Development and Implementation of a Telemedicine Program at an NCI-Designated Cancer Center

April 25, 2019
Overview

• Introduction to Jefferson Health System
• History of telemedicine
• Telemedicine Program within Jefferson Health System
• Outline telehealth opportunities in cancer care
• Discuss unique telehealth practice factors
• Delineate potential future directions for developments in telehealth.
Andrew E. Chapman DO, FACP
Adam Binder MD
Ana Maria Lopez MD, MPH, MACP
We Improve Lives.

Thomas Jefferson University Hospital is ranked among the Top 5 in the nation in Ophthalmology and Orthopedics.

Nationally Ranked Specialties

OPHTHALMOLOGY
Wills Eye Hospital

ORTHOPEDICS
Rothman Institute at Jefferson
The Philadelphia Hand to Shoulder Center at Jefferson

CANCER
Sidney Kimmel Cancer Center – Jefferson Health

CARDIOLOGY & HEART SURGERY

EAR, NOSE AND THROAT

GASTROENTEROLOGY & GI SURGERY

GERIATRICS

NEPHROLOGY

NEUROLOGY & NEUROSURGERY
Vickie and Jack Farber Institute for Neuroscience – Jefferson Health

UROLOGY
14 Hospitals

• Abington Hospital*
• Abington – Lansdale Hospital**
• Jefferson Bucks Hospital
• Jefferson Cherry Hill Hospital*
• Jefferson Frankford Hospital
• Jefferson Hospital for Neuroscience*
  – Vickie and Jack Farber Institute for Neuroscience
• Jefferson Methodist Hospital*
• Jefferson Stratford Hospital*

• Jefferson Torresdale Hospital
• Jefferson Washington Township Hospital*
• Magee Rehabilitation Hospital
• Physicians Care Surgical Hospital
• Rothman Orthopaedic Specialty Hospital
• Thomas Jefferson University Hospital*
  – Sidney Kimmel Cancer Center (NCI-designated)

6,100 physicians/practitioners

7,400 nurses (full/part time)

40+ outpatient and urgent care locations

Over 4.5 million patient interactions annually

* Magnet® designation from the American Nurses Credentialing Center for nursing excellence
** Pathway to Excellence® designation from the American Nurses Credentialing Center for sustaining a positive practice environment
Academic Areas of Interest

- Architecture
- Business
- Design
- Engineering
- Fashion & Textiles
- Health
- Science
- Social Science

Campuses
- Center City
- East Falls
- Abington-Dixon
- Bucks County
- Delaware County at Pennsylvania Institute of Technology
- New Jersey

International Study Locations & Research Centers
- Latin America
- Ireland
- Israel
- Italy
- India
- Japan
10 Colleges + 3 Schools

- College of Architecture and the Built Environment
- College of Biomedical Sciences
- College of Health Professions
- College of Humanities and Sciences
- College of Life Sciences
- College of Nursing
- College of Population Health
- College of Pharmacy
- College of Rehabilitation Sciences

- Kanbar College of Design, Engineering and Commerce
  - School of Business
  - School of Design and Engineering

- Sidney Kimmel Medical College

- School of Continuing and Professional Studies

Honors

- Philadelphia University Honors Institute

160+ Graduate & Undergraduate programs

63,000 Alumni

7,400 Students (full/part time)

over $136 million in public/private research funding.

17 NCAA Division II Teams

1,000 patents for new drugs, software innovations, medical devices and diagnostic tools

Nationally ranked in emergency management, fashion, graphic design, interior design, occupational therapy, physician assistant, primary care, research and strategic leadership.
Primary Catchment
- Greater Philadelphia region
- 1 hour drive from integral academic site (TJUH)
- Majority patient base
- 4 counties

<table>
<thead>
<tr>
<th>County</th>
<th>FY16 Volume</th>
<th>FY 2016%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philadelphia County</td>
<td>63,155</td>
<td>43.6%</td>
</tr>
<tr>
<td>Montgomery County</td>
<td>19,205</td>
<td>13.3%</td>
</tr>
<tr>
<td>Camden County</td>
<td>9,444</td>
<td>6.5%</td>
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<tr>
<td>Delaware County</td>
<td>8,262</td>
<td>5.7%</td>
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<tr>
<td>Bucks County</td>
<td>6,872</td>
<td>4.7%</td>
</tr>
<tr>
<td>Burlington County</td>
<td>6,689</td>
<td>4.6%</td>
</tr>
<tr>
<td>Gloucester County</td>
<td>5,626</td>
<td>3.9%</td>
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<tr>
<td>Atlantic County</td>
<td>4,936</td>
<td>3.4%</td>
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<tr>
<td>Chester County</td>
<td>4,034</td>
<td>2.8%</td>
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<tr>
<td>Cape May County</td>
<td>2,713</td>
<td>1.9%</td>
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<tr>
<td>New Castle County</td>
<td>2,583</td>
<td>1.8%</td>
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<tr>
<td>Ocean County</td>
<td>2,563</td>
<td>1.8%</td>
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<tr>
<td>Mercer County</td>
<td>1,856</td>
<td>1.3%</td>
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<tr>
<td>Cumberland County</td>
<td>1,769</td>
<td>1.2%</td>
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<td>Berks County</td>
<td>1,567</td>
<td>1.1%</td>
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<td>Monmouth County</td>
<td>674</td>
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<td>Salem County</td>
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<tr>
<td>Lehigh County</td>
<td>479</td>
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<tr>
<td>Northampton County</td>
<td>395</td>
<td>0.3%</td>
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<tr>
<td>Lancaster County</td>
<td>220</td>
<td>0.2%</td>
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<tr>
<td>Middlesex County</td>
<td>220</td>
<td>0.2%</td>
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<tr>
<td>Somerset County</td>
<td>204</td>
<td>0.1%</td>
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<tr>
<td>Kent County</td>
<td>202</td>
<td>0.1%</td>
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<tr>
<td>Cecil County</td>
<td>180</td>
<td>0.1%</td>
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<tr>
<td>Hunterdon County</td>
<td>175</td>
<td>0.1%</td>
</tr>
<tr>
<td>Warren County</td>
<td>84</td>
<td>0.1%</td>
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</table>

* Catchment area population greater than 21 individual states
SKCC at a glance:
Clinical Portfolio: SKCC as an enterprise sees approximately 8,900 new index cases annually.

- Center City region - ~ 4,800 new cancer patients with ~19% on interventional clinical trial
- Northern region - ~ 2,300 cancer patients
- Northeast - ~ 1,100 cancer patients
- South Jersey - ~ 700 cancer patients
<table>
<thead>
<tr>
<th>SKCC Network Partners currently accruing to SKCC trials</th>
<th># Cases</th>
<th>Current # Interventional Trials Active</th>
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</thead>
<tbody>
<tr>
<td>Brandywine</td>
<td>188</td>
<td>0</td>
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<tr>
<td>Delta Medix</td>
<td>n/a</td>
<td>0</td>
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<tr>
<td>Doylestown</td>
<td>757</td>
<td>0</td>
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<tr>
<td>Easton</td>
<td>367</td>
<td>0</td>
</tr>
<tr>
<td>Einstein Phila</td>
<td>1163</td>
<td>9</td>
</tr>
<tr>
<td>Holy Redeemer</td>
<td>635</td>
<td>0</td>
</tr>
<tr>
<td>Jennersville</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Nemours</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>Nazha</td>
<td>n/a</td>
<td>2</td>
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<tr>
<td>Phoenixville</td>
<td>276</td>
<td>0</td>
</tr>
<tr>
<td>Reading</td>
<td>1669</td>
<td>2</td>
</tr>
<tr>
<td>St. Francis</td>
<td>198</td>
<td>1</td>
</tr>
<tr>
<td>Suburban</td>
<td>202</td>
<td>8</td>
</tr>
<tr>
<td>Trinitas</td>
<td>542</td>
<td>5</td>
</tr>
<tr>
<td>Wills Eye</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>Mercy (3 sites of care)</td>
<td>692</td>
<td>16</td>
</tr>
<tr>
<td>Pocono</td>
<td>563</td>
<td>21</td>
</tr>
<tr>
<td>Kennedy</td>
<td>1253</td>
<td>6</td>
</tr>
<tr>
<td>Riddle</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>Hem &amp; Onc Assoc of NE PA</td>
<td>n/a</td>
<td>31</td>
</tr>
<tr>
<td>Hudson Valley</td>
<td>n/a</td>
<td>6</td>
</tr>
<tr>
<td>NE Rad Onc Ctr</td>
<td>n/a</td>
<td>23</td>
</tr>
<tr>
<td>Sparta</td>
<td>n/a</td>
<td>28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8605</strong></td>
<td><strong>158</strong></td>
</tr>
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</table>
Telemedicine

The Institute of Medicine defines telemedicine as “the use of electronic information and communications technologies to provide and support health care when distance separates the participants.”
History - Telemedicine is not a new phenomenon

• 1906: Dutch Willem Einthoven developed an electrocardiograph that using a string galvanometer and telephone wires was able to transmit and EKG from 1.5km away.

• 1920’s: Norwegian physicians provided medical advice to sick ship crew members at sea via a radio link.

• 1967: Dr. Kenneth Bird established a clinic at Mass General Hospital to treat patients at Logan International Airport through an audio-visual microwave circuit.

• 1970’s: Term Telemedicine coined. Literally means “healing at a distance.”
History Cont.

• 1990s-2000s: Broadband internet and telecommunications infrastructure expands throughout the world connecting remote areas to large medical centers.
  • Video Conferencing between physicians discussing difficult cases (i.e. ECHO model from University of New Mexico).
  • Tele-Stroke model (real time interactive video/monitoring).
  • Tele-ICU model (physician monitoring data from distant site in real time).
  • Teledermatology (store and forward of images).
  • E-Consultation through EMR or third party platform (VA hospital; San Francisco General).

Silva et al. Stroke. 2012; 43:00-00.
Warshaw E, et al. Teledermatology for Diagnosis and Management of Skin Conditions: A Systematic Review of the Evidence [Internet]. Washington (DC): Department of Veterans Affairs (US); 2010 Jan.
Telemedicine

- Telemedicine is about how to optimize use of technology into daily work flows and operations.
- Telemedicine is a care delivery model.
- The medicine is the same.
Medical Consultation
Teleconsultations
Telemedicine

• You can do a physical exam.

• You might actually get different information than in an office visit.
  • It is about actionable information.
Virtual physical exam
JeffConnect - Scope of Telemedicine at Thomas Jefferson University
Metrics Now Aligned with NQF Measure Framework

Creating a Framework to Support Measure Development for Telehealth

FINAL REPORT
AUGUST 31, 2017

TABLE 2. DOMAINS AND SUBDOMAINS OF THE TELEHEALTH MEASUREMENT FRAMEWORK

<table>
<thead>
<tr>
<th>Domain</th>
<th>Subdomain(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to Care</td>
<td>• Access for patient, family, and/or caregiver&lt;br&gt;• Access for care team&lt;br&gt;• Access to information</td>
</tr>
<tr>
<td>Financial Impact/Cost</td>
<td>• Financial impact to patient, family, and/or caregiver&lt;br&gt;• Financial impact to care team&lt;br&gt;• Financial impact to health system or payer&lt;br&gt;• Financial impact to society</td>
</tr>
<tr>
<td>Experience</td>
<td>• Patient, family, and/or caregiver experience&lt;br&gt;• Care team member experience&lt;br&gt;• Community experience</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>• System effectiveness&lt;br&gt;• Clinical effectiveness&lt;br&gt;• Operational effectiveness&lt;br&gt;• Technical effectiveness</td>
</tr>
</tbody>
</table>
JeffConnect Programs

- Health professional training
  - Mandatory and optional modules
- Telehealth facilitator program
  - Nonprovider support staff
- Pre-health professionals
  - PACU Ambassador & Virtual Rounds
  - Fellowship program

- Undergraduate (medical student) elective
- Graduate medical education (resident) elective
- Fellowship program
- Continuous Medical Education
  - Physical examination skills, simulation
  - Institute for Digital Health
Best Practices - Telemedicine training

- Essential, multi-step process
- Overview didactics program
- Hands-on training
- On-site - reference number
- Single point of contact
- Intermittent updates
- Checklist
On-Demand (Direct to Consumer) Care

- **Access To Care (24/7/365 Jefferson providers)**
  - 40% of visits new patients
  - 83% would have sought care elsewhere

- **Financial Impact/Cost**
  - Savings of approx $100 per encounter

- **Experience**
  - Net Promoter Score > 70
  - Time saved over one hour = 87%
  - *Already recommended JeffConnect = 81%*

- **Effectiveness**
  - Antibiotic stewardship for sinusitis equal or better than ED/UC
  - Health complaint addressed as hoped the overwhelming majority of the time
  - Most received no further care
Scheduled Appointments (including Post Discharge)

- **Access To Care**
  - Over 1000 providers trained
    - > 400 providers regularly engaged

- **Experience**
  - Net promoter score = 59
  - 85% reported time savings > 1 hour
  - 86% said they were better able to receive care when/where needed
  - *Already* recommended JeffConnect = 43%

- **Effectiveness**
  - Same level of care as in-person visit = 83%
Telehealth Growth at Jefferson

Telehealth Volume

Q1 FY16  Q2 FY16  Q3 FY16  Q4 FY16  Q1 FY17  Q2 FY17  Q3 FY17  Q4 FY17  Q1 FY18  Q2 FY18  Q3 FY18  Q4 FY18  Q1 FY19  Q2 FY19

Total JNN  Total JeffConnect
Tele-oncology
Tele-Oncology

- Definitions
- Outline telehealth opportunities in cancer care
- Discuss unique telehealth practice factors
- Delineate potential future directions for developments in telehealth.
What is telemedicine?

• Telemedicine utilizes telecommunications technology as a tool to deliver health care to populations with limited access to care
Telemedicine approaches

• Synchronous:
  • Videoconference, fully interactive
  • Real-time
  • Specific attachments for the exam
  • Schedule: teleconsultant, telepresenter, pt

• Asynchronous
  • Store-forward
  • Review of clinical data at an alternate time
  • Schedule: teleconsultant

• Combination
What Makes a Good Teleconsultation?

• Understand the goal of the consultation
  • Increase access to specialty care
  • Confirm diagnosis
  • Assist in triage
• Assure complete data and diagnostic images
• Build in quality review
Teleoncology

Use of telehealth technology in cancer care.

• Multidisciplinary in nature:
  • Prevention, early detection, diagnostic consultation, surgical oncology, medical oncology, radiation oncology evaluation, clinical trial education and evaluation, supportive care and follow-up, palliation, tumor board and chart review models of care.
Why telemedicine? Why telehealth? Why tele-onc?

• Space Technology Applied to Rural Papago Advanced Health Care (STARPAHC)
Populations that benefit from tele-oncology

- Remote:
  - Rural
  - Frontier
  - Incarcerated

- Difficult access
  - Urban
Is telemedicine as effective as in-person care?

- Overall, studies demonstrate equivalency
  - HIPAA compliant technology
- Some studies show improved outcomes
- Fairly uniform high level of patient and clinician satisfaction
- How can we best use tele-applications in oncology care?
Rationale for tele-oncology

- Virtually redistribute oncology workforce to meet healthcare needs:
  - Shortage of oncologists
  - Maldistribution of health care
  - Greying of the population
  - Direct to “consumer” care

- Provide care when needed

- Consider: diagnostic question dictates technology use
  - Transmission of images/sounds
  - Where the “talk is the treatment”
  - The right technology for the diagnostic question
Tele-genetics, Tele-survivorship, Tele-behavioral health
Bundling of tele-oncology services

• Oncology care is multidisciplinary
• Evaluate:
  • Rash, Supportive care (nutrition, physical activity, support group), Pain, Medication review, Hospice care
  • Technology to fit the diagnostic question
• Bundled services: may include in-person
  • Tele-radiology
  • Tele-pathology
  • Tele-oncology
    • Tele-nursing: patient education
    • Tele-navigation
    • Tele-symptom management
Digital Mammography

Tuba City

Tucson, AZ
Teleradiology
Telepathology

- Common area of need
- Barriers:
  - Inability to review all the tissue
  - Length of fixation
  - Cumbersome nature of robotic microscopy
Digital Scanning

"array microscope"
• 80 tiny lens systems
• staggered rows
• transparent disc
• size of a quarter: 1” diameter
• 24-megapixel camera
  • most digital cameras: 3-5 megapixels
Scans a tissue sample and produces a precise diagnostic image with a resolution of up to 54,000 dots per inch: 700x that of a picture made on a home printer
Process takes less than a minute.
Field of view
Arizona Telemedicine Program 2013

Virtual Slide Image Acquisition

Raster scanning
The Virtual House Call
Portable Telemedicine System

- Canon G2 4.0 M pixel Digital Camera
- American TeleCare Digital Stethoscope
- Koss Porta Pro 15-25,000 Hz Headphones
- Starview SV 8000i IP Videophone
- to Wireless LAN Connection
- to 100V-240V AC

Sidney Kimmel Cancer Center
Jefferson Health | NCI – designated

Until every cancer is cured
Home Health Care Applications

- Wound care
- Post-operative care
- Pre-organ transplantation
- Physical therapy

- Tele-geriatrics
- Tele-palliative care
Facilitate access to cancer clinical trials

• Eligibility assessment
• Consent
• Follow-up
  • Symptom assessment
Newest Health Care Tool
Symptom Monitoring
Limitations
Virtual Reality Palpation
National survey of telemedicine uptake (ACP)

• Random sample of internal medicine specialists and subspecialists
• 51% have access to a telehealth technology
• Most common use: connect with another physician
• Nearly 20% have access to video technology
  • Of which nearly 20% use the system regularly
Jefferson Tele-Oncology Engagement

- Breast: 14
- Head and neck/Lung: 28
- GI: 22
- GU: 3
- GYN: 5
- Skin: 2
- Malignant heme: 90
- Geri: 5
- Genetics: 2
- Palliative: 56
- Tele-nursing: 7
- Tele-social work: 1
Jefferson Tele-Oncology Engagement

<table>
<thead>
<tr>
<th>E-PRO Application Pilot</th>
<th>Post Discharge Video Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>71 Patients Approached</td>
<td>56 Post Discharge Video Visits</td>
</tr>
<tr>
<td>43 Eligible</td>
<td>22 Visits resulted in Medication Reconciliation/Education</td>
</tr>
<tr>
<td>21 Registered</td>
<td>13 Visits resulted in Symptom Management</td>
</tr>
</tbody>
</table>
Patient reported outcomes study (NIMHHD)

- Reporting vital signs from a distance
- Reporting of symptoms from a distance
- Tele-oncology nursing contact when initiated by
  - Patient symptom prompt
- Tele-oncology contact initiated by nursing
- Feasibility, clinical/cost efficacy
Future work

• Use of telehealth technology to support
  • Transitions of care
    • Prevent hospitalization
    • Support patient at home for:
      • Symptom management/Palliation
    • Provide the right care at the right time to the right patient *always*
Telehealth payer rules vary by state

- Medicaid and private insurance coverage for telehealth
- Medicaid coverage for telehealth
- Private insurance coverage for telehealth
- No required coverage for telehealth
- May not apply to all health care services

American Telemedicine Association: State Policy Resource Center
http://www.americantelemed.org/policy-page/state-policy-resource-center

States with the year of enactment:
- Alaska (2018)*
- Arizona (2013)*
- Arkansas (2015)
- California (1996)
- Colorado (2001)
- Connecticut (2015)
- Delaware (2015)
- Georgia (2006)
- Hawaii (1999)
- Indiana (2015)
- Iowa (2018)
- Kentucky (2000)
- Louisiana (1995)
- Maine (2009)
- Maryland (2012)
- Michigan (2012)
- Minnesota (2016)
- Mississippi (2013)
- Missouri (2013)
- Montana (2013)
- Nebraska (2013)
- Nevada (2015)
- New Hampshire (2016)
- New Jersey (2013)
- New Mexico (2013)
- New York (2014)
- North Dakota (2017)
- Oklahoma (1997)
- Oregon (2009)
- Rhode Island (2016)
- Tennessee (2014)
- Texas (1997)
- Vermont (2012)
- Virginia (2010)

States with proposed legislation:
- In 2018, Alaska, Massachusetts, Pennsylvania, and South Dakota

*Coverage applies to certain health services.

http://legacy.americantelemed.org/policy-page/state-policy-resource-center
And so you want to do tele-health...
Acknowledgements:

Arizona Telemedicine Program
https://telemedicine.arizona.edu/

Huntsman Cancer Institute
University of Utah Health Sciences
https://healthcare.utah.edu/huntsmancancerinstitute/
Thank You to...

- The participants
- The collaborators/partner sites
- The funders:
  - Better Than Ever
  - Health Resources and Service Administration
  - Arizona Biomedical Research Commission
  - National Cancer Institute
  - National Institute of Minority Health and Health Disparities
We will now take questions for our presenters. Please use the question box on the lower right to submit a question. Questions will be answered as time permits.