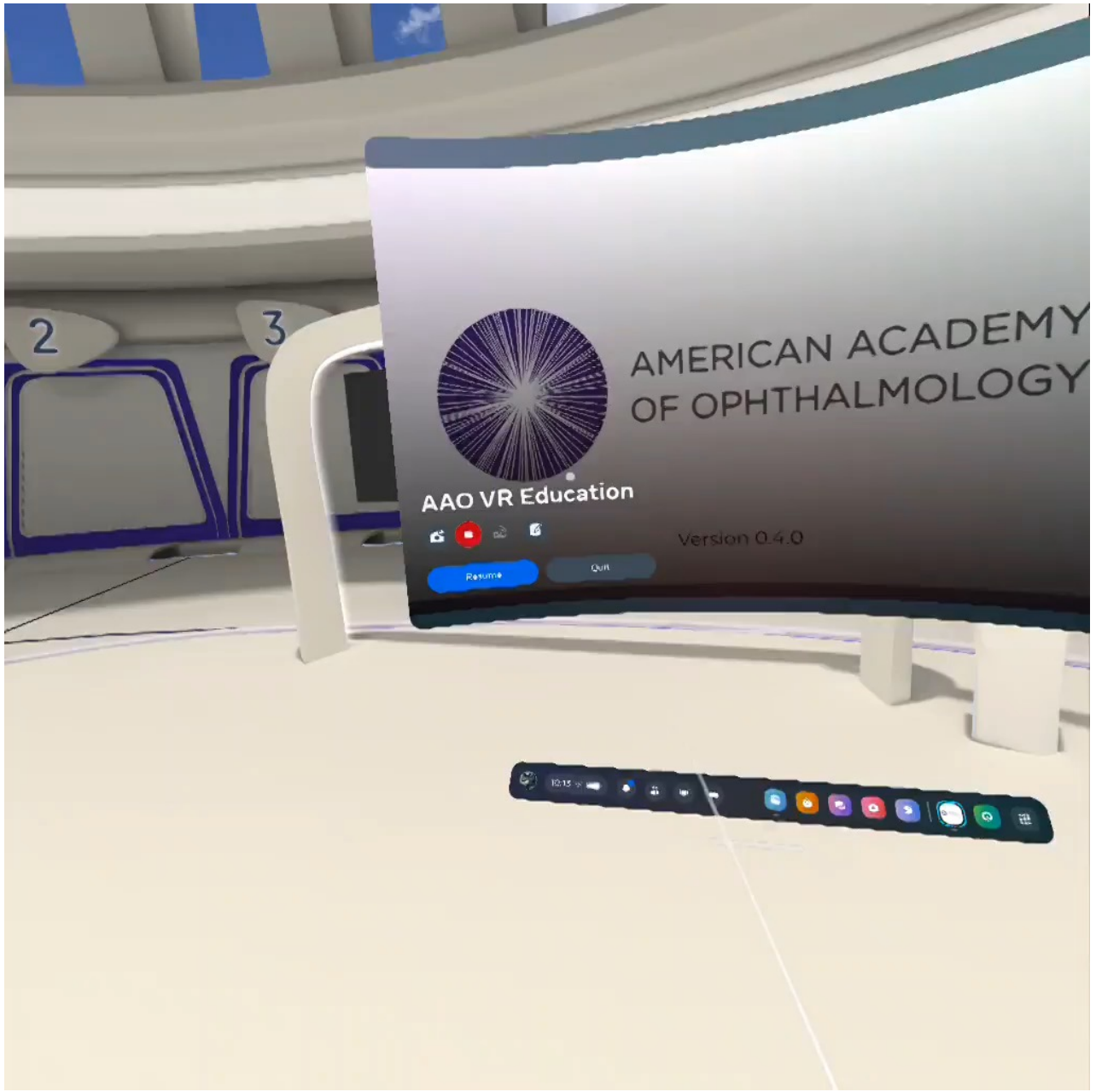
AAO VR Platform: ROP Module – Screen Sharing



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AAO VR Platform:
ROP Module –
Bed Height

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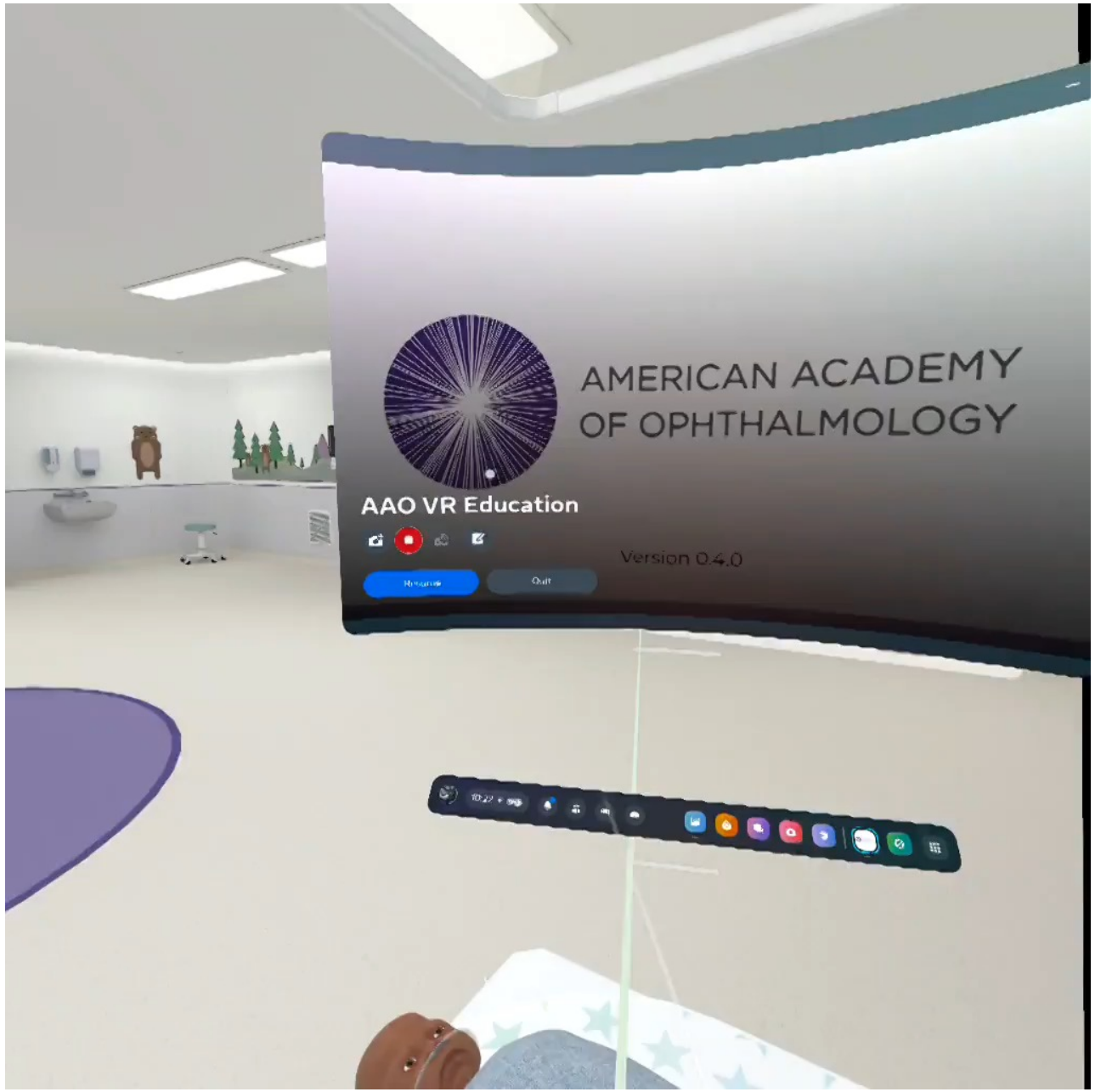
AAO VR Platform: ROP Module – Indirect



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AAO VR Platform: ROP Module – Indirect lens

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AAO VR Platform: ROP Module – Scleral depressor

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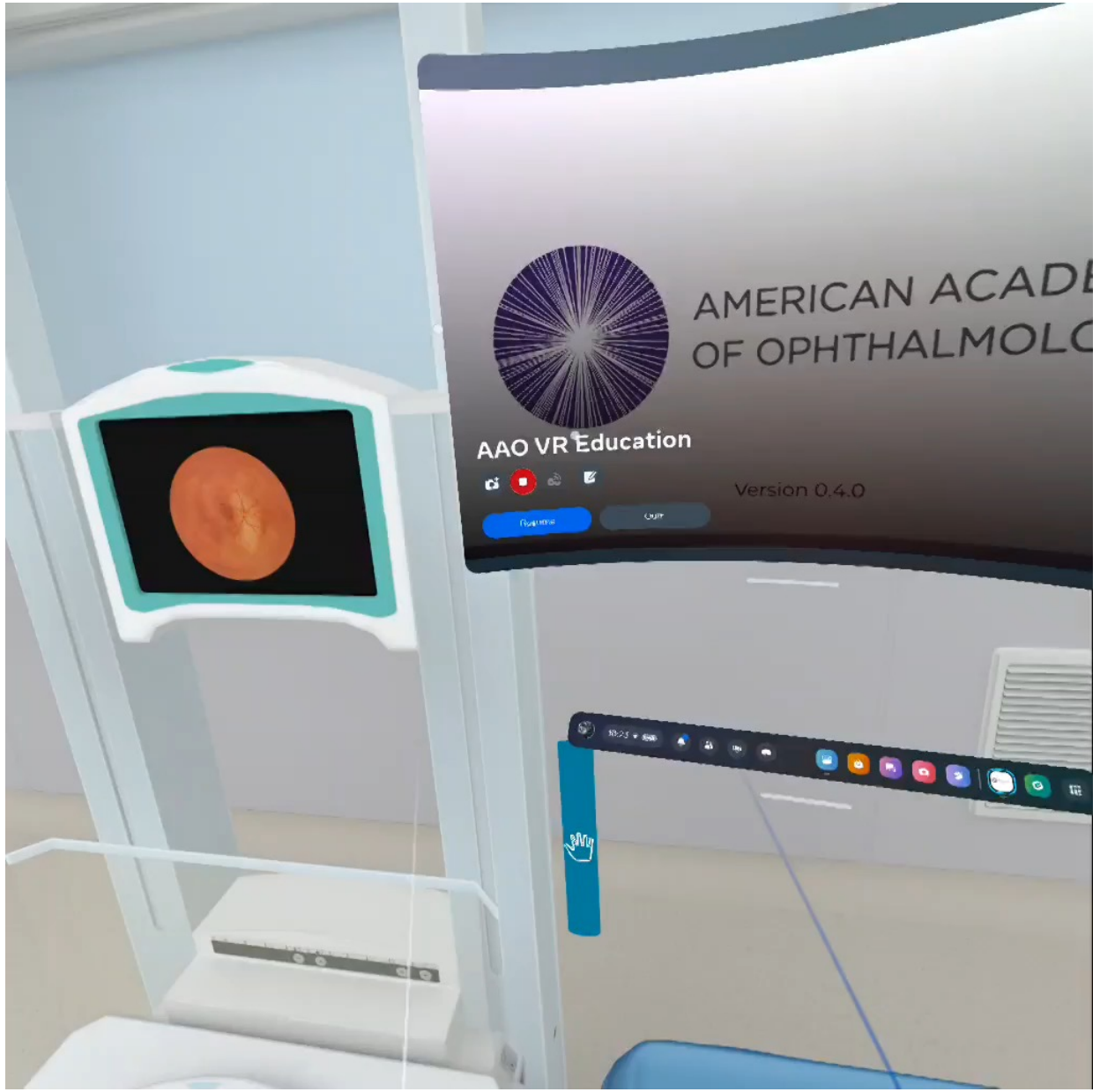
AAO VR Platform: ROP Module – Locking tools



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AAO VR Platform:
ROP Module –
Diagnosis

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AAO VR Platform: ROP Module

Laser console

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Lasering

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Caliper

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IV Injection

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AAO VR Platform: What's Next?

- Other pediatric retina pathologies
- We will be incorporating the Strabismus and the refraction simulators into the platform
- Virtual eye clinic
- Strabismus surgery
- Gonioscopy and angle surgeries
- Adult retina module
- …

Thank you…

SCAN ME

https://www.aao.org/pediatric-ophthalmology-strabismus

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https://aao.fundamentalvr.com/home