Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

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Philadelphia Telemedicine Glaucoma Detection and Follow-up Study

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

- 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

Cloud Based Software

PCP/HC
Download PDF reports
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)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs mean (+SD)</td>
<td>59.3 (±10.4)</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td>Female 552 (61)</td>
</tr>
<tr>
<td>Race, n (%)</td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>548 (72)</td>
</tr>
<tr>
<td>White</td>
<td>154 (20)</td>
</tr>
<tr>
<td>Asian/Hawaiian</td>
<td>50 (6)</td>
</tr>
<tr>
<td>More than one race/ethnicity</td>
<td>14 (2)</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>161 (18)</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>731 (82)</td>
</tr>
<tr>
<td>Last time you saw an eye doctor? n(%)</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>84 (9)</td>
</tr>
<tr>
<td>&gt;2 years ago</td>
<td>469 (52)</td>
</tr>
<tr>
<td>Within past 2 years</td>
<td>340 (38)</td>
</tr>
<tr>
<td>Diabetes, n (%)</td>
<td>514 (57)</td>
</tr>
<tr>
<td>Family history of glaucoma, n (%)</td>
<td>230 (25)</td>
</tr>
</tbody>
</table>
## Visit 1 Telemedicine Screening Results: Scheduled vs. Walk-in Appointments

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

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

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Visit 1 (n)</th>
<th>Visit 2 (n)</th>
<th>% confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspicious nerve (inc. Glaucoma and GS)</td>
<td>176</td>
<td>139</td>
<td>78.9%</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Glaucoma: n=23</td>
<td></td>
<td></td>
<td>13.1%</td>
</tr>
<tr>
<td>Suspect: n=116</td>
<td></td>
<td></td>
<td>65.9%</td>
</tr>
</tbody>
</table>

* 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
  - benefit of telemedicine screening compared to a full eye exam in primary care settings in underserved communities, and
  - success of an intervention to improve adherence to follow up examinations and treatment.
Thank you to the Team

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Thank You!