

Philadelphia Telemedicine Glaucoma Detection and Follow-up Study



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Philadelphia Telemedicine Glaucoma Detection and Follow-up Study



Principal Investigators

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Disclosures

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Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

- Study was designed to evaluate strategies to
 - *identify persons at high risk of glaucoma in underserved communities using telemedicine technology*
 - *improve follow-up care*

Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

- Study Aims

- Phase 1: Determine the effectiveness of a **telemedicine**, practice-based intervention using fundus photography of the **optic nerve and macula** to detect previously undiagnosed glaucoma, glaucoma suspect, and retinal diseases in high-risk populations.
 - *Achieved by confirming “telemedicine diagnosis” with a full ophthalmologic examination*

Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

- Study Aims (*continued*)
 - Phase 2: Evaluate the effectiveness of a social worker and patient navigators to improve follow-up care with local ophthalmologists for those with ocular pathology compared to usual care

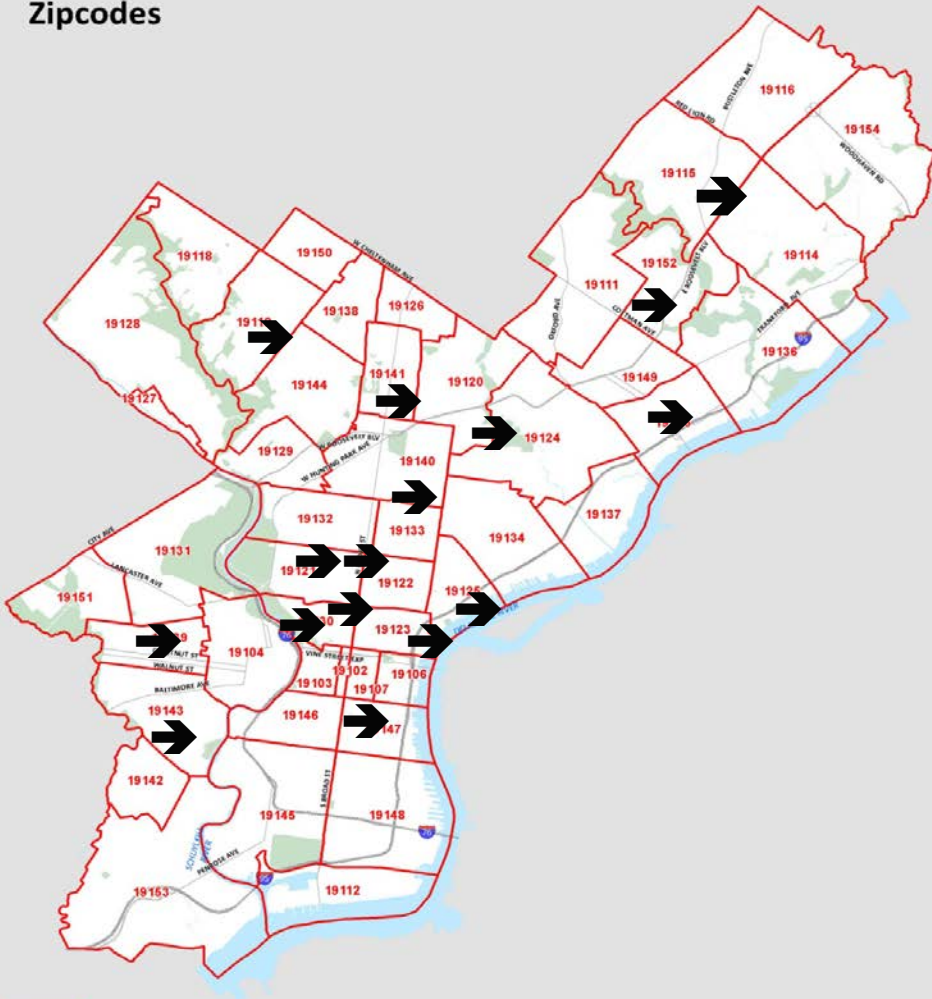
Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

- Study status
 - Data collection began in 2015
 - Screening visits (Visit 1) completed 12/2016
 - Ophthalmologic exams (Visit 2) to be completed (Spring, 2017)
 - Visits for Phase 2 ongoing

Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

- Presentation Aim
 - To describe the first phase of the study and present preliminary results from a telemedicine screening visit and a comprehensive eye exam

City of Philadelphia Zipcodes



Data Source: Philadelphia City Planning Commission

0 0.75 1.5 Miles



Recruitment

13 Primary Care Community Partners

- 7 Primary Care Practices (PCP)
-Temple Physicians Inc.
- 6 Health Centers (HC)
-Public Health Mngt. Corp.
-Health Federation of Phila.
-Phila. Dept. of Health

Eligibility Criteria

Inclusion

- Have not had an eye exam in the past year
- Over age 40 years with any of the following
 - *African-American, Hispanic, or Asian ethnicity,*
 - *Family history of glaucoma*
 - *Dx of diabetes mellitus*
- Over age 65 years, if Caucasian

Exclusion

- Any patient with previously diagnosed glaucoma, suspect glaucoma, or other eye diseases currently under ophthalmologic care.

Study Population

- 7200 eligible persons
 - identified by electronic records of the Primary Care Facilities
 - invited to participate in a screening visit at their usual Primary Care Practice/Center
- 905 attended Screening Visit (**Visit 1**)
 - 7.5% (540/7200) of invited persons attended the Screening Visit
 - an additional 365 (40%) of Screening Visit attendees were “walk-in’s” (same day referrals)

Visit 1: Telemedicine Screening at the Primary Care Office/Health Center (N=905)

Retinal Module



Retinal imaging enables non-mydratiatic eye fundus examination and image capture with a 45° field of view.

iCARE
Tonometer



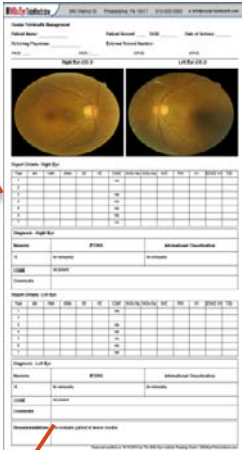
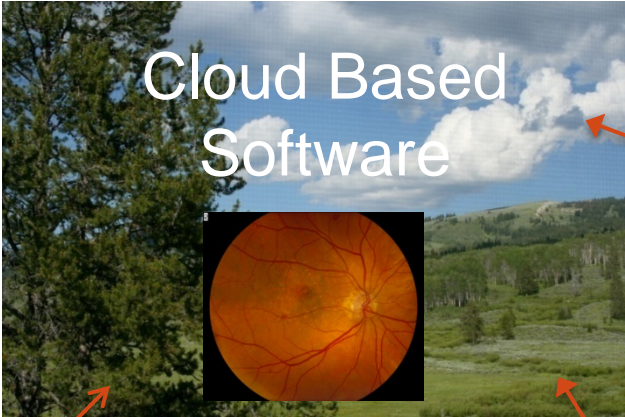
- Bilateral optic nerve and macula photos (*Volk Pictor handheld camera*)
- Anterior segment photos
- Other data collected
 - Age, gender
 - Race/ethnicity
 - Family history of glaucoma
 - Visual acuity
 - Intraocular pressure (*IOP*) (iCARE tonometer (3x per eye))

Telemedicine Protocol

- Data Transfer
 - Secure Internet Electronic Transmission to *Wills Eye Telemedicine Reading Center*
- Images reviewed by
 - Glaucoma Specialists
 - Trained retinal readers

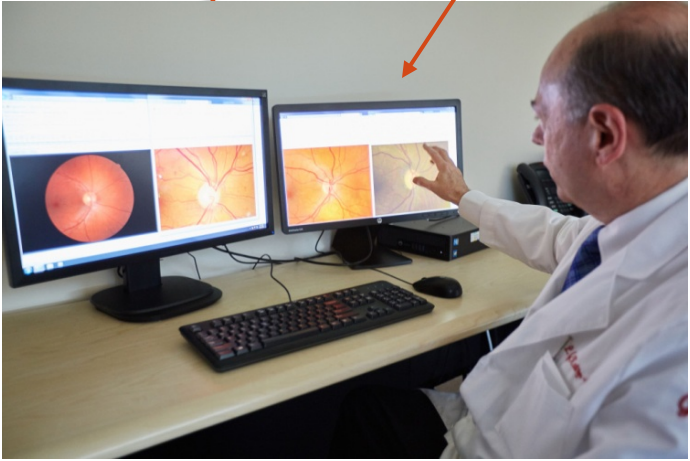
Telemedicine Image/Data Transfer and Review

PCP/HC
Download PDF reports



A screenshot of a PDF report from a telemedicine system. The report includes patient information, two fundus images, and a table of data.

Field	Value
Right Eye	Normal
Left Eye	Normal



Telemedicine Criteria

■ Suspicious Nerve

- Vertical C/D of >0.65 in average or large discs, >0.5 in small discs (*small and large as judged clinically from the photo.*)
- Rim width of < 0.2 in any area (*this covers all notches*)
- Vertical C/D asymmetry of > 0.2 .
- Disc hemorrhage
- Nerve fiber layer (NFL) defect
- Zone beta peri-papillary atrophy in association with suspicious rim thinning (PPA)

■ Ocular hypertension (OHTN)

- IOP >21 mmHg and normal appearing disc

Visit 1 Telemedicine Diagnoses and Recommendations*

- Normal (*follow-up with eye care provider in 1-year*)
- Abnormal diagnoses (*return for Visit 2*)
 - Suspicious nerve (C/D ratio, Rim, Asym, Hem, NFL, PPA)
 - Retinal abnormality (DR, HTN changes)
 - Other retinal findings
- OHTN (*IOP >21 mmHg, normal disc*) (*return for Visit 2*)
- Unreadable image in at least one eye (*return for Visit 2*)

**Based on image and clinical data*

Visit 1: Participant Characteristics (N=905)

Characteristic	Results
Age, yrs mean (\pm SD)	59.3 (\pm 10.4)
Gender, n (%)	Female 552 (61)
Race, n (%)	African- American 548 (72) White 154 (20) Asian/Hawaian 50 (6) More than one race/ethnicity 14 (2)
Ethnicity, n (%)	Hispanic 161 (18) Non-Hispanic 731 (82)
Last time you saw an eye doctor? n(%)	Never 84 (9) >2 years ago 469 (52) Within past 2 years 340 (38)
Diabetes, n (%)	514 (57)
Family history of glaucoma, n (%)	230 (25)

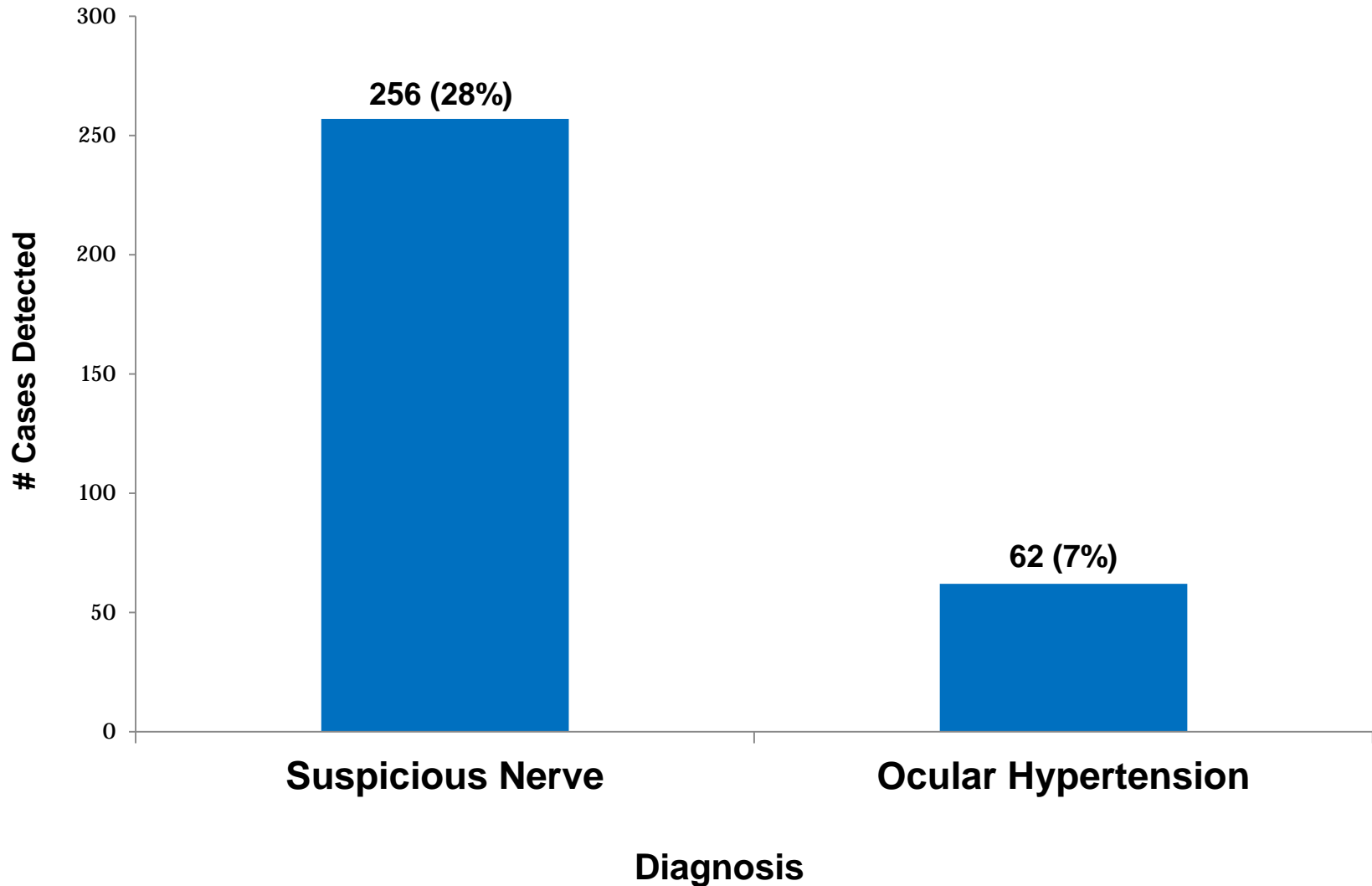
Visit 1 Telemedicine Screening Results: Scheduled vs. Walk-in Appointments

Visit 1 Image Results	Scheduled n (%)	Walk-In n (%)	All Participants n (%)
Normal	220 (40.8)	136 (37.3)	356 (39.3)
Abnormal	182 (33.7)	149 (40.9)	331 (36.6)
OHTN	33 (6.1)	29 (8.0)	62 (6.9)
Unreadable	105 (19.4)	51 (14.0)	156 (17.2)
TOTAL	540 (59.7%)	365 (40.3%)	905 (100.0)

Invited
back for
Visit 2
n=549
(61%)

p=0.04 Based on Fisher's exact test

Visit 1: Telemedicine Diagnosis* (N=905)



**Diagnosis present in at least one eye*

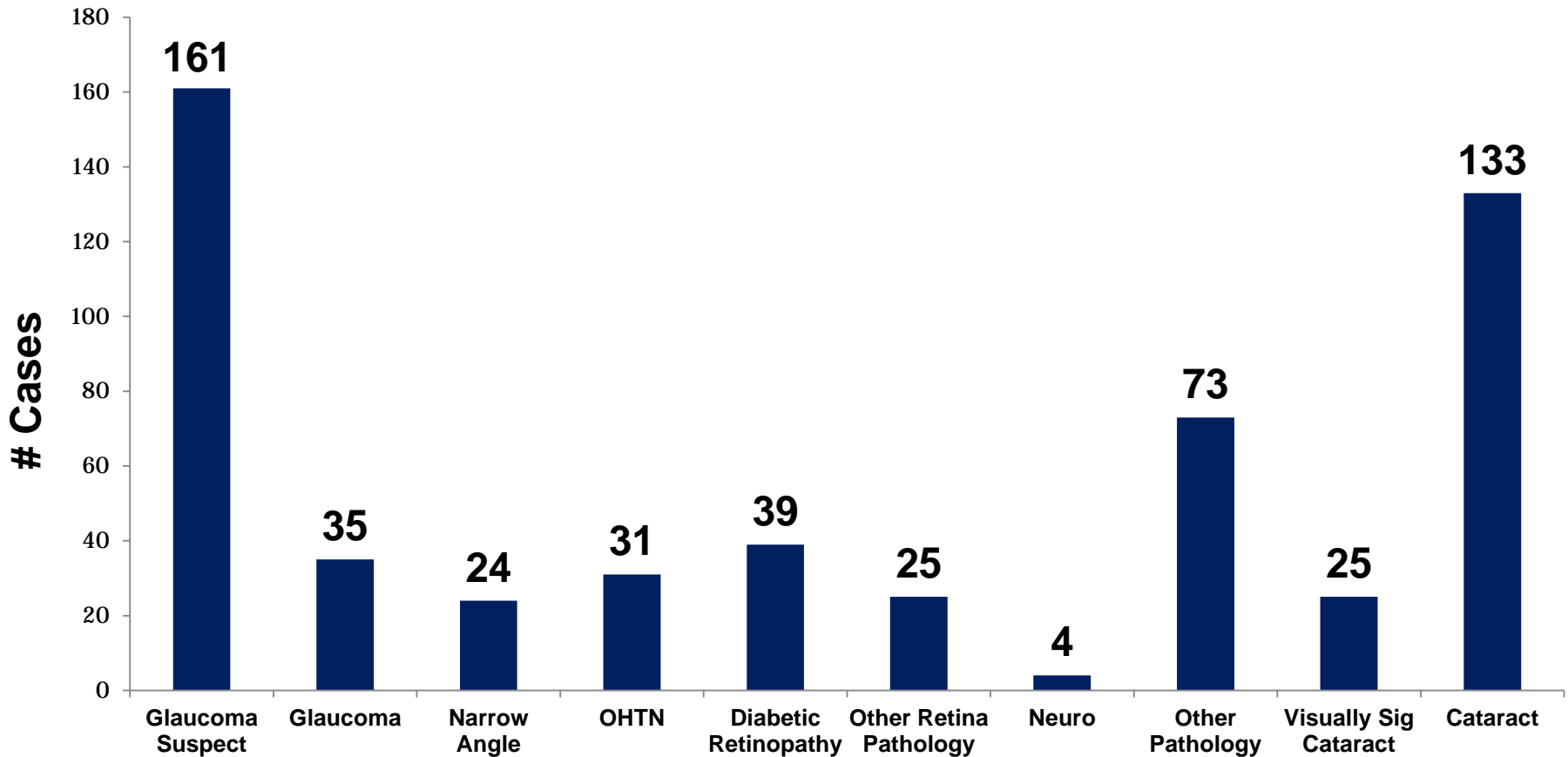
Visit 2: Confirmation Eye Exam at the Primary Care Practice/Health Center

- Data collection
 - History: *medical, ocular conditions, meds*
 - IOP measured via Goldman tonometer
 - Visual field testing
 - Slit lamp examination (*undilated and dilated*)
 - Gonioscopy
 - Pachymetry (*corneal thickness*)
- Determining diagnosis and treatment plan
- Providing follow-up recommendations

Visit 2 Results

- 76% (419/549) persons referred for Visit 2, attended and 81% (338/419) agreed to be randomized for Phase 2
- 80.5% of the 338 were diagnosed with at least 1 eye condition in at least one eye

Visit 2 Preliminary Results: Comprehensive Eye Exam Diagnoses* (N=338)



**Multiple diagnoses/eye possible*

Diagnoses

Agreement between Telemedicine and Ophthalmologic Examination Diagnoses of Suspicious Nerve* (N=338)

Diagnosis Visit 1	Visit 1 (n)	Visit 2 (n)	% confirmed
Suspicious nerve (inc. Glaucoma and GS)	176	139	78.9%
		Glaucoma: n=23 Suspect: n=116	13.1% 65.9%

* Preliminary results

Conclusions

- Based on preliminary results, high frequency of eye pathology detected by telemedicine screening in this high risk population, shows benefit of using this non-invasive approach in such settings.
- Telemedicine (*fundus photography and clinical data*) appears to be effective in identifying persons/eyes with glaucoma or suspect glaucoma in a targeted high-risk population.

Conclusions

- The low yield (7.5%) of scheduled appointments from the recruitment letters and the effective same day referral approach (40% of Visit 1 screenings) provide guidance for developing future approaches to screening efforts.

Conclusions

- Future results from this study will provide new information on the
 - the benefit of telemedicine screening compared to a full eye exam in primary care settings in underserved communities, and
 - the success of an intervention to improve adherence to follow up examinations and treatment.

Thank you to the Team

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Thank You!