Management of Type 1 Diabetes Using Telemedicine

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Disclosures

No conflicts of interest
Objectives

• Define the role of telemedicine in diabetes care

• Discuss the initial experience with telemedicine implementation at the Barbara Davis Center
Outline

• Defining telemedicine
• Role of telemedicine in diabetes care
• Use of telemedicine for care of pediatric type 1 diabetes
• Summary / Conclusions
Telehealth Definition

• The delivery of health-related services and information via electronic/telecommunications technologies to improve patient’s health status.
  – Electronic Health Record
  – Telemedicine (direct patient care, specialty clinic visit)
  – Consulting (providers or families)
  – Education (CME, conference)

American Telemedicine Association
www.americantelemed.org
Store and Forward

- Capturing an image and **storing** it to then be **forwarded** for review by a medical specialists

- Teleradiology (PACs images), telecardiology (ECHOs), telepathology and teledermatology

*Teleradiology and Image Transfer*

![Web-Based Portals]
Remote Patient Monitoring

Monitoring critical care unit
Live Interactive

School based health clinic

Direct patient care – MFM monitoring
Education / Training / Administrative

Conferences
Care Coordination
Case Review
Consultation
Other Applications

- EMS: Scene, Transport, ED consultation
- Home Health
- Child care centers
- Hospice
- Chronic care - home monitoring
- Interpreting services
- Connecting families

Telesstroke networks throughout the United States

Telesstroke networks may be found in more than 20 states across the country. New telesstroke networks can further expand the reach of specialized stroke care to rural and underserved areas of the United States.
Telehealth in Medicine

- Videoconferencing
  - Education
  - Case review
  - Direct patient care
Telemedicine for Diabetes Care

- Diabetes care is different from other fields of medicine
  - Providers provide recommendations for the home management plan
  - Family and patient must implement the care plan in daily life
  - Insulin dose adjustment based on history from the patient/ family and data from glucose meters, insulin pumps and CGM
Telemedicine for Diabetes Care

- Model using electronic log books for T1D adolescents (n=63) and data sent to physician mobile phone.
  - Physician provided weekly feedback by text messaging
  - Glycemic control improved (median A1c 9.9 to 8.9%)

Telemedicine for Diabetes Care

- Modem transmission of data to providers every 2 weeks - similar glycemic control at decreased cost vs. quarterly visits over 6 months (n=63, mean age = 17 yrs)

- Intensive behavioral therapy by telehealth leads to improved glycemic control (HbA1c decrease 0.74%) in adolescents with poor T1D control

Chase HP, Garg SK et al, Diabetes Care 2003
Lehmkuhl HD et al, J Diabetes Sci Technol, 2010
Telemedicine for Diabetes Care

Previous data

• Use of videoconferencing for adults with diabetes and for youth in the school setting indicate high patient satisfaction

• Use of videoconferencing for pediatric T1D patients in rural areas may allow for more efficient outpatient visits for patients traveling several hours for in-person visits

Outline

• Defining telemedicine
• Role of telemedicine in diabetes care
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• Summary / Conclusions
Barriers To Care in Rural Wyoming

- Travel time
- Cost of travel
- Geographic/ weather barriers
Goals of Telemedicine for T1D Care

• Improve access to care
• Support for local providers
• Reduce travel expenses for families and for providers
• Increase provider productivity
• Reduce travel “burnout”
Telemedicine for youth with T1D

• BDC started telemedicine May 2012
• Current sites: Casper, Cheyenne, Jackson Hole, Wyoming and Durango, CO
• All pediatric T1D patients eligible for study*
• Study participants complete a questionnaire regarding:
  – Their experience with telemedicine
  – Their child’s diabetes control over the previous year
### Patient Demographics

<table>
<thead>
<tr>
<th></th>
<th>Telemedicine Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of T1D youth seen</td>
<td>89 (172 visits)</td>
</tr>
<tr>
<td>Number of T1D youth consented</td>
<td>52</td>
</tr>
<tr>
<td>Age (years)</td>
<td>12.6 ± 3.7 years (range 2 – 19 yrs)</td>
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<tr>
<td>Gender</td>
<td>78% male</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>21.0 ± 5.9</td>
</tr>
<tr>
<td>BMI percentile</td>
<td>63.5 ± 23.6%</td>
</tr>
<tr>
<td>Diabetes duration (years)</td>
<td>5.7 ± 4.2 years</td>
</tr>
<tr>
<td>A1c at first telemedicine visit</td>
<td>9.4 ± 1.7% (range 5.5% - 13.5%)</td>
</tr>
<tr>
<td>A1c at the following visit</td>
<td>9.4 ± 2.0%</td>
</tr>
</tbody>
</table>

Wood, Wadwa et al, ADA 2014
• For 52 T1D youth enrolled, 43 surveys were returned
• 97% of families rated their overall experience with telemedicine as very satisfied or satisfied
• The majority of patients who filled out a survey followed up in telemedicine at least once

Wood, Wadwa et al, ADA 2014
Decreased time off work/school.

Wood, Wadwa et al, ADA 2014
### Visit Frequency

<table>
<thead>
<tr>
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<th>Pre-Telemedicine</th>
<th>Post-Telemedicine</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>#Visits/Year</td>
<td>2.2 ± 1.2</td>
<td>2.8 ± 1.2</td>
<td>0.02</td>
</tr>
<tr>
<td>Seen 0 Times in Year</td>
<td>7/33 (21%)</td>
<td>0/33 (0%)</td>
<td></td>
</tr>
<tr>
<td>Seen 1-3 Times in Year</td>
<td>19/33 (58%)</td>
<td>22/33 (67%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Seen ≥4 Times in Year</td>
<td>7/33 (21%)</td>
<td>11/33 (33%)</td>
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- Telemedicine increased the total number of patient visits per year
- More patients were seen 4 or more times per year after starting telemedicine (per ADA guidelines)

Wood, Wadwa et al, ADA 2014
Summary – BDC Data

• Access to care for rural pediatric T1D patients is increased with telemedicine.

• Patient/family satisfaction is high for telemedicine experience and most return for future visits.

• Initial data - glycemic control equivalent to previous care.

• Further study is needed to determine how telemedicine affects diabetes control over time and if telemedicine can help to reduce the risk of T1D complications.
Challenges

- Identifying good partner sites
- Contracts
- Coding/billing/reimbursement
- Equipment
  - Connectivity
  - Bandwidth
- HIPAA and security
- Interstate licensure
- Credentialing and hospital privileges
- Meter, pump, CGM downloads
Future Plans

• Improve outcomes
• Expand BDC telemedicine program
  – New sites
  – Reach patients who need it most
  – Exploring other uses (education, provider consultation, acute care)
  – Sustainability
• Home use – Patient contacts team from home
  – College students – dorms/ campus
• Shared medical appointments
  – Adolescents, College students
Summary

- Telemedicine and telehealth are broad terms that can apply to many different facets of clinical care.
- Diabetes care for patients with geographic or other challenges to in person care may be more accessible with the use of telemedicine.
- BDC data show T1D youth and families find telemedicine to be more efficient and offer an alternative to making in person visits without a significant decrease in level of diabetes control.
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Camp Colorado
Woodland Park, CO
Questions?

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