Enhancing Access of Underserved Populations to Pediatric Specialty Care through Telemedicine


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Definition: Telemedicine

The use of medical information exchanged from one site to another via electronic communications to support

- Medical diagnosis
- Ongoing patient care
- Remote patient monitoring

- HRSA: The use of electronic communication and information technologies to provide or support clinical care at a distance. Included in this definition are patient counseling, case management, and supervision/preceptorship of rural medical residents and health professions students when such supervising/precepting involves direct patient care.
Definitions

Telemedicine is the use of medical information exchanged from one site to another via electronic communications to support

- Medical diagnosis
- Ongoing patient care
- Remote patient monitoring
  - Telepsychology - psychology services
  - Telepsychiatry - psychiatry services; psychopharmacology

Telehealth encompasses a broader definition of remote healthcare that does not always involve clinical services

- Health-related distance learning
History of Telemedicine

• **Alexander Graham Bell?**

• **1906: ECG Transmission**
  Einthoven, the father of electrocardiography, first investigated on ECG transmission over telephone lines in 1906. “Le telecardiogramme”; Archives Internationales Physiologie. 4:132, 1906

• **1920s: Help for ships**
  During this time, radios were used to link physicians standing watch at shore stations to assist ships at sea that had medical emergencies.

• **1924: The first exposition of Telecare**
  "Radio News" magazine from April 1924. The article includes a spoof electronic circuit diagram which combined all the gadgets of the day.
History of Telemedicine

- **1955: Telepsychiatry**
  - The Nebraska Psychiatric Institute was one of the first facilities in the country to have closed-circuit television in 1955.
  - In 1971 the Nebraska Medical Center was linked with the Omaha Veterans Administration Hospital and VA facilities in two other towns.

- **1967: Massachusetts General Hospital**
  - This station was established in 1967 to provide occupational health services to airport employees and to deliver emergency care and medical attention to travelers.

- **1970s: Satellite telemedicine**
  - Via ATS-6 satellites. In these projects, paramedics in remote Alaskan and Canadian villages were linked with hospitals in distant towns or cities.
# Definition of Telemedicine

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Mode of Interaction</th>
<th>Types of Information Transferred</th>
<th>Minimum Bandwidth Requirements‡</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic or therapeutic consultation</td>
<td>Real-time, one-way or two-way interactive motion video</td>
<td>Voice, sound, motion video images, text, and documents</td>
<td>Moderate to high</td>
<td>Telepsychiatry and mental health applications, remote surgery, interactive examinations</td>
</tr>
<tr>
<td>Diagnostic or therapeutic consultation</td>
<td>Still images or video clips with real-time telephone voice interaction</td>
<td>Voice, sound, still video images or short video clips, text</td>
<td>Low to moderate</td>
<td>Multiple medical applications, including dermatology, cardiology, otolaryngology, orthopedics</td>
</tr>
<tr>
<td>Diagnostic or therapeutic consultation</td>
<td>Still images or video clips with text information; “store-and-forward,” with data acquired and transmitted for review at a later date</td>
<td>Sound, still video images or short video clips, text</td>
<td>Low</td>
<td>Multiple medical applications, including dermatology, cardiology, otolaryngology, orthopedics</td>
</tr>
<tr>
<td>Medical education</td>
<td>One-way or two-way real-time or delayed video</td>
<td>Voice, sound, motion video images, text, and documents</td>
<td>Moderate to high</td>
<td>Distance education and training</td>
</tr>
<tr>
<td>Case management or documentation</td>
<td>Transfer of electronic text, image, or other data</td>
<td>Text, images, documents, and related data</td>
<td>Low to high</td>
<td>Community health information networks, medical record management</td>
</tr>
</tbody>
</table>

*Omits telemedicine consultations performed using the telephone alone.

†Bandwidth is the transmission capacity of a telecommunication link. Conventional telephone lines have relatively little carrying capacity (low bandwidth). High-capacity lines are required to transmit large amounts of information (such as images) rapidly.
Benefits of Telehe

• **Patients**
  – Timely access to locally unavailable services
  – Spared burden and cost of transportation
  – Improvement in quality of care

• **Health Professionals**
  – Access to consultative services
  – Primary care retains oversight of patient care
  – Addresses workforce shortages

• **Communities**
  – Enhanced healthcare/economic empowerment
    • Rural
    • Underserved areas
Financial impact

Telemedicine Market Growth

Telemedicine is one of the fastest growing sectors in healthcare. With increased pressure worldwide on improving the efficiency of care delivery and reducing costs, this growth will be even more explosive in the next five years. Here is a look at the numbers.

**TELEMEDICINE MARKET 2010 - 2016**

- **2010**
  - $9.8 Billion
- Almost Triple
- **2016**
  - $27.3 Billion
  - (forecast)

**HOSPITAL BASED TELEHEALTH TECHNOLOGY**

- $19.5 Billion by 2019

**PATIENTS WORLDWIDE USING TELEHEALTH TECHNOLOGY**

- Less than 350,000 in 2013
- **Approximately 7 Million by 2018**

**HOME BASED TELEHEALTH TECHNOLOGY**

- 24%
- Compound annual growth rate through 2019

**40,000 - 50,000**
- Remote physician consults in 2013 — more than twice the number hosted in 2011.

Resources:
- www.fiercehealthit.com
- www.informationweek.com
- www.beckershospitalreview.com

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Technology

Types of Telemedicine Units

Room Systems

Mobile Systems

Desktop Systems
Telemedicine

- Medical Lab
- Hospital
- Doctor's Office
- Nursing Home
- Mobile Health Worker/Doctor

Connections:
- DICOM
- PACS
- HL7
- Secure Network (Local or Worldwide)
Home Telehealth:

- Primarily clinical monitoring
- Home telehealth devices

- Currently in trial by Veterans Administration
  - Complex heart failure, chronic lung disease, and/or diabetes mellitus
Legal and Regulatory Issues:

Licensure (United States)

• Licensure and Scope of Practice:
  – State-based
  – Must be licensed/registered in each state of electronic practice
  – Exceptions:
    • Physician-to-physician consultations
    • Educational or residential training purposes
    • Border states
    • U.S. Military
    • Public health services
    • Medical emergencies (Good Samaritan) or natural disasters
Telemedicine Credentialing

• Usually required at facility where patient is located (as well as licensure)
• May be required at facility where physician resides
• Depends on the source of payment for the service
  – CMS requirement for Medicare payments
• Joint Commission requirement for accredited facilities
Telemedicine in Maryland

• May 2, 2013: Senate Bill 776 signed by Governor O’Malley,
  – 13th state to require private sector insurance companies to pay for telehealth services.
  – Mandates that private payers cover telehealth services that are considered medically necessary and would otherwise be covered when provided face-to-face.
  – Defines telemedicine (or telehealth) as "interactive audio, video or other telecommunications or electronic technology... to deliver a health care service."
  – Does not apply to audio-only phone conversations, email messages or faxes between providers and patients.

Legal requirements

- Maryland license (exception for physicians practicing in adjoining state)
- The following individuals may practice medicine without a license:
  - A physician licensed by and residing in another jurisdiction, while engaging in consultation with a physician licensed in this State;
  - A physician who resides in and is authorized to practice medicine by any state adjoining this State and whose practice extends into this State, if the physician doesn’t have an office or other regularly appointed place in Maryland to meet patients and the same privileges are extended to licensed physicians Maryland by the adjoining state.
Confidentiality & Security

- Increasing applications
- Ensuring HIPPA compliance
- Providing flexible systems
- Encrypting data
- Finding technical support
- Network design and architecture
Telemedicine Payment: Medicaid & Private Insurance

National Conference of State Legislatures (NCSL.org; accessed 10/6/2014)
Telemedicine Payment: Medicare

• Eligible services:
  – consultation,
  – office visits,
  – individual psychotherapy,
  – pharmacologic management.

• Eligible providers:
  – Physician;
  – Nurse practitioner;
  – Physician assistant;
  – Nurse midwife;
  – Clinical nurse specialist;
  – Clinical psychologist;
  – Clinical social worker;
  – Registered dietitian or nutrition professional.

• Eligible facilities
  – Office of a physician or practitioner
  – Hospital
  – Rural health clinic
  – Federally qualified health center
  – Skilled nursing facility
  – Hospital-based dialysis center
  – Community mental health center
# Telemedicine Payment Models: Contractual

<table>
<thead>
<tr>
<th>Type</th>
<th>Provider</th>
<th>Remote Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracted hourly rate paid by remote site.</td>
<td>Advantage: Payment for services is direct and there is lower overhead since there is no need to bill an insurance company. Disadvantage: The negotiated payment may be lower due to its guaranteed nature.</td>
<td>Advantage: By billing for services the remote site has greater control over its revenue. Disadvantage: Additional overhead is incurred for billing for additional patient visits.</td>
</tr>
<tr>
<td>Contracted time block</td>
<td>Advantages: 1) Payment for services is direct and there is lower overhead since there is no need to bill an insurance company. 2) Payment is received for the time block regardless of whether or not patients are seen. 3) Revenue is a defined amount each period of time. Disadvantage: The negotiated payment may be lower due to its guaranteed nature.</td>
<td>Advantages: 1) By billing for services the remote site has greater control over its revenue. 2) a time block of services is guaranteed to be available. 3) this is a more flexible approach when “fee for service” is not applicable. Disadvantage: 1) Additional overhead is incurred for billing for additional patient visits. 2) The remote site may be required to pay for specialist time even if no patients are seen.</td>
</tr>
</tbody>
</table>

CLINICAL EXPERIENCE:
NEURODEVELOPMENTAL MEDICINE
Telemedicine in Special Populations

• Telemedicine for people with developmental disabilities and children with neurological disorders
  – Literature is scarce – Neurology and Developmental Medicine Lags Behind
    • Stroke
    • Epilepsy
  – UK Assistive Technology Program
  – Speech and Language Pathology
Needs Assessment

- CYSHCN: (birth-21 years) : MD prevalence 15.7% (National 15.1%)
- 28% of children 4mos-5 yr are at a risk for DD but only 22.3% received services
- ASD: MD prevalence 1 in 64 (1 in 68 nationally) (ADDM, 2012)
- Wide disparity between access to services:
  - --central MD concentration of services
  - --Poverty (Balt City 34%; Eastern Shore 23-29%; Western MD 24%)
- Ethnic diversity + poverty (AA 17%; Hispanic 13%)

(MD Commission on Autism report, Sept 2012)
“International Telemedicine Consultations for Neurodevelopmental Disabilities”
Pearl PL, et al. Telemedicine and e-Health 2014

Table 1. Primary Diagnoses

<table>
<thead>
<tr>
<th>PRIMARY DIAGNOSIS</th>
<th>NUMBER OF PATIENTS (N=48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebral palsy</td>
<td>15</td>
</tr>
<tr>
<td>Global developmental disorder</td>
<td>12</td>
</tr>
<tr>
<td>Autism</td>
<td>9</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>7</td>
</tr>
<tr>
<td>Neurogenetic disorders</td>
<td>6</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>5</td>
</tr>
<tr>
<td>Neuromuscular disorders</td>
<td>4</td>
</tr>
<tr>
<td>Systemic disease</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2. Common Comorbidities

<table>
<thead>
<tr>
<th>COMMON COMORBIDITY</th>
<th>NUMBER OF PATIENTS (% OF TOTAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive impairment</td>
<td>32 (67%)</td>
</tr>
<tr>
<td>Communication disorders</td>
<td>32 (67%)</td>
</tr>
<tr>
<td>Behavioral disorders</td>
<td>16 (33%)</td>
</tr>
</tbody>
</table>

Table 3. Specific Management Recommendations

<table>
<thead>
<tr>
<th>SPECIFIC MANAGEMENT RECOMMENDATIONS</th>
<th>NUMBER OF PATIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech therapy</td>
<td>26</td>
</tr>
<tr>
<td>DNA studies</td>
<td>23</td>
</tr>
<tr>
<td>Orthotics</td>
<td>18</td>
</tr>
<tr>
<td>Imaging studies</td>
<td>14</td>
</tr>
<tr>
<td>Botulinum toxin</td>
<td>9</td>
</tr>
<tr>
<td>Behavioral therapies</td>
<td>8</td>
</tr>
<tr>
<td>Referral for orthopedic surgical procedures</td>
<td>6</td>
</tr>
<tr>
<td>Antiseizure medication management</td>
<td>5</td>
</tr>
<tr>
<td>Kinesiotaping</td>
<td>3</td>
</tr>
</tbody>
</table>
Evaluating Interactive Videoconferencing for Assessing Symptoms of Autism
Reese RM, et. al, Telemed J E Health 2013

• Comparison of Autism Diagnostic Observation Schedule (ADOS)-Module 1, Autism Diagnostic Interview-Revised (ADI-R), and parent satisfaction for in-person and interactive videoconferencing.

• Ten children (3-5 years old) with developmental delays and 11 children matched on chronological age with a diagnosis of autism.

• Assessed and interviewed either in-person or over videoconferencing.

• **Results**: No significant difference in:
  – reliability of diagnostic accuracy,
  – ADOS observations,
  – ratings for ADI-R parent report of symptoms,
  – parent satisfaction
Telehealth in Developmental-Behavioral Pediatrics

Neelkamal S. Soares, MD,* Diane L. Langkamp, MD, MPH†

ABSTRACT: Developmental-behavioral pediatrics (DBP) is recognized as one of the fields with the greatest shortages of pediatric subspecialists. Families who access care often must travel great distances to tertiary academic medical centers or endure long waiting lists. While the shortages are likely to persist due to limited provider availability and an increasing number of children with developmental and behavioral disorders being identified, our field must look to innovative ways to reduce the barriers to access. One such way is telehealth, the use of videoconferencing to deliver DBP services to underserved populations. We aim to describe the practical uses of telehealth for the delivery of diagnostic and management clinical services in a variety of settings and for the additional educational and research benefits of the modality. We will highlight the obstacles to setting up a successful DBP telehealth practice and direct readers to resources to address these in their communities. Most of all, we will demonstrate the benefit to families and children, practitioners, and health care systems of supplementing traditional in-person DBP services with telehealth modalities to enhance outreach and engagement with communities.


Developmental Neurorehabilitation, December 2010; 13(6): 423–432

SUBJECT REVIEW

Telepractice in the assessment and treatment of individuals with autism spectrum disorders: A systematic review

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¹University of Massachusetts Amherst, Amherst, USA and ²Texas State University, San Marcos, Special Education, San Marcos, USA
Goals of Telemedicine Project

• Telemedicine can be additive to current diagnostic services and Therapeutic interventions that is provided at KKI and can serve to address the needs identified and also serve to improve patient health care outcomes and quality of life.

• We hope to identify and drive best practices and potential use cases for telemedicine use to improve and increase therapeutic support for CYSHCN, cost effectively and for better therapeutic outcomes.

• Improve care of CYSHCN within their medical homes and communities.
AGH-KKI Developmental medicine telemedicine clinic
Telemedicine suite
Telemedicine suite
Telemedicine on the Eastern Shore

• Delmarvanow.com: Telemedicine program connects doctors in Baltimore with child patients in Berlin

NDD Evaluation
Evaluation Experience.

• First KKI Telemedicine clinic with AGH was on 12/13/2013.
• Held every 2nd and 4th Friday of the month for 6 mos (Pilot).
• 2 patients scheduled for 90 mins each. One monthly whole day clinics where 4 new pts and 2 follow up patient scheduled
• Access granted to AGH EMR system.
• Currently both providers have been present for all the visits.
• Have been able to do developmental screening using CAT/CLAMS; Gessel Figures; Block design, WRAT-4 etc.
• Providers will figure out what other tests can be reliably done via telemedicine. (Standardize)
• Have trained the Telemedicine RN at AGH, Dornese Whittington who facilitates testing.
• In the process of gathering info about local resources.
Current clinical experience_ Outcomes

- Outcomes- wait times, demographics, drawing area, patient satisfaction, community relations
- We are monitoring Parent satisfaction; Referring physician satisfaction; KKI consultant satisfaction.
Current Clinical information.

- Between Dec 2013 and Sept 2015 we saw 100 patients in total
- Show rate 93/100 (93%)
- Ages: 18 mos to 15 yrs;
  - (0-3 yrs=8%; 3-5 yrs= 24%; 5-12 yrs= 57%; >12 yrs =9%)
- **Most common diagnosis:**
  ADHD= 21 and Disruptive behavior disorder =21
  ASD=22
  Mixed Receptive Expressive language delay = 20
  Anxiety=4
  DCD and Sensory issues=1
  Specific learning issues=6
  Others( Microcephaly=1; Dysmorphic features=1; feeding issues=1; sleep issues=1)
## Clinic Demographics

<table>
<thead>
<tr>
<th></th>
<th>Number of patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial</strong></td>
<td>32</td>
<td>78.05%</td>
</tr>
<tr>
<td><strong>Follow Up</strong></td>
<td>5</td>
<td>12.20%</td>
</tr>
<tr>
<td><strong>No Show/Cancel</strong></td>
<td>4</td>
<td>9.76%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>41</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
## Referral/Followup pattern

<table>
<thead>
<tr>
<th>Follow-up method</th>
<th>Number of patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No further follow-up</td>
<td>6</td>
<td>14%</td>
</tr>
<tr>
<td>Via telemedicine only</td>
<td>8</td>
<td>19.51%</td>
</tr>
<tr>
<td>Via telemedicine plus clinic visit</td>
<td>8</td>
<td>19.51%</td>
</tr>
<tr>
<td>Via clinic visit</td>
<td>15</td>
<td>36.59%</td>
</tr>
</tbody>
</table>
Lessons Learned

• Good resource for Neurological and NDD consultation
• Good patient satisfaction
• Good show rate
• Increased collaboration with PCP and community providers
• Ability to steer referrals as needed and cutting down on unnecessary consultations at main hospital
• Avenue for education of paraclinical
Lessons learned

• Need Good IT staff at both sites.
• Can have technical glitches.
• Telemedicine compatibility
• More standardized methods of doing ASD evaluation and Neuro evaluation
Telehealth Operations Module

Developed by: The Great Plains Telehealth Resource and Assistance Center under a HRSA Office for the Advancement of Telehealth grant

This module will address topics related to how a telemedicine service is established or developed and operated. In particular, it will focus on medical specialty consultation services provided via telemedicine where a medical specialist in any of a variety of fields from allergy and asthma to urology is involved with examining, diagnosing and treating a patient at another geographic location. Telemedicine is just one of several aspects of telehealth. If you are interested in home telehealth services, such as home monitoring, using telehealth technologies for distance learning or training, telediagnosis, remote ICU services, telepharmacy, school based services or other types of services not listed here, you will need to consult other modules.

This module is intended to address the concerns and questions of organizations and providers who are interested in offering telemedicine services either within their own organization or to other medical care settings or among individual patients. It is not intended to

Types of Telemedicine Specialty Consultation Services

Organization of Telemedicine Services

Getting Started

Staffing and Recruiting Specialists

Training

Facilities at the Provider Site

Facilities at the Patient Site

CREDENTIALING AND LICENSING

Legal Issues (Privacy and Contracting for Services)
Telehealth Resource Centers

- 12 Regional Centers and 2 National Centers
- Funded by the HRSA Office for the Advancement of Telehealth, in Office of Rural Health Policy
- Mission: Advancing the effective use of telehealth & support access in rural and underserved communities
Additional Information

- HRSA
  [http://www.hrsa.gov/ruralhealth/about/telehealth/telehealth.html](http://www.hrsa.gov/ruralhealth/about/telehealth/telehealth.html)

- Center for Medicare and Medicaid Services (CMS)

- Telehealth Resource Centers

- American Telemedicine Association (ATA)
  [http://www.americantelemed.org/home](http://www.americantelemed.org/home)

Journals:
- Telemedicine and e-Health
- Journal of Telemedicine and Telecare