Telemedicine and Telehealth: The Future is NOW!
Through incorporation of telemedicine technology into our daily practice of medicine, we can optimize:

- Patient care
- Quality and outcomes
- Population health
- Customer service
- Access
- Practice efficiency
- Job satisfaction
- Cost savings
What is Telemedicine/Telehealth?

1. **Telehealth**: Use of technology to bridge distances in any aspect of medicine including clinical care (telemedicine), administrative functions, education, research, quality improvement, and advocacy

2. **Telemedicine**: Use of technology to conduct clinical medicine at a distance
   - Traditional subspecialty telemedicine: Hospital to hospital, clinic to clinic, MD to MD, MD to home
   - Rapidly growing direct to consumer telemedicine: via computer, tablet, smart phone…
Global Telehealth Services Market Growth

Billions of US Dollars

30% Large Employers
$6 Billion Savings/2 years

2010: $9.8
2011: $11.6
2012: $13.8
2016: $27.3
2020: $58.8
Building a Telemedicine Practice

- Store Forward
- Remote Monitoring
- Live Video
- Mobile Health
Use Cases May Be Achieved Across Multiple Modalities

Telehealth Use Cases, Relevant Modalities, and Investment Required

Use Cases
- Professional Consultation
- Diagnosis & Treatment
- Education & Engagement
- Ongoing Monitoring & Care Coordination

Modalities
- Videoconference
- Asynchronous Store-and-Forward
- Remote Device
- Telephone
- Patient Portal
- Mobile App
Our Infrastructure: Videoconferencing

Enterprise Video Network

- Over 100 sites/400 users
- Room, desktop, PC, tablet/smartphone
- Partners in 21 states and 19 countries
- 15 Years: 15,000 consults/3,000 conferences
- State of the art upgrade in progress: Convergence of video and Webex: **Jabber**
LifeImage Cloud Server
Cloud based software that enables physicians to send and receive exams to and from colleagues and import them into a patient’s EMR. Shared account with Children’s Boston

Our Infrastructure: Asynchronous

- VPN
  - Machines
  - Remote PACs
- Direct log in to remote PACs systems
- SFTP (Historical)
- Our PACs (Xcelera)
  - Full program: Client
  - View only: Web
Objectives

1. How did we get here?
2. Where are we going?
Live Transmission of Neonatal Echocardiograms from Underserved Areas: Accuracy, Patient Care, and Cost

CRAIG SABLE, M.D., F.A.C.C., F.A.A.P., THERESA ROCA, M.D., JACK GOLD, R.B.P., ALBERT GUTIERREZ, M.D., EILEEN GULOTTA, R.D.C.S., and WALTER CULPEPPER, M.D.
Washington, DC 1998
Telemedicine eliminated the need for consultation in 194 cases. This resulted in average time savings of 4.2 person-hours/wk.

...is diagnostic, improves patient care and echocardiography quality, is efficient, and impacts referral patterns.
Interpretation/Diagnosis:
Moderate PDA

Recommendations/Management:
Transfer to CNMC for surgical ligation
History of Pediatric Tele-Echocardiography

- 1989, 97 – Finley, Nova Scotia: Real time over POTS, cost savings
- 1993 – Strobczyk, Kentucky: Store and forward over POTS
- 1996 – Fisher, Chicago: Real time over single ISDN line
- 1998 – Rendina, North Carolina: Reduced length of stay
- 1999 – Houston, Glasgow: 100% accuracy requires 3 ISDN lines
- 1999 – Randolph, Minnesota: Accuracy, management over T1
- 2006 – Lewin, Seattle: 769 studies/3 ISDN lines/99% accurate
- 1999 – Scholz, Iowa:
  - Positive echos
<table>
<thead>
<tr>
<th>Ordering MD</th>
<th>&lt; 1 year</th>
<th>&gt; 1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatrician</td>
<td>15%</td>
<td>24%</td>
</tr>
<tr>
<td>Peds Card</td>
<td>24%</td>
<td>83%</td>
</tr>
</tbody>
</table>
- 2003 – Sharma, New York: Live fetal echo accuracy/3 ISDN lines
- 2011 – Mckrossen, Belfast: Store/forward fetal echo accurate
Original Research
The Evolution of Pediatric Tele-echocardiography: 15-Year Experience of Over 10,000 Transmissions

Anita Krishnan, MD, Mary Fuska, MHS, Ron Dixon, MD, and Craig A. Sable, MD, FAAP, FASE

- Guam
- New Mexico
- Delaware
- Virginia
- District of Columbia
- Maryland
Outcomes

- Medical Management: 29%
- Outpatient Follow up: 43%
- Discharge: 26%
- CNHS Admission: 2%

Technology Transition

IP Expansion: Live Sites

IP Expansion: Store and Forward Sites

Multicenter Study
Patients without Critical Heart Disease

Pulse Ox Screening for CCHD
Demand for National Telemedicine Solution

http://cchdscreeningmap.org/
Our Regional Network
Neuro-Oncology Tumor Boards
Genetics, Pulmonary and Diabetes

![Chart showing trends in genetics, pulmonary, and diabetes over years 2009 to 2014]
Genetics APP

Step 3: Family History

Add Sibling

Step 4: Exam Photos

- Right Head
- Left Head
- Anterior Facial
- Posterior Facial
- Right Hand
- Left Hand
Dear Flora-

I just wanted to take a moment to write a letter of appreciation to you and your entire team. The diabetes program here at PRMC in conjunction with Children’s Hospital in DC has been a godsend for me.

I am a divorced mother of 2 girls. My younger daughter was diagnosed at 3 1/2 years old with type 1 diabetes. My older daughter was diagnosed in July. My kids were so young and I did not know how to handle this. It was overwhelming and difficult.

I have worked here since 1996 in the capacity of a medical assistant. I would be at a loss to keep up with all the work needed to manage a diabetes program. I am not sure what I would have done without your help.

In July I thought I was not going to be able to handle two type 1 diabetic children - my kids or I did nothing wrong to get this disease...but you have helped me see that there is light!!!

In July I thought I was not going to be able to handle two type 1 diabetic children.

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic children...

In July I thought I was not going to be able to handle two type 1 diabetic childhood...
TeleDiabetes: School

Telemedicine
- ↓ Urgent calls
- ↓ Hospitalizations
- ↓ ED visits

Business Modeling

FY14: $21 million charges/$8 million collected: 36 telecardiology babies referred for surgery/cath

Clinical efficiency
Patient satisfaction
Communication

Clinical Revenue
Direct
Downstream

Practice Efficiency

Non-Clinical Revenue

Grants/Philanthropy
Consultation
Education
Branding

New partner institutions/systems
Expansion at existing sites
New Specialties
Global markets
Remote Monitoring Devices

- Reduced readmissions
- Improved chronic disease-related mortality
- Reduced ED visits
- Improved care coordination

Remote Monitoring has Wide Reach

19 Million
Estimated patients connected to remote monitoring devices by 2018

$5.85 Billion
Total remote patient monitoring market in 2013
Surgery
Emergency Medicine
# TABLE 4. Referring Provider’s Perception of Quality of Care With Telemedicine and Telephone Consultations

<table>
<thead>
<tr>
<th>Provider Survey Questions</th>
<th>Telemedicine</th>
<th>Telephone</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical skills of the pediatric critical care physician, mean (95% CI)</td>
<td>6.82 (6.70–6.94)</td>
<td>6.13 (5.62–6.64)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Overall telemedicine/telephone consult experience, mean (95% CI)</td>
<td>6.69 (6.48–6.89)</td>
<td>6.20 (5.77–6.62)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Importance of the consultation for the child, mean (95% CI)</td>
<td>6.33 (6.13–6.53)</td>
<td>5.87 (4.98–6.75)</td>
<td>0.11</td>
</tr>
<tr>
<td>Consultation assisted in the medical management, mean (95% CI)</td>
<td>6.20 (5.97–6.44)</td>
<td>5.87 (4.95–6.77)</td>
<td>0.29</td>
</tr>
<tr>
<td>Additions or changes in diagnostic studies, %</td>
<td>47.8</td>
<td>13.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Changes in therapeutic interventions, %</td>
<td>55.2</td>
<td>7.1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Changes in disposition, %</td>
<td>37.7</td>
<td>20.0</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

*Dharmar...Marcin, et al. Crit Care Med 2013; 41:2388–2395*
Remote ICU Monitoring
“Clinical outcome measurements documented that mortality rates and LOS outcomes were comparable to severity adjusted benchmark data from 33 national pediatric ICUs as well as to historic control patients”

Marcin et al, J Pediatr 2004;144:375-80
Arkansas’s Antenatal and Neonatal Guidelines, Education and Learning System (ANGELS)
Arkansas’s Antenatal and Neonatal Guidelines, Education and Learning System (ANGELS)

Telemedicine
Network and Clinics

In 2013
4,928 telemedicine visits

- OB ultrasounds-1,829 visits
- Fetal echocardiography- 149 visits
- High risk OB- 498 visits
- Infectious disease- 91 visits
- Telemedicine psychiatry-200 visits
- Other-71 visits
- Colposcopy-2,088 exams

Telemedicine Team

- Shantay Peckham, M.S.N., A.N.P.
- Mindi Dixon, R.D.M.S.
- Tracy Ford, R.N.
- Tina Lopy, M.S.N., A.N.P.
- Lashia, R.D.M.S.
Orthopedic Surgery

Dermatology

Quick Guide to Store-Forward Teledermatology for Referring Providers
Karen McKoy, MD, Scott Norton, MD, Charles Lapan, MBA, MPA
ATA Teledermatology Special Interest Group
April 2012

1. WORK FLOW

Referral site
- Obtains patient consent, history and consult question
- Image acquisition
- Transmits consult electronically to dermatologist
- Medical record keeping

HIPAA-compliant electronic transmission

Consulting dermatologist
- Receives consult and returns a report to referral site within specified time
- Maintains medical record of consult
Mental Health

• 21% of children ages 9-17 have psychological disorder
  • 11% experience significant impairment
  • High rates of absenteeism/tardiness
  • 45% percent of students with emotional disorder drop out of high school

• < 20% of children receive services
  • 70-80% percent receive it in a school setting
  • Referral to school-based mental health center reduces absenteeism rates by 50%

• Telemedicine is obvious answer

• Planning pilot project with DC Public Schools
Global Telemedicine
Uganda Collaborative

- 17 missions to Uganda: 2003 – 15
- Diagnosis/Surgical and catheter treatment
- Research: Rheumatic Heat Disease
- Education: clinical and didactic
- Telemedicine room opened Feb 2014
Morocco Telemedicine Program

- Supported by grant from Mosaic Foundation: built telemedicine infrastructure
- Distance education: Rabat Children’s Hospital
- Cardiac surgery collaboration: Marrakech Faculty of Medicine
  - Build sustainable cardiac surgery program
  - Two surgical visits and two cath missions
  - Weekly live case discussions with cardiac surgeons and cardiologists
    - 450+ cases discussed in 2011 - 2014
    - Significant impact on patient outcomes
  - Participation in Children’s National weekly cardiac surgery teaching conference
Rheumatic Heart Disease: Brazil/Uganda

- 7 published manuscripts
- > $1 million in grant funding
- Supported by cloud telemedicine
UAE Development Disabilities Project

- Supported by partnership with Sheikh Kalifa Foundation: $4 million/3 yrs
- Fujairah and Dibba
  - Telemedicine Consultation
  - Educational visits
- Primary Diagnoses: N = 48
  - Cerebral palsy: 15
  - Global developmental disorders: 12
  - Autism: 9
  - Congenital anomalies: 7
  - Neurogenetic disorders: 6
  - Epilepsy: 5
  - Neuromuscular disorders: 4
  - Systemic disease: 2

Telehealth Policies Vary by State: Advocacy Key

• 50 states with 50 different telemedicine policies
• 47 state Medicaid programs have some type of telemedicine coverage
• 13 Indicators analyzed – each state graded
  • Reimbursement
  • Credentialing
  • Licensure
Telemedicine Overall Grade and Licensing

Only 7 states get an “A”

Only 10 states offer telemedicine license
Direct to Consumer Telehealth

Health care online, at any time

Talk to a healthcare provider through video, chat, phone and mobile devices.

Learn More →

NowClinic

First Name  Last Name
Email
Confirm Email
Password

I agree to these Terms of Use.

Sign Up

Already have an account? Log In

Children's National

Emerging Areas for Virtual Care

Remote

Prescription Refill
Urinary Tract Infection
Minor Cough, Cold, Rash
Chronic disease
Remote Consult
Remote Diagnostics

Emerging Areas for Virtual Care

In-Person

Physical Exam
Cut, Sprain, Fracture
Complex Infection

$73 Million
“I think [virtual visits] will become a normal part of health care in three to five years.”

Dr. Harry Leider
Walgreens CMO

$49
Cost of Walgreens virtual visit, most of which goes to physician

9,000
Interactions per week via Walgreens’ Pharmacy Chat virtual visit platform

2 Million
Estimated new patients added per day for MDLive following partnership with Walgreens
Consumers Increasingly Prefer “On-Demand” Care

Survey Finds Email Visits Preferred to Clinic Near Errands or Work

Preference for Location of Services

- Clinic location near work
- Clinic located near errands
- Emailing provider with symptoms
- Clinic located near the home

Increasing Consumer Preference

Young, Wealthy, Busy—Strongest Potential Telehealth Targets

- 54% Of 18-29 yrs olds
- 49% Of those making >$71K per year
- 53% Of those working >35 hours per week
E-Visits for Repeat Patients Maximize Capacity Gains

**Typical PCP Workload**

- 35% of panel, 0-1 visits/year
- 21% of visits
- 25% of panel, 2 visits/year
- 42% of visits
- 25% of panel, 4 visits/year

1 Square = 1% of Physician Time with Patients

**Workload with Remote Check-Ins**

- 35% of panel, 0-1 visits/year
- 6% of visits
- 25% of panel, 2 visits/year
- 31% of visits
- 25% of panel, 2 visits/year, 2 e-visits/year

15% of panel, 3 visits/year, 2 e-visits/year

**Routine check-ins converted to shorter remote interactions, but most MDs unpaid for time**

29% increase in available time, panel size

**~15** Average PCP visit length, in minutes

**~5** Minutes needed to respond to typical email query

**571** Example increase in panel size from converting periodic check-ins to e-visits
Telecardiology Pilot: Richmond, IN

First 3 Months

100+ Virtual visits scheduled

94 Visits completed

142.5 Miles of saved patient travel time

Satisfied or Highly Satisfied with Telehealth: 99%

Prefer Telehealth to an In-Person Visit: 85%

Highly Satisfied with Telehealth LPN: 97%

Would Have Another Telehealth Visit: 98%

“This is a no-brainer and will dramatically improve care delivery”

“I am horrified, this will destroy quality patient care”
Accrediting Safe Online Healthcare Services

ATA’s Accreditation Program for Online Patient Consultations recognizes Organizations providing online, real-time patient health services that comply with operational, clinical and consumer-related standards. The program promotes patient safety, transparency of operations and adherence to all relevant laws and regulations. Approved organizations proudly display the ATA Seal of Accreditation, a benchmark to assure patients, payers and consumers that the organization’s online patient consultative services meets the standards and guidance established for the program.

The program has been developed over the past two years in consultation with providers, medical societies, consumer groups, payers and regulators. The program is designed to guide organizations toward quality, safety and excellence. Accreditation provides validation and increased confidence to private payers, employers, government regulators and consumers. Organizations earning the ATA Seal of Accreditation will be publicly acknowledged and widely promoted.
Mobile Health APPs: $50 Billion by 2020

ECG Check iPhone Case Now Available as Prescription or OTC

Children's National™
### Personal Fitness Tracking

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total</th>
<th>Yesterday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steps</td>
<td>11,557 steps</td>
<td>1,264 steps</td>
</tr>
<tr>
<td>Distance</td>
<td>5.38 miles</td>
<td></td>
</tr>
<tr>
<td>Floors</td>
<td>17 floors</td>
<td></td>
</tr>
<tr>
<td>Calories</td>
<td>2,721 calories burned</td>
<td></td>
</tr>
</tbody>
</table>

![Fitness Tracker](image)

![Graph](image)
Telemedicine Tools: If We Can Use These ....

Sony SmartEyeglass

“Smart” Diaper

i Watch
…“Star Trek Medicine” Is Not Far Away

The “Tricorder”

12 Star Trek gadgets that became reality

Posted in Lists, Sci-Fi by Conner Flynn on January 29th, 2008

THANK YOU!