Northwest Tribal Vision Project: The Long-Term Comparative Effectiveness of Telemedicine to Detect Diabetic Retinopathy

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Northwest Tribal Vision Project (NWTVP)

- Originally designed to determine the prevalence and severity of various eye diseases in AI/AN populations
- Most recent grant focused on the comparative effectiveness of using telemedicine to increase the proportion of patients with diabetes that obtain annual retinopathy screenings
Why CER in Diabetic Retinopathy?

- Leading cause of blindness in working-age adults and disproportionately affects American Indians and Alaska Natives (AI/AN) and other minorities
  - greater difficulty with transportation, ability to access eye care providers, co-pays and other costs of the eye exam, and/or lack of health insurance.
- Laser treatment results in a 10-fold reduction in vision loss from PDR and a 3-fold reduction from DME.
- Diabetic eye exams would save the government an estimated $472 million dollars per year.


Why CER in Telemedicine?

- Poor research designs (no randomized controlled trials)
- No long-term follow-up
- No adoptable telemedicine system
Study Methods

- Randomized Controlled Trial with Staged Intervention
  - Provider Group (Traditional Surveillance)
    - Visited local eye care providers
    - Exam results received via postcard or web-based entry
  - Camera Group (Telemedicine)
    - Digital images of retina captured with a non-mydriatic camera
    - Images taken at primary care clinic by trained staff
    - Images sent to Devers for evaluation and report generation

- Two locations: Yellowhawk Tribal Health Center (Pendleton, OR) and Hunter Health Clinic (Wichita, KS) in May of 2006.

- After 2 years, all participants were offered screening with telemedicine

Non-Mydriatic Camera

- Able to view retina without dilation
- Better than ophthalmologist
- Digitally stored
- Potential for teleophthalmology
The **Remote Client**

- Secure, encrypted, password protected, and HIPAA compliant
- Accessible to any clinic or provider

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**Devers SAAS Software**

- Data monitoring page
- Emails ophthalmologist when new images are ready to be reviewed.
- Ophthalmologist fill out a data review form
- Final reports by fax and email

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**Report Generation**

Devers Eye Institute Reading Center
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Participants

- 567 diabetic patients
  - 296 in the Camera Group (52%)
  - 271 in the Provider Group (48%)
- Diabetes
  - Diabetes for mean 9.5 years
  - HbA1c: 8.3% (4-6% normal, with recommended <7.0%)
- Age
  - Range: 20 to 79 years old
  - Mean Age = 51 (SD = 12)
- Gender
  - 49% Male; 51% Female
- Ethnicity
  - 50% AI/AN
  - 82% non-white race/ethnicity

Baseline Results: Screening

- Telemedicine Group
  - 92% had baseline images evaluated

- Provider Group
  - 44% had a baseline eye exam

\( p < 0.001 \) (Telemedicine had a higher proportion of screening exams)
Baseline Results: Prevalence of DR

All Participants

<table>
<thead>
<tr>
<th>Levels of Diabetic Retinopathy</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Diabetic Retinopathy</td>
<td>71.6%</td>
</tr>
<tr>
<td>Mild Non-Proliferative</td>
<td>13.8%</td>
</tr>
<tr>
<td>Moderate Non-Proliferative</td>
<td>4.7%</td>
</tr>
<tr>
<td>Severe Non-Proliferative</td>
<td>0.7%</td>
</tr>
<tr>
<td>Proliferative DR</td>
<td>2.3%</td>
</tr>
<tr>
<td>Unable to Determine</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

Overall, 85.4% of those had levels of diabetic retinopathy not requiring evaluation by an eye care provider.

Baseline Results: Triaged Screening

Telemedicine participants only:

- 4.7%: based on moderate diabetic retinopathy or worse
- 20.5%: Moderate diabetic retinopathy, macular edema, or ‘unable to determine’
- 26.7%: above criteria, or glaucomatous optic neuropathy or ‘unable to determine’
Baseline Results: ‘Unable to Determine’

- 15.8% with Telemedicine
- 55.0 vs. 50.9 years ($p = 0.008$) was the only demographic or clinical variable associated with an ‘unable to determine’ result.
- Instruments or protocols to decrease ‘unable to determine’ would decrease the referral proportion ~ 75%

Baseline Results: Risk Factors for DR

- DR was associated with:
  - Higher systolic blood pressure ($p < 0.001$)
    (DR Group: $M = 135.0$; No DR Group: $M = 125.2$)
  - Higher HbA1c level ($p = 0.001$)
    (DR Group: $M = 9.0$; No DR Group: $M = 8.1$)
  - Longer duration of diabetes ($p < 0.001$)
    (DR Group: $M = 13.7$ years; No DR Group: $M = 8.8$ years)
  - Non-white primary ethnicity ($p < 0.005$)
    (Prevalence for non-whites was 59.7% vs. 43.3% for whites)
Long-Term Annual Eye Exams

Progression of Diabetic Retinopathy
(-preliminary data)

- Included those with 1 follow-up visit (n=226 eyes of 115 patients) with average follow-up of 537 days
- Progression defined as increased diabetic stage (by 1 stage)
  - 83% had no change in DR stage
  - 12.4% had progression of DR.
  - 4.4% eyes had a decrease in the stage of DR
Summary

- Most participants did not have levels of diabetic retinopathy requiring referral to an eye care provider
- Telemedicine may be a more effective way to screen patients for DR
- The staged-intervention suggests that telemedicine would increase the proportion of diabetic screening exams over the long-term when compared to traditional surveillance

Future Directions

- Research to Practice
  - IM Clinic at Legacy
    - >10 physicians
    - ~1500 patients with diabetes
- New Imaging Techniques
Ioptics- Easy Scan

SLO imaging
OCT based imaging

iVue Versatility
expand your OCT World

Optional iStand
for universal iVue positioning
such as supine scanning

Optional Rolling Case
26" x 18" x 17" @ 24 lbs.

Thank You

- Centers for Disease Control and Prevention
- National Institutes of Health/National Eye Institute
- OHSU Prevention Research Center, Hunter Health Clinic, Yellowhawk Tribal Health Center
If you have any further questions, please contact:

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