Module 2 Portfolio Assignment - Identifying a Digital and Virtual Health Solution: The *iCare HOME2 Tonometer* for Diagnosis and Remote Monitoring of Glaucoma

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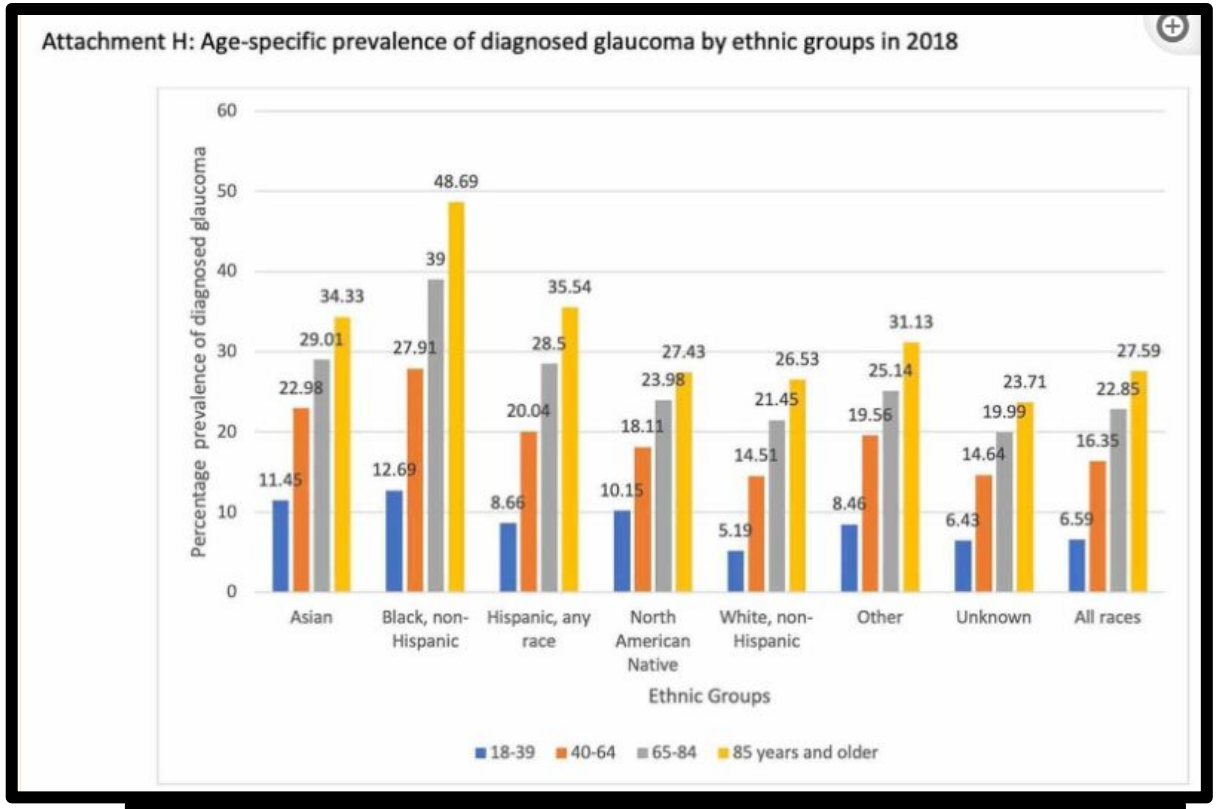
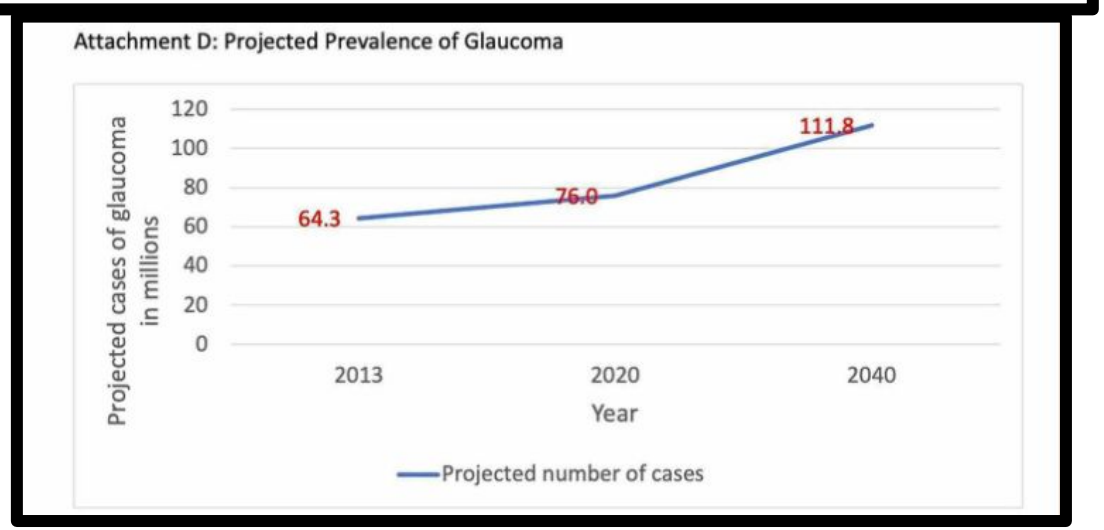
Glaucoma – Population Health + Health Equity

- #1 cause of irreversible blindness worldwide
- POAG – 57.5 million worldwide (Allison et al, 2020)
- Effect 112 million people by 2040!!
- Health Inequity by Population
  - African American – 5.6% -> 15%
  - Hispanic/Latino – 4.7% -> 18%
  - Non-Hispanic WHITE- 1.7% -> 7%
  - Asian -> 5% (PACG)
  - Men 36% higher than Females
  - Diabetes Mellitus
  - Age 65+ years
  - Family History

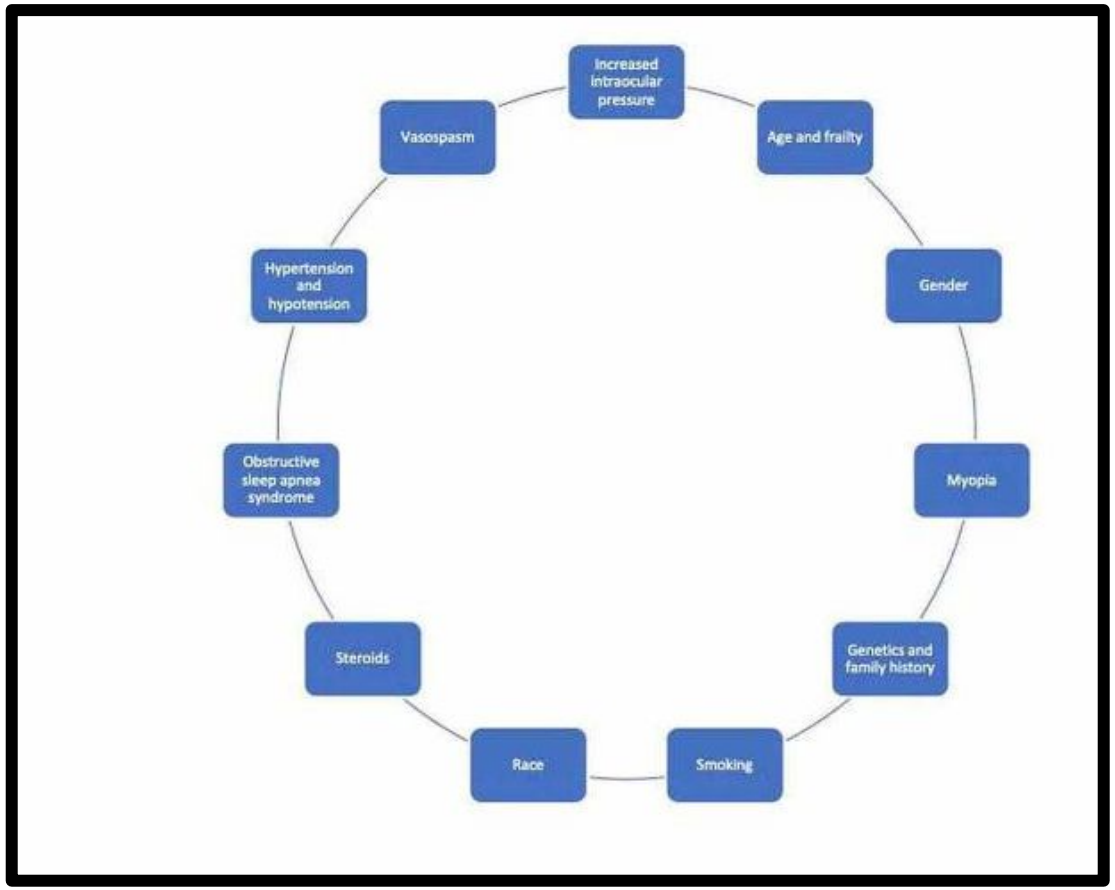




Glaucoma – Economic Burden + Risk Factors

Economic Burden of Glaucoma - USA

- American economy: $2.9 billion
- Treating/preventing glaucoma per year: $5.8 billion
- Annual medical cost of glaucoma projection:
  - $12 billion by 2032
  - $17.3 billion by 2050

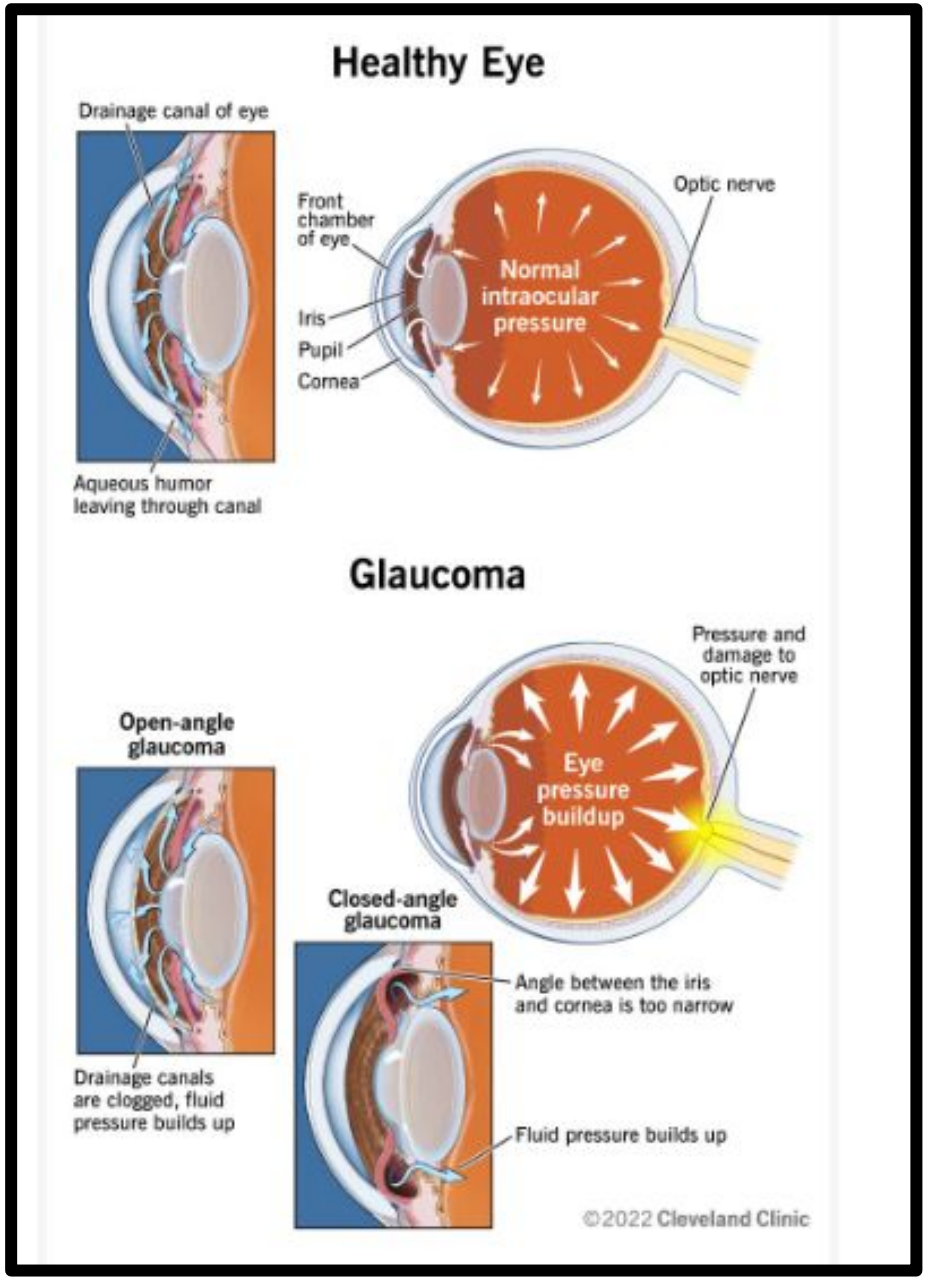


Glaucoma Risk Factors (Allison et al, 2020)

- How many of these are SDOH?
- How many of these already contribute to US healthcare economic burden?
- How many of these are preventable risk factors via digital health intervention?

Glaucoma - Pathophysiology

- Anterior eye filled with a clear fluid (aqueous humor).
- Fluid is made behind the Iris and leaves through channels where the iris and cornea meet
  - “Anterior chamber angle” or “The Angle”
- Slowing or blocking aqueous humor flow => intraocular pressure



Glaucoma - Pathophysiology

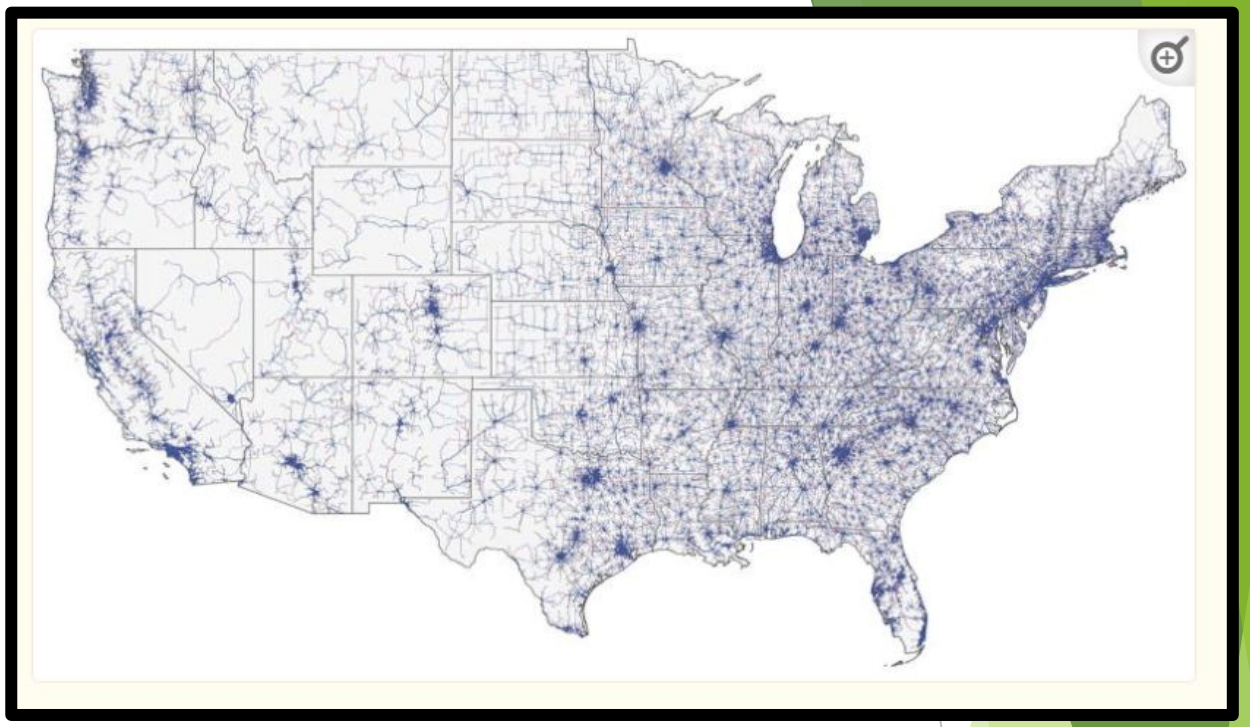
Open-Angle glaucoma	Angle-Closure glaucoma
Caused by inter ocular pressure	Caused by inter ocular pressure
Develops slowly	Develops quickly
Don't have noticeable symptoms	Noticeable Symptoms.

Shehryar et al. 2014

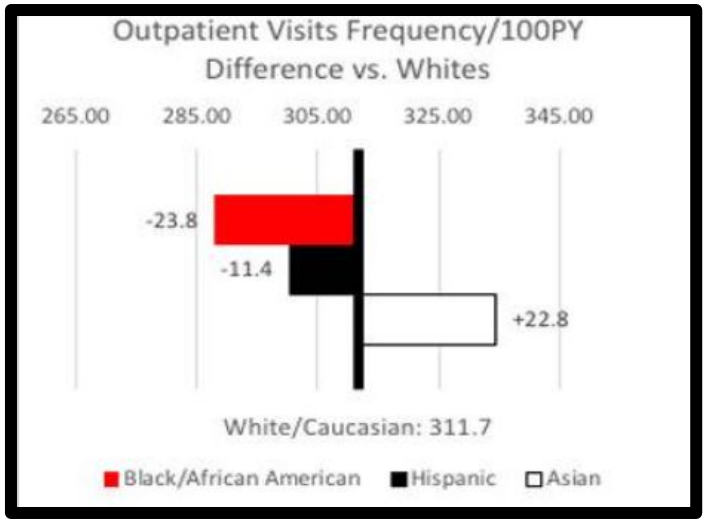
- Glaucoma Classification:
  - Primary (idiopathic)
    - **Open-Angle (9 in 10 in USA!!!)**
    - **Angle Closure**
    - Normal-Tension
    - Congenital
  - Secondary (known cause)
    - Neovascular
    - Pigmentary
    - Exfoliation
    - Uveitic

Why did I choose this?

- "Teleglaucoma" has become common for diagnosis + monitoring IOP (Ertel et al, 2021)
- Why? Socioeconomics/SDOH/DDOH
  - **Transportation/Geography**
  - **Number of Eye Specialists**
  - Insurance
  - Education + Adherence
- Why? Racial Inequity
  - Black and Hispanics
    - Less outpatient eye exams
    - Less preventative screenings



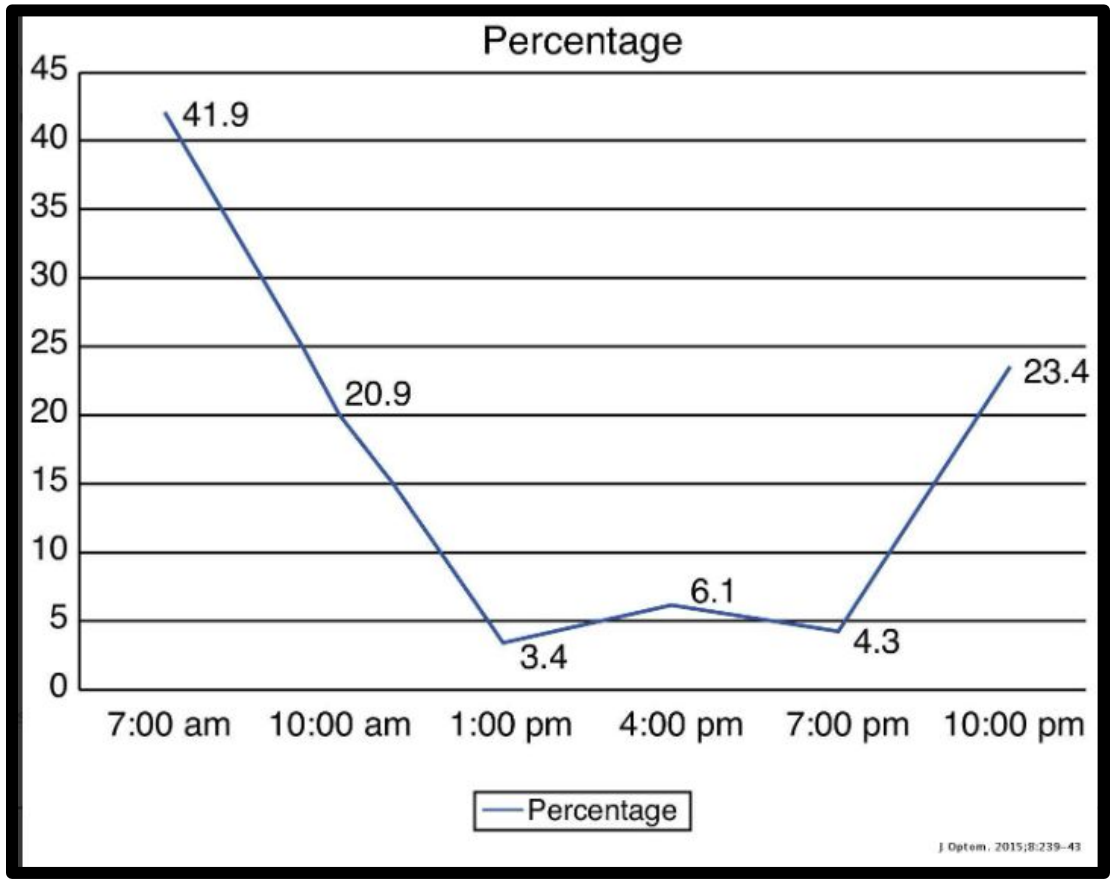
Source: Lee et al, 2016



Source: Halawa et al, 2022

Tonometry for Diurnal Variations

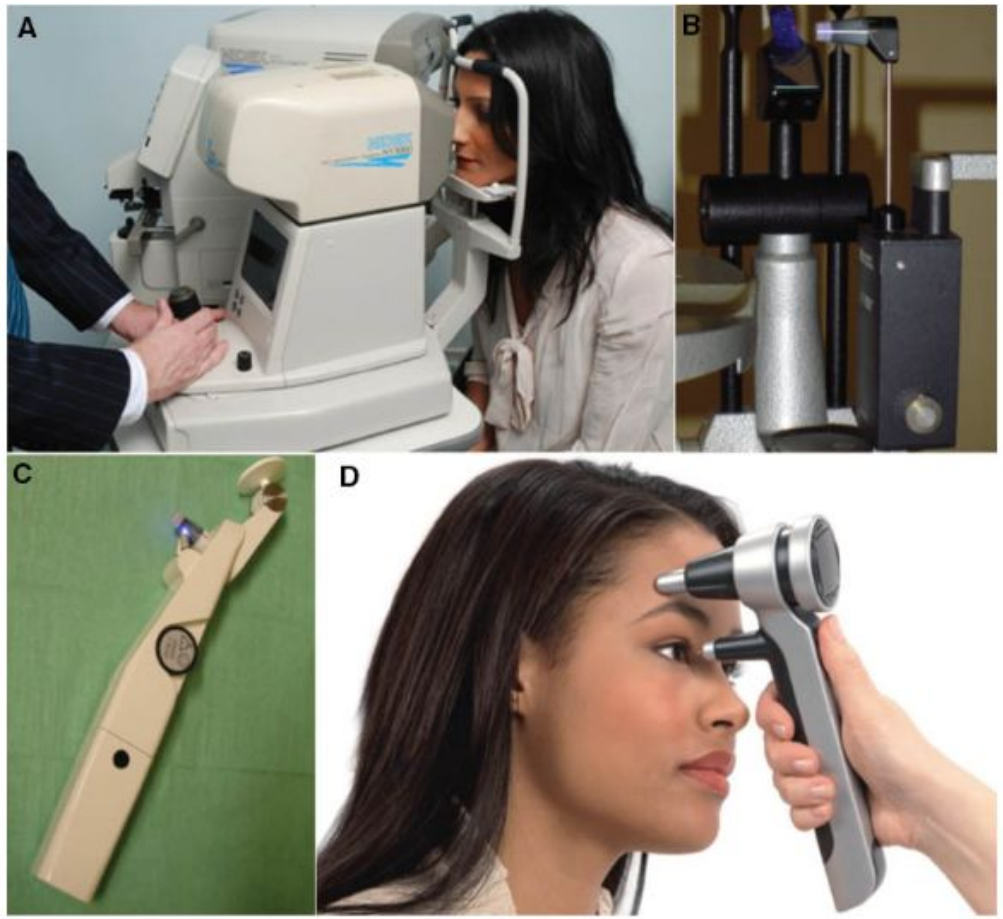
- IOP measures variation:
  - Circadian rhythms
  - Diurnal Variations
- Majority IOP spikes are outside of normal 8am-5pm clinic visits
- Patients evaluated every 3-4 months!!!
  - 50% of glaucoma is undiagnosed!



Source: Arora et al, 2015

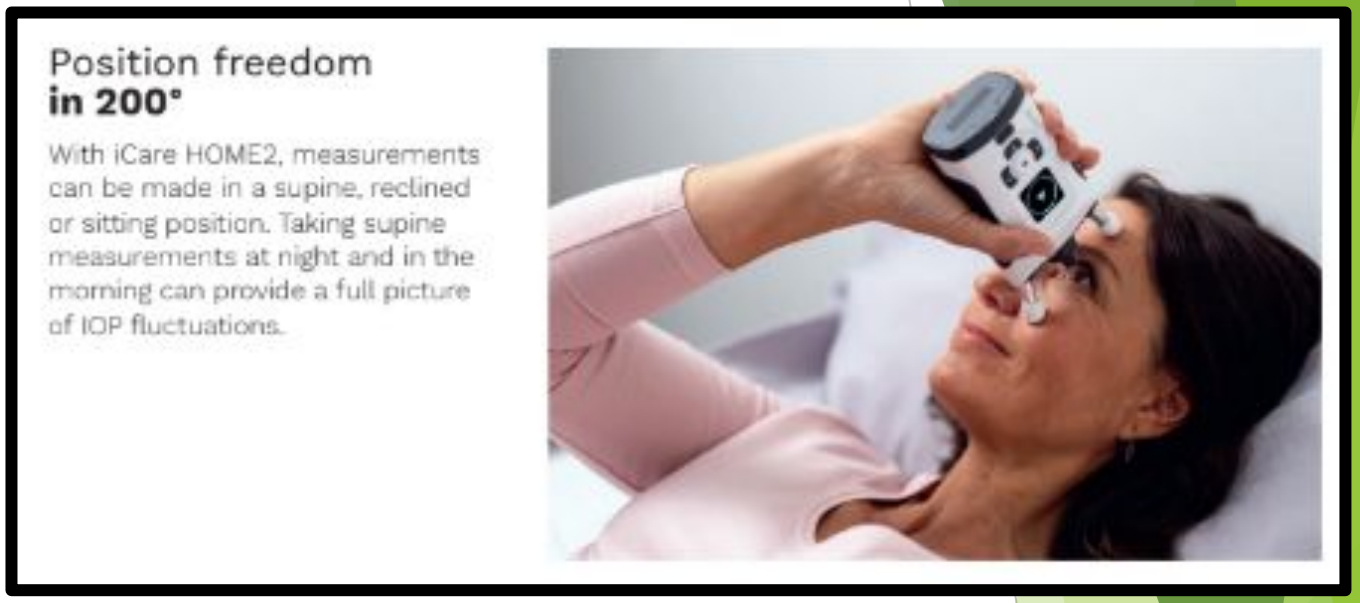
Tonometry - Issues

- Non-Contact Tonometer
- Goldmann applanation
- Perkins applanation
- iCare (early version)
  - “Rebound tonometer”



iCare HOME2 - Overview

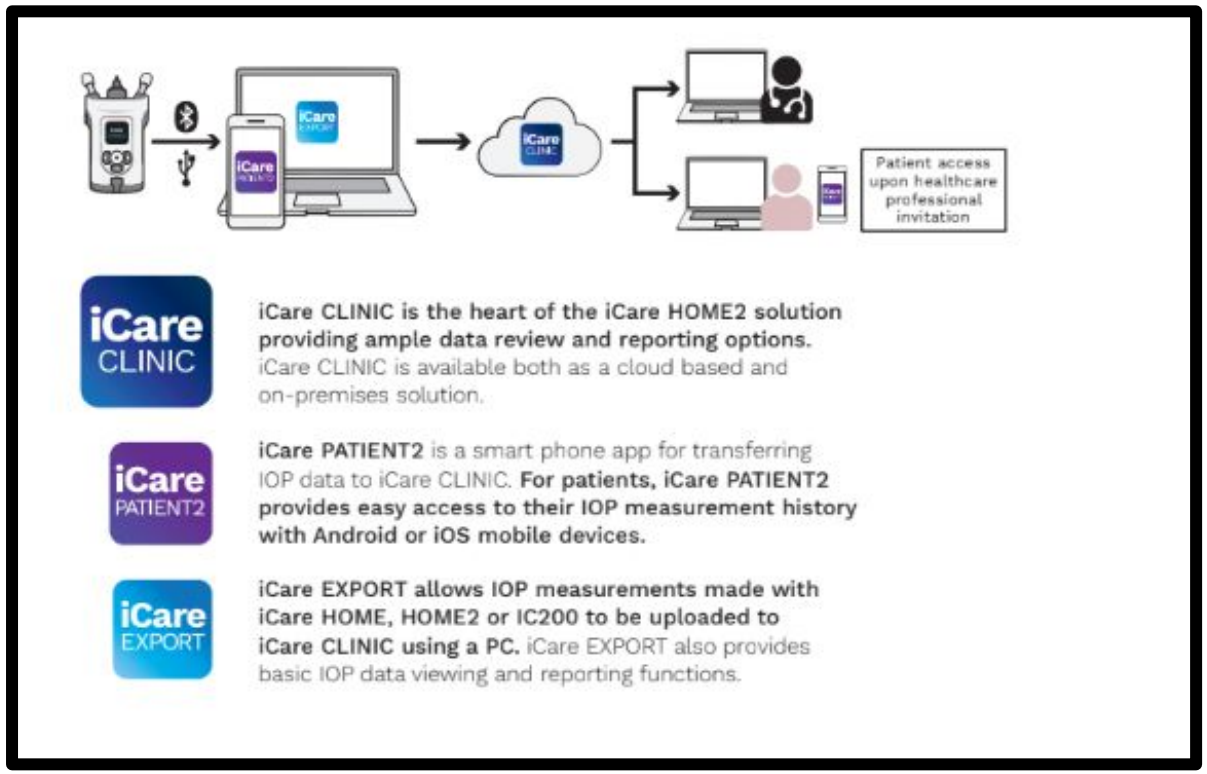
Source: Digital Glaucoma, 2023

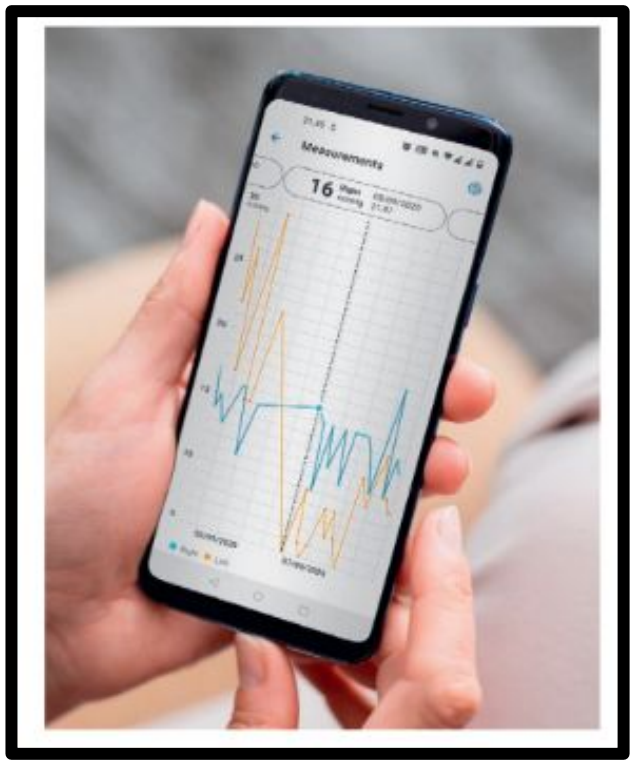


1. Multiple positions for use
2. Informs patient of correct eye position

Source: iCare, 2023

iCare HOME2 – Real-Time Data



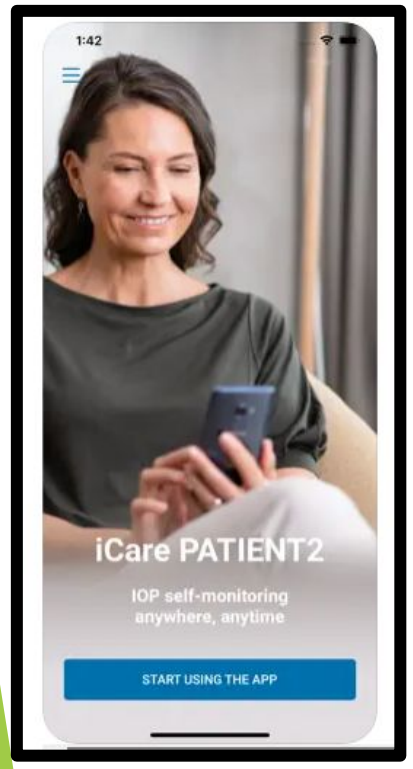


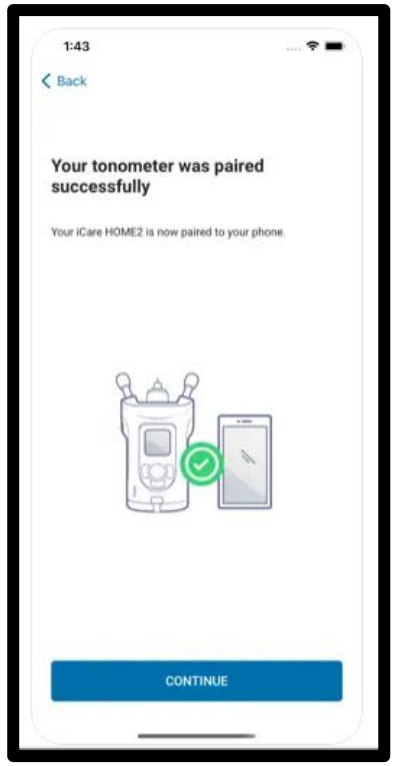
- iCare CLINIC (cloud or desktop)
- iCare PATIENT2 (mobile app)
- iCare EXPORT
- ***internet connection needed for all technical components!!!!***

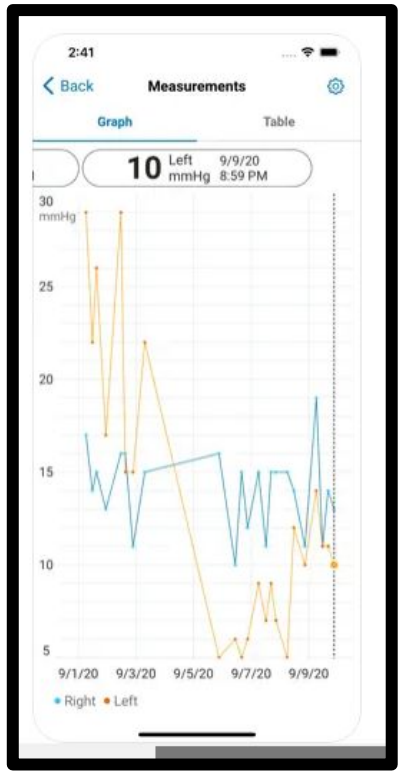
iCare PATIENT2 mobile app

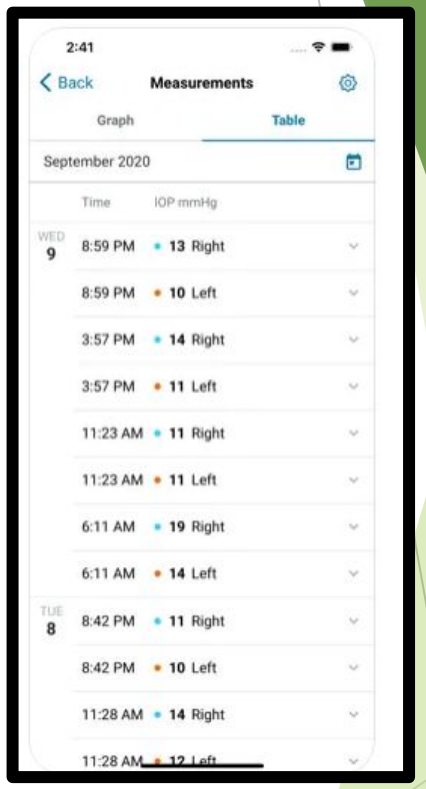
- Android compatible (v6+)
- iOS (iPhone) compatible (v12+)

iCare HOME2 – Mobile App User Interface









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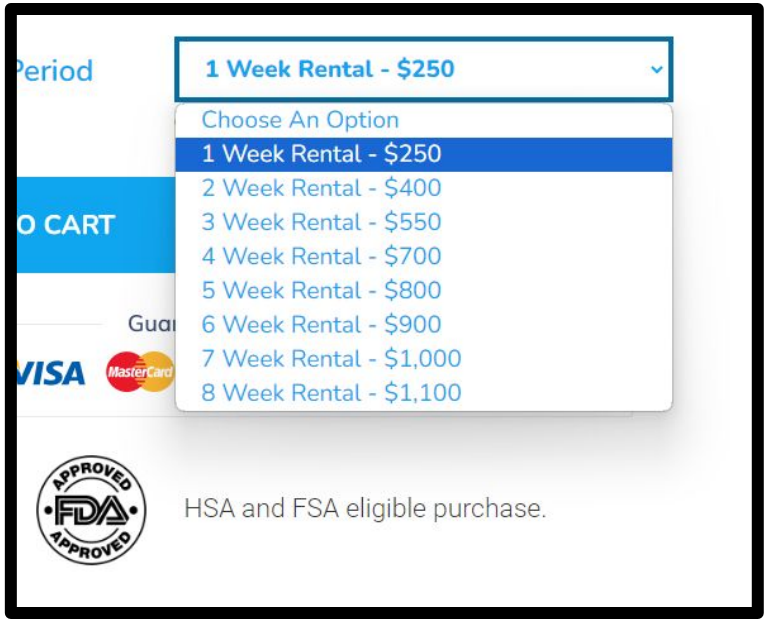
(Future slides)

Positives

- Easy to use
- Teach Remotely
- Real-time results -> mobile phone
- Health Equity Equalization
- Diagnosis + Precision Treatments
- Medication Adherence
- Population Reach
  - Rural
  - Urban
  - Socioeconomics
  - Racial Disparity

Negatives

- **Cost!!!!!!!!!!!!!!!!**
- Socioeconomic bias?!
- Technical demands
  - Internet
  - Bluetooth
  - Mobile Phone
- FDA 501(k) clearance
  - More likely to recall?
  - Less likely to be approved by insurance?



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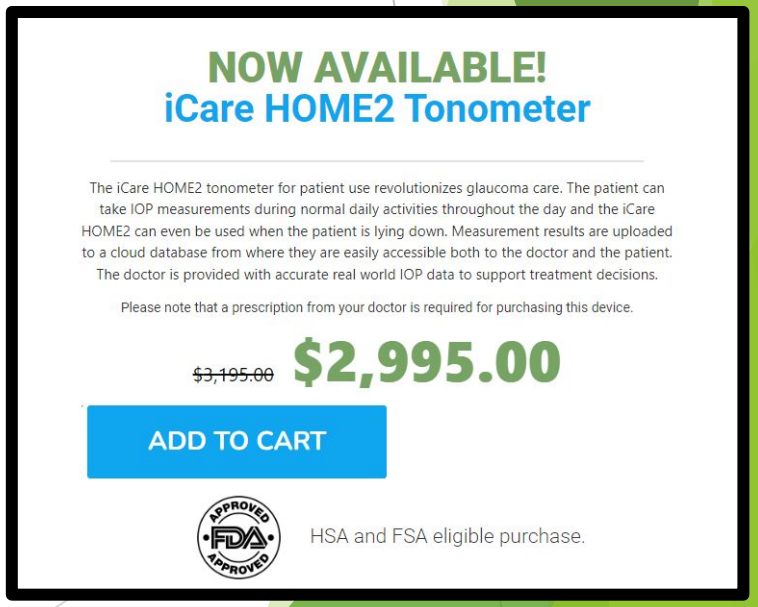

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