Telemedicine System for Glaucoma Screening and Disease Management

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New Paradigm: Telemedicine and online patient care for cost-effective disease management

How to leverage new technology to:

1. Facilitate access to health care services
2. Streamline patient flow and increase throughput
3. Enable patient self-care, compliance and e-health
4. Reduce physician and clinic resources spent on routine care
New Paradigm: Telemedicine and online patient care for cost-effective disease management

Solution: Telemedicine + Disease Management

1. Reduce utilization
2. Reduce unit cost of service
3. Improve system-wide quality indicators (HEDIS metrics)
GLAUCOMA DZM: Case in point

Glaucoma:

1. Leading cause of blindness
2. Progressive, Irreversible Optic Nerve Atrophy
3. Largely undiagnosed ( >50%)
   • 2 million have the disease
   • 2-3 million undiagnosed
HEDIS 2005 – Glaucoma Screening Cost Analysis

Cost to Society

Annual Cost of Treatment: $2 Billion

Irreversible Blindness and High Treatment Costs from Late Detection

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Average annual costs per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total costs</td>
</tr>
<tr>
<td>Stage</td>
<td>mean (SD), P=0.0156*</td>
</tr>
<tr>
<td>0</td>
<td>$200 ($106)</td>
</tr>
<tr>
<td>1</td>
<td>$374 ($193)</td>
</tr>
<tr>
<td>2</td>
<td>$483 ($183)</td>
</tr>
<tr>
<td>3</td>
<td>$605 ($116)</td>
</tr>
<tr>
<td>4</td>
<td>$836 ($409)</td>
</tr>
</tbody>
</table>

*SD = Standard deviation. P-value based on analysis of variance (ANOVA). SOURCE: SIEBERT 1999
Glaucoma HEDIS measure mandatory - January 2006

HEDIS glaucoma compliance and reporting

HEDIS score of each health plan based on the percentage of plan participants over 65 years of age who have have one of the following evaluations over a 2-year period:

- mid-level eye exam *by a physician* (level 2 - 4)
- OR
- glaucoma screening *by a physician* using the G code
- OR
- Visual field (perimetry) screening test
Glaucoma metrics: Can we improve HEDIS score?

HEDIS score – Impact

- Improving HEDIS rates on average requires sustained, rational and often costly efforts – only 5% increase in breast cancer screening rates for the last 8 years (NCQA)

- Low glaucoma rates can adversely impact total HEDIS score – an important surrogate for overall quality of care.
Glaucoma screening rates vary widely

- Glaucoma screening rates vary from 22.8% to 93.3% among the managed care organizations\(^1\)

- Large differences between plans due to lack of standardized screening and disease management programs.

- Underperforming plans will need to create in-house programs to improve rates. No programs for outsourced glaucoma screening and disease management.

1. APHA Annual Meeting, Abstract #81563
GLAUCOMA Disease Management

Challenges: Can Disease Management Help?

1. Improve (early) detection?
   • 50% undiagnosed
   • 80% present with advanced visual field defects
   • 75% skip annual exam because of doctor visit

2. Improve Compliance with Rx
   • Compliance rate 30-50%
### GLAUCOMA: Enabling Tools for screening and prevention.

<table>
<thead>
<tr>
<th></th>
<th>Conventional Office Perimetry</th>
<th>Optic Disc Analyzer</th>
<th>Peristat ® Virtual Perimetry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sensitivity</strong></td>
<td>&gt;85%</td>
<td>&gt;85%</td>
<td>&gt;83%</td>
</tr>
<tr>
<td><strong>Specificity</strong></td>
<td>&gt;95%</td>
<td>&gt;90%</td>
<td>&gt;90%</td>
</tr>
<tr>
<td><strong>Screening</strong></td>
<td>Eye MD Office-based</td>
<td>Eye MD Office-based</td>
<td>Self testing Home/Online</td>
</tr>
</tbody>
</table>
Peristat – The Clinical Results

Peristat Reproduces HVF Results with High Accuracy

> 90% Sensitivity

> 90% Specificity

Peristat – The Clinical Results

Peristat Reproduces HVF Results with High Accuracy

> 90% Sensitivity

> 90% Specificity

Eye: Right
Error metrics:
- Fixation loss: 11%
- False positives: 0%
- False negatives: 2%
<table>
<thead>
<tr>
<th>Feature</th>
<th>Peristat</th>
<th>Standard Office Perimetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Validation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>85%-90%</td>
<td>85%-90%</td>
</tr>
<tr>
<td>Specificity</td>
<td>90%</td>
<td>90%-95%</td>
</tr>
<tr>
<td>Reliability parameters</td>
<td>False Positives</td>
<td>False Positives</td>
</tr>
<tr>
<td></td>
<td>False Negatives</td>
<td>False Negatives</td>
</tr>
<tr>
<td></td>
<td>Fixation Losses</td>
<td>Fixation Losses</td>
</tr>
<tr>
<td>Multiplex Testing</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Technician-Free</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Home Testing</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Results Data-basing</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Online Recording and Retrieval</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>FDA Clearance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
High-throughput Self-screening via Telemedicine

Incremental cost of test delivery via telemedicine: $0
Online Perimetry Service

User logs-in with Referral Code

User takes a 3-minute test online

Test results are automatically sent to Peristat for review

Peristat reviews test and sends notification via email to member

Test results

Doctor Visit

Follow-up Routine Care

- Online, fully automated process
- Test administration through self-testing
- Telemedicine system for screening and disease management
- Scalable System
- No equipment needed
Glaucoma – The Office Screening Paradigm
2-3 glaucoma cases for every 100 target screens

Repeat Testing 30-40%

$70-100 per test

Office Visit  Registration  Preparation & Instructions  On-Site Testing  Analysis & Review
HEDIS 2005 – Glaucoma Screening Cost Analysis

A More Cost-Effective Method?

Conventional Screening Options

Cost to administer test: $70-$100

Online Visual Field Screening

Cost to administer test: $10-15
Online glaucoma screening: cost-optimized

**Screening Efficacy and Total Cost Per Glaucoma Case Detected**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>100%</td>
<td>$2,400</td>
</tr>
<tr>
<td>30%</td>
<td>80%</td>
<td>$1,430</td>
</tr>
<tr>
<td>50%</td>
<td>60%</td>
<td>$527</td>
</tr>
<tr>
<td>70%</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>90%</td>
<td>20%</td>
<td>$2,400</td>
</tr>
</tbody>
</table>

**Screening Efficacy and Cost Per Glaucoma Screen**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>100%</td>
<td>$120</td>
</tr>
<tr>
<td>30%</td>
<td>80%</td>
<td>$60</td>
</tr>
<tr>
<td>50%</td>
<td>60%</td>
<td>$23</td>
</tr>
<tr>
<td>70%</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>90%</td>
<td>20%</td>
<td>$120</td>
</tr>
</tbody>
</table>

○ = cost ($)

- Survey
- Office Glaucoma Test
- Peristat
- Exam
Peristat Overview

WHY ONLINE PERIMETRY?

Benefits of Telemedicine Screening

- **SCALABILITY**: Can be taken and delivered any time, any place, and to unlimited simultaneous users.

- **SELF-ADMINISTERED AND AUTOMATED**: Online Perimetry is a SELF-test (unaided) – does not require a specialized technician to administer every test.

- **COST SAVINGS**: Online Perimetry requires no equipment and maintenance (Average perimetry device costs $15,000-20,000); Cost to administer a perimetry test - $60-100 per office test vs <$15 for Peristat.