

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?

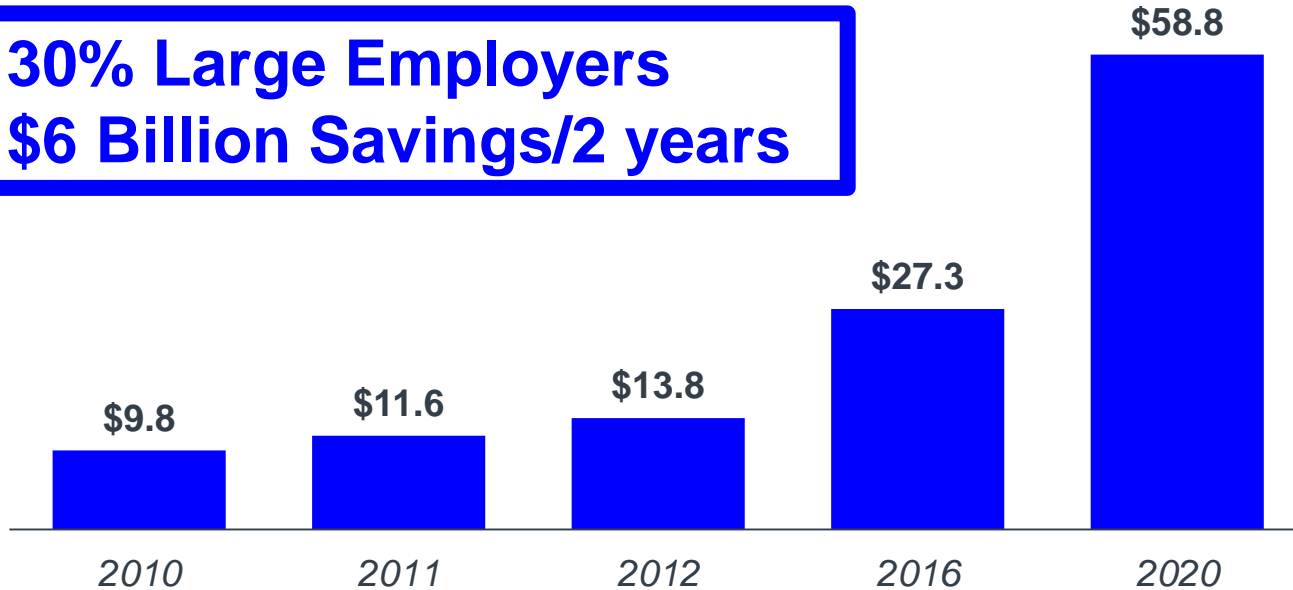
1. **Telehealth:** Use of technology to bridge distances in any aspect of medicine including clinical care (telemedicine), administrative functions, education, research, quality improvement, and advocacy
2. **Telemedicine:** Use of technology to conduct clinical medicine at a distance
 - Traditional 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

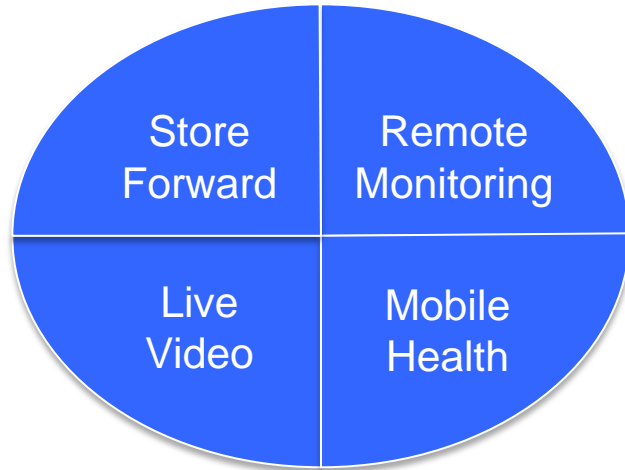
Billions of US Dollars

**30% Large Employers
\$6 Billion Savings/2 years**



Building a Telemedicine Practice

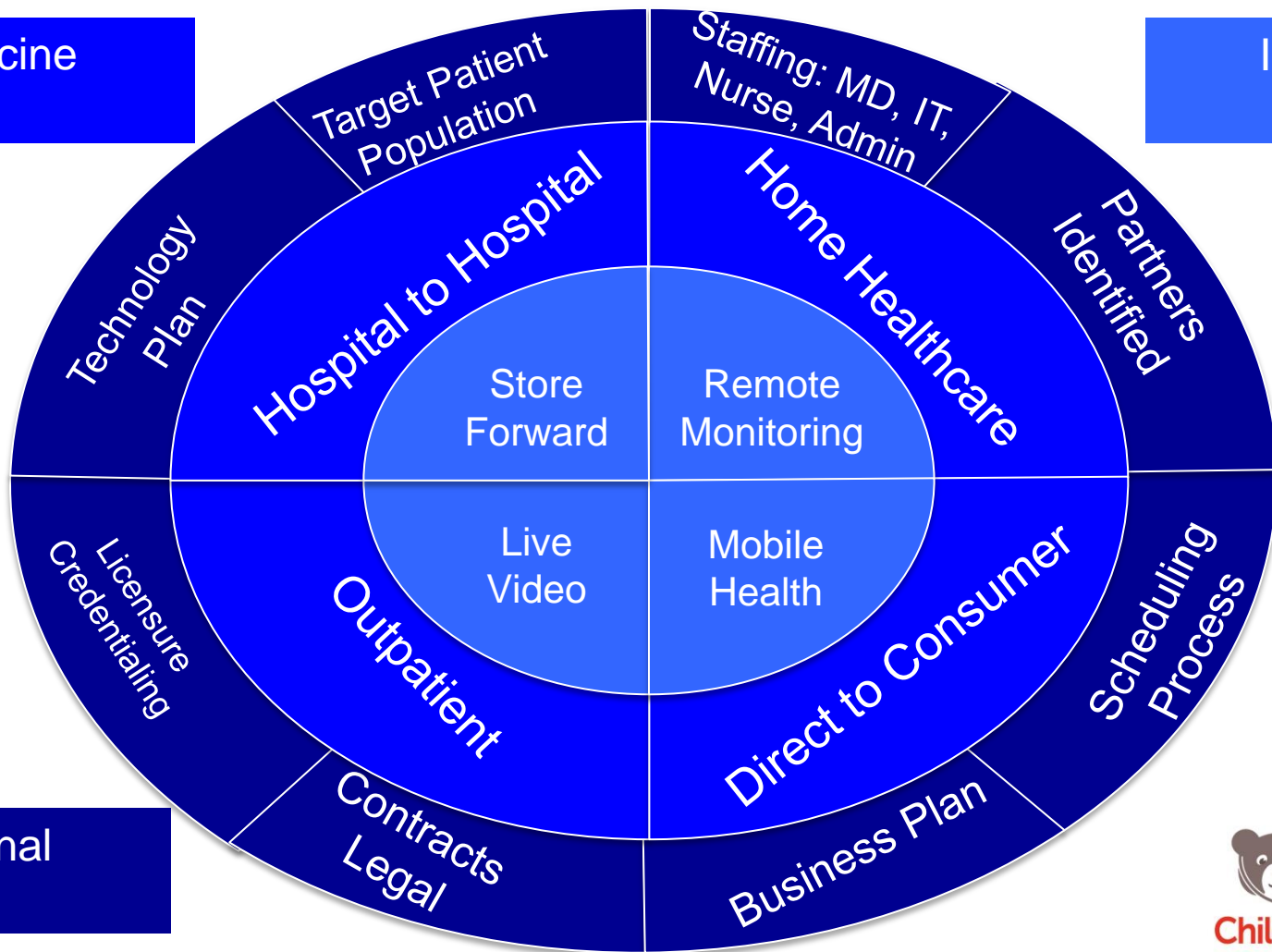
Infrastructure
Tools



Children's National™

Telemedicine
Model

Infrastructure
Tools



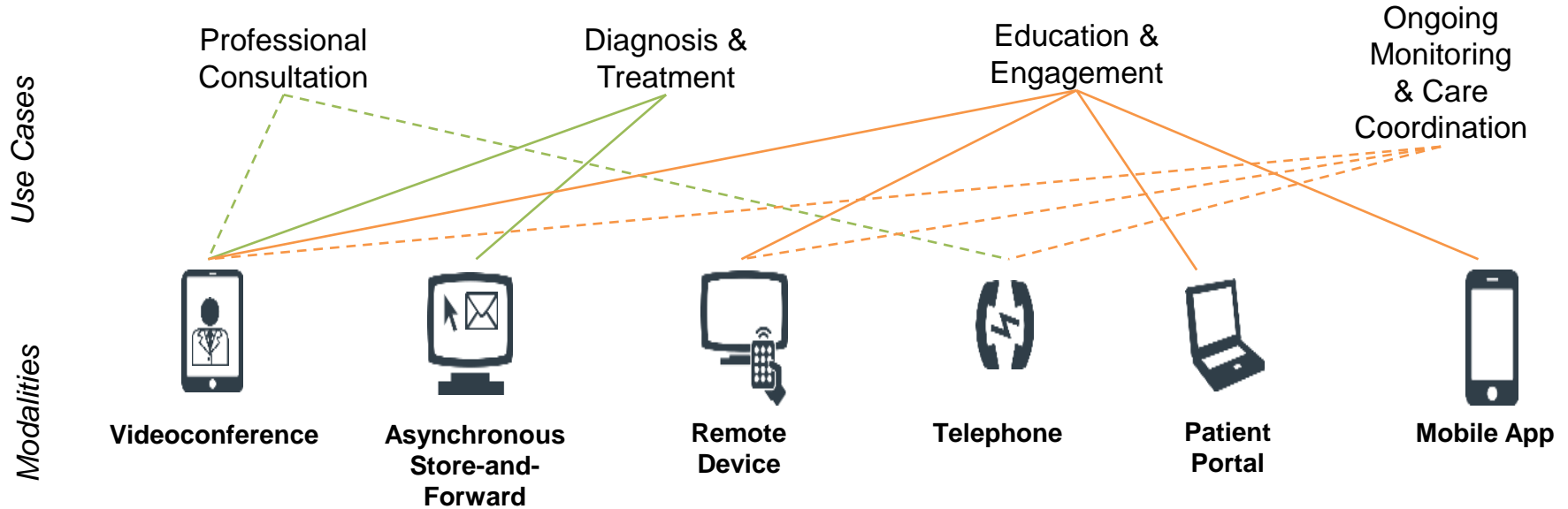
Operational
Metrics



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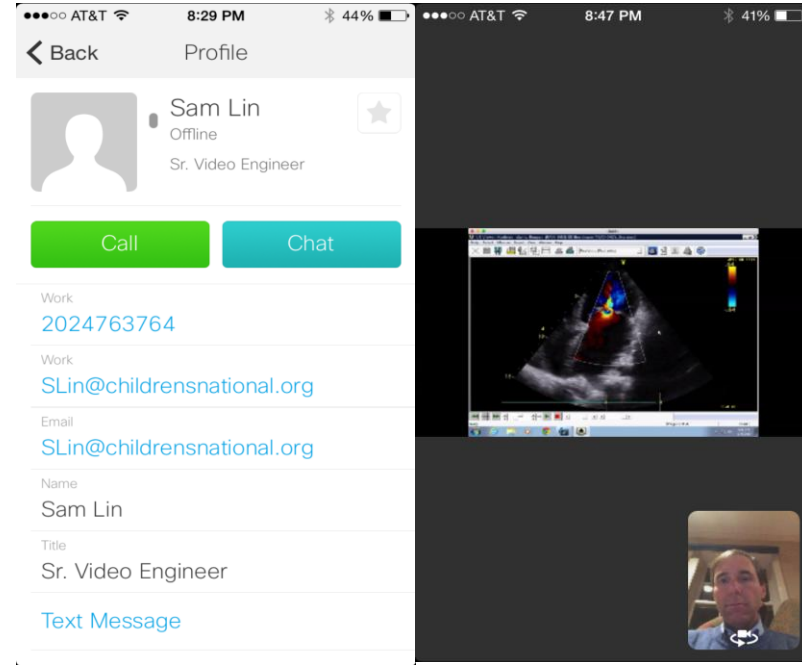
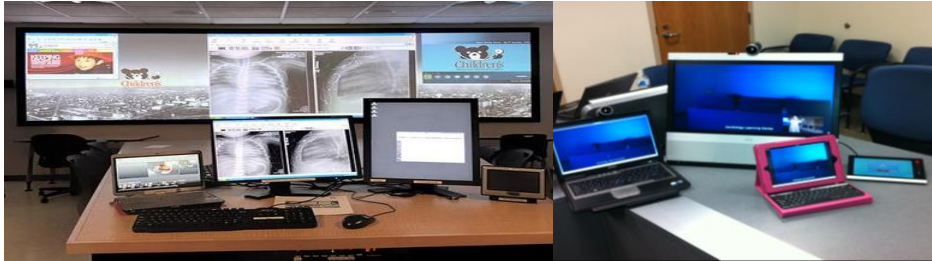
Use Cases May Be Achieved Across Multiple Modalities

Telehealth Use Cases, Relevant Modalities, and Investment Required



Our Infrastructure: Videoconferencing

Enterprise Video Network



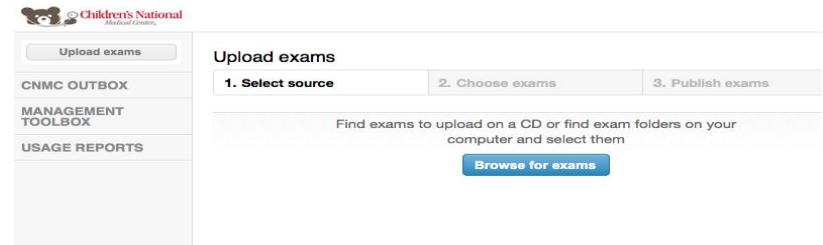
- Over 100 sites/400 users
- Room, desktop, PC, tablet/smartphone
- Partners in 21 states and 19 countries
- 15 Years: 15,000 consults/3,000 conferences
- State of the art upgrade in progress:
Convergence of video and Webex: **Jabber**

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

Lifeline 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



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.,¹ THERESA ROCA, M.D.,² JACK GOLD, R.B.P.,²
ALBERT GUTIERREZ, M.D.,³ EILEEN GULOTTA, R.D.C.S.,²
and WALTER CULPEPPER, M.D.¹



Washington, DC 1998

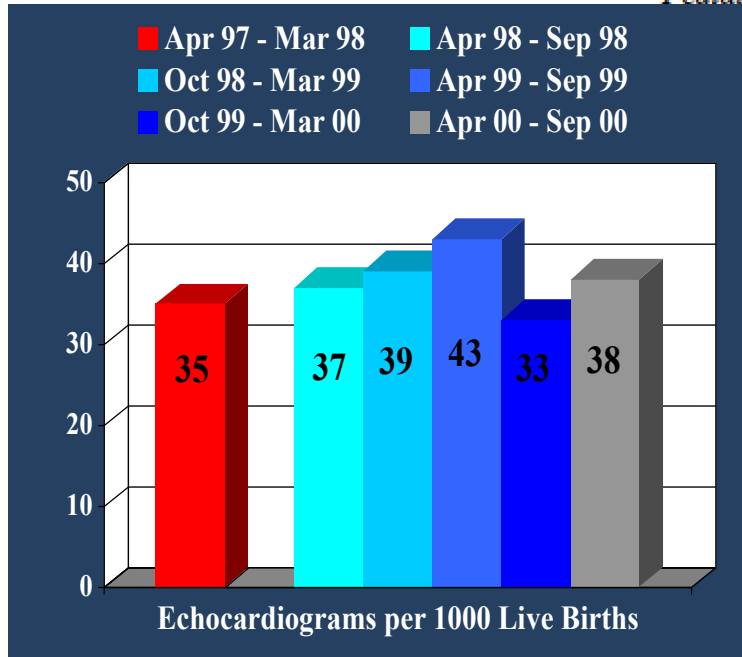


PEDIATRICS[®]

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Impact of Telemedicine on the Practice of Pediatric Cardiology in Community Hospitals

Craig A. Sable, Susan D. Cummings, Gail D. Pearson, Lorraine M. Schratz, Russell C. Cross, Eric S. Quivers, Harish Rudra and Gerard R. Martin
Pediatrics 2002;109:e3



...is diagnostic, improves patient care and echocardiography quality, is efficient, and impacts referral patterns.

Telemedicine eliminated the need for consultation in 194 casesThis resulted in average time savings of 4.2 person-hours/wk...

EXIT



Last N.: _____ First: **BG** Patient ID: _____ Date: **09/16/2002**
 D.O.B.: _____ Hospital: **Prince George's Hospital** Cardiologist: **Craig Sable, MD**
 Gestational Age: **24** Referring M.D.: **Fratarola** Receive Loc: **Echo Lab**
 Weight: **900** Referring Location: **NICU** Technician: **Esther**
 Indication: **Rule out PDA**

Mgmt Change: **YES**
 More Views: **YES**
 M.D. Interaction: **Yes**
 Family Interaction: **No**
 Telemed Issues: **None**
 Real Time: **Yes**
 Time Delay: **0**
 Echo Time: **10**
 Conf. Time: **10**

CONNECT LOCAL SOURCE VIDEO CONFERENCING REMOTE SOURCE DISPLAY

RECORD MANAGER

CARDIAC POSITION	VEINS
Normal segmental anatomy	
ATRIUM	ATRIOVENTRICULAR VALVES
Moderate left atrial	SEMILUNAR VALVES
VENTRICLES	
Dilated left ventricle, mild	PERICARDIAL & PLEURAL SPACE
GREAT VESSELS	INFLOW HEMODYNAMICS
Patent ductus arteriosus,	
FUNCTION	PHYSIOLOGY/SHUNTS
	Left to right atrial shunt, small:
OUTFLOW HEMODYNAMICS	
OTHER	

Interpretation/Diagnosis:
Moderate PDA

Recommendations/Management:
Transfer to CNMC for surgical ligation

Date of Interpretation: **09/16/2002** Cardiologist: **Craig Sable, MD**

CASE STATUS

PRELIMINARY **FINAL**

DISPLAY FORMAT

Display VIDEO PIP Display MPEGs

 1X1 1X2 2X2 3X3

CAPTURE MANAGER

ECHO CLIPS **1** CAPTURE MPEG

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:

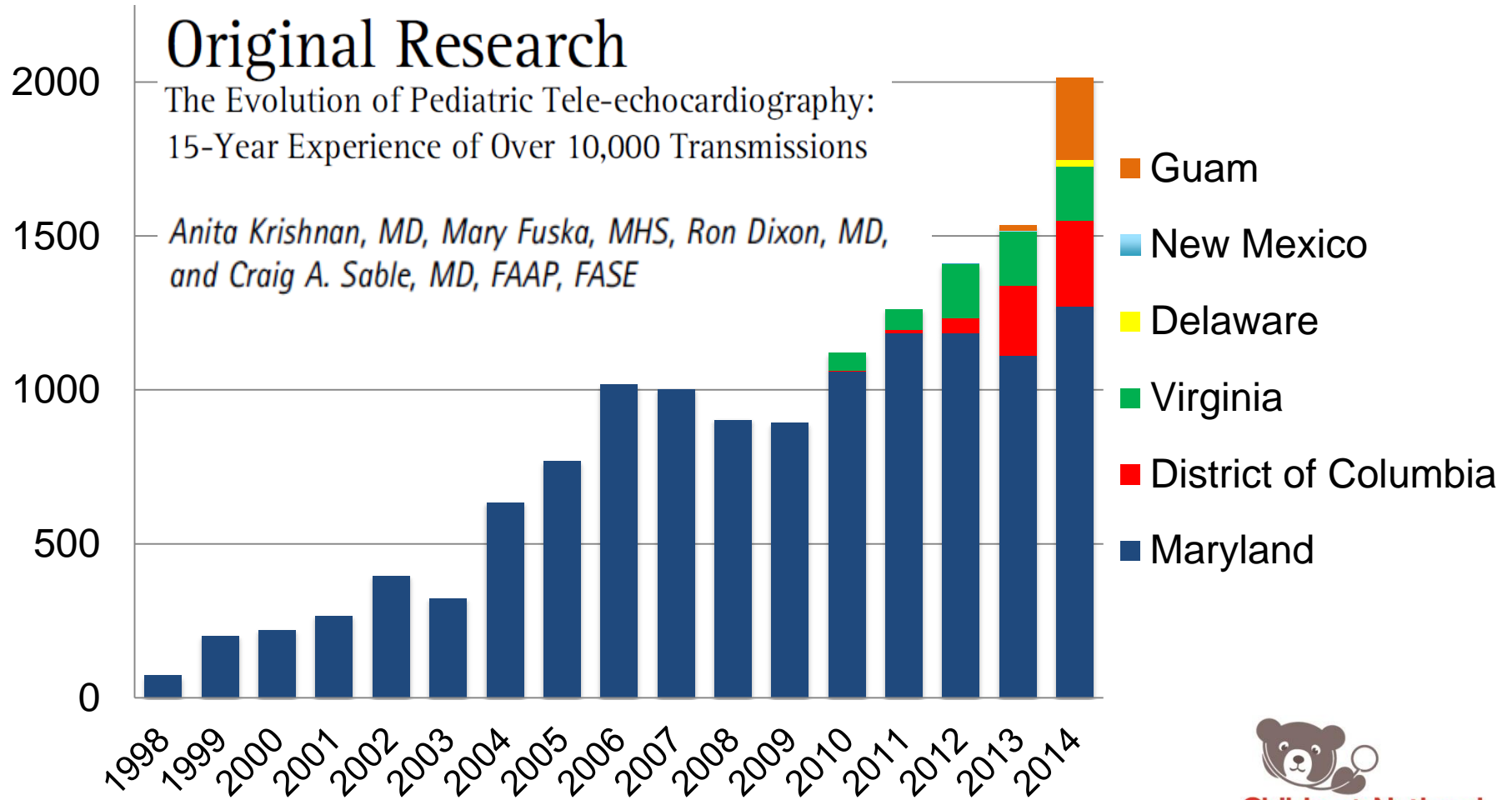
	Ordering MD	< 1 year	> 1 year
Positive echos	Pediatrician	15%	24%
	Peds Card	24%	83%
- 2003 – Sharma, New York: Live fetal echo accuracy/3 ISDN lines
- 2011 – Mckrossen, Belfast: Store/forward fetal echo accurate



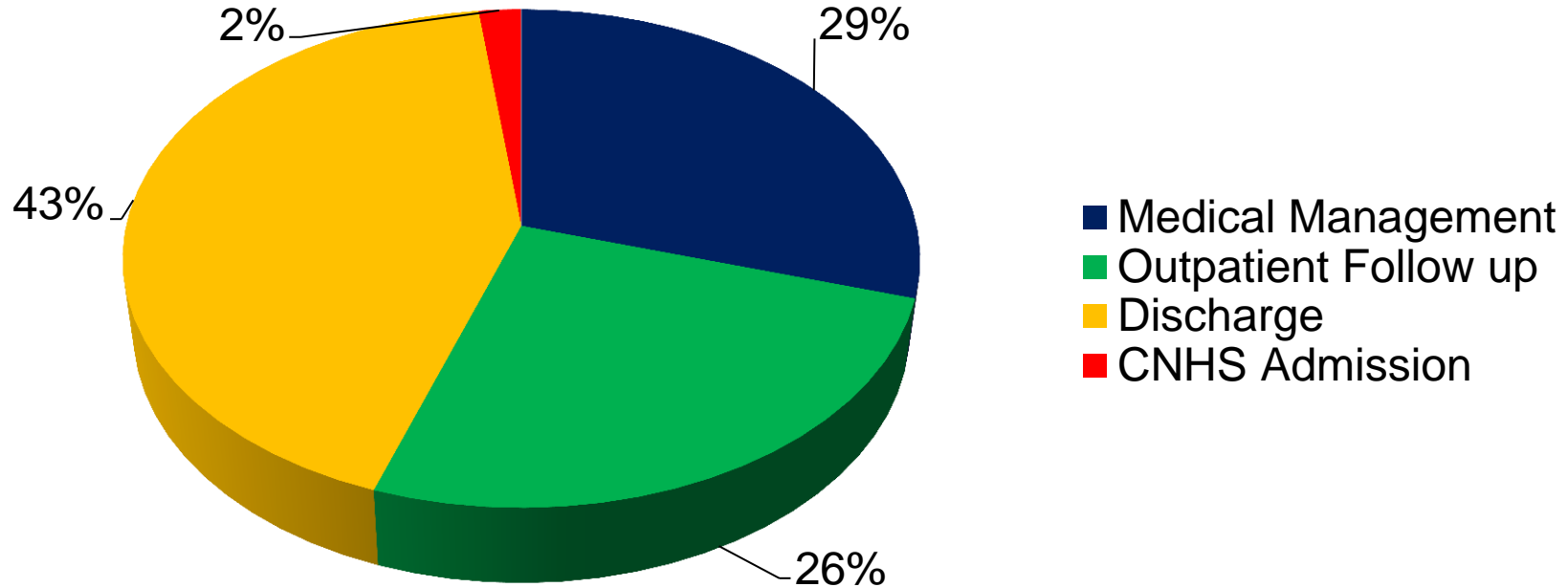
Original Research

The Evolution of Pediatric Tele-echocardiography:
15-Year Experience of Over 10,000 Transmissions

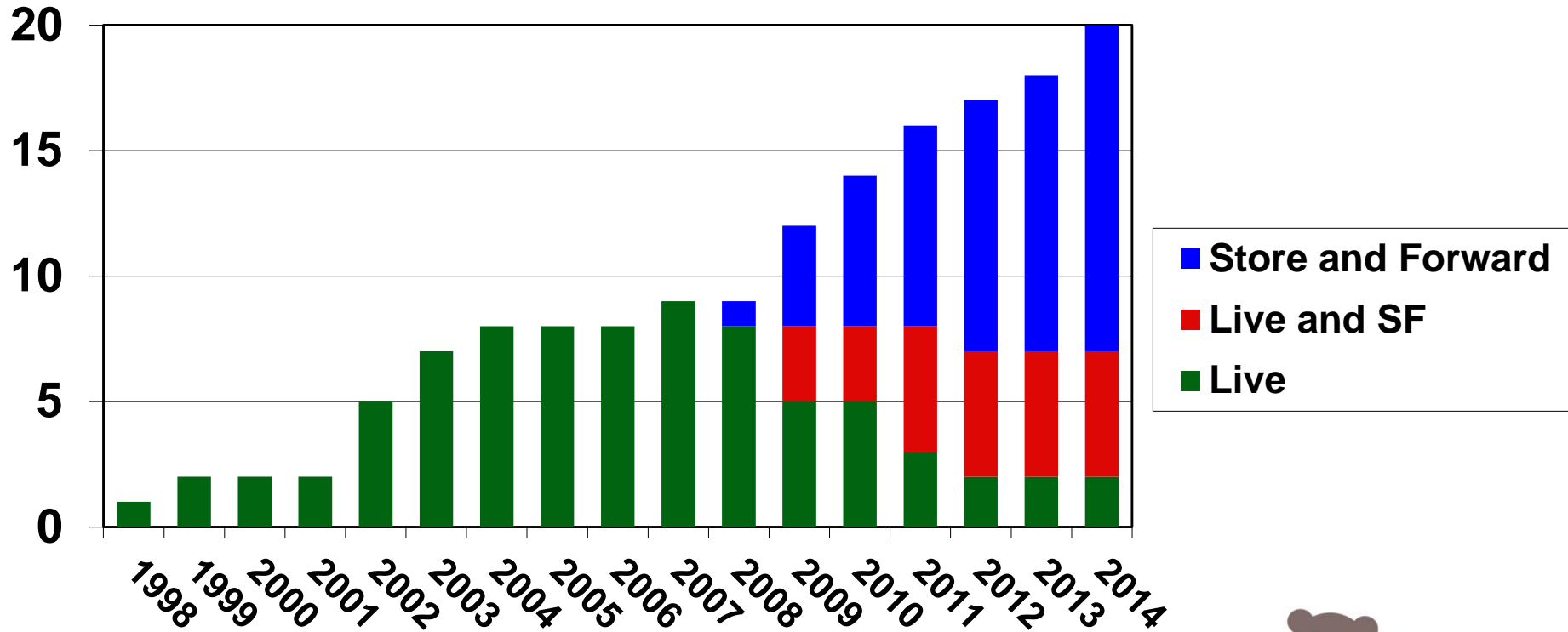
*Anita Krishnan, MD, Mary Fuska, MHS, Ron Dixon, MD,
and Craig A. Sable, MD, FAAP, FASE*



Outcomes



Technology Transition

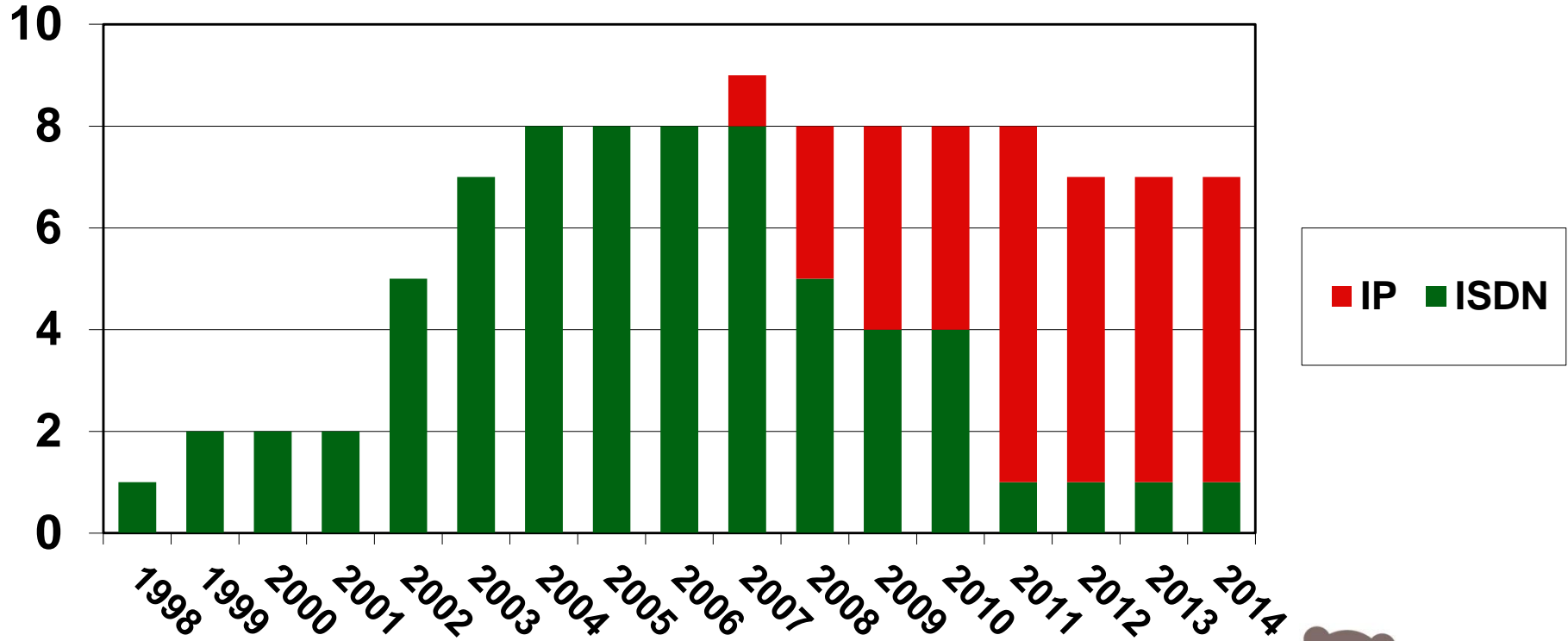


Krishnan et al. *Telemedicine and e-Health*. 2014 Aug;20(8):681-6

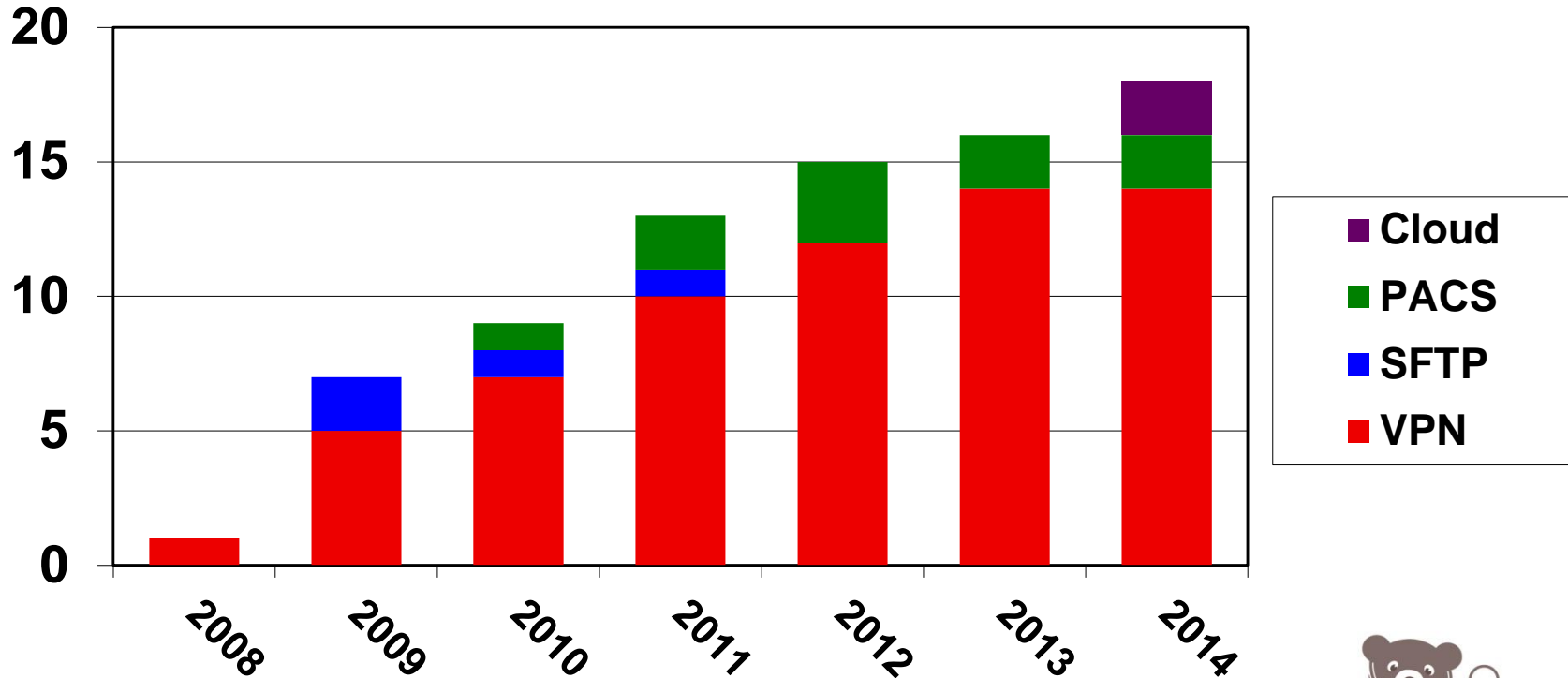


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IP Expansion: Live Sites



IP Expansion: Store and Forward Sites



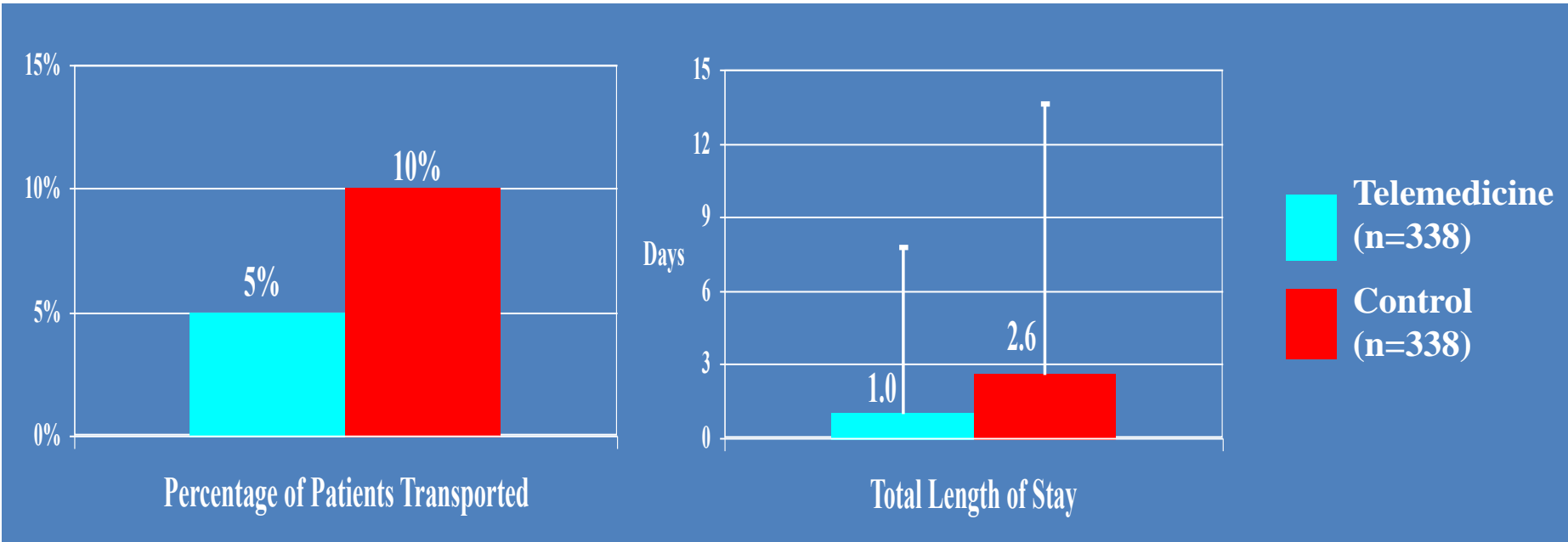
Krishnan et al. *Telemedicine and e-Health*. 2014 Aug;20(8):681-6



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Multicenter Study

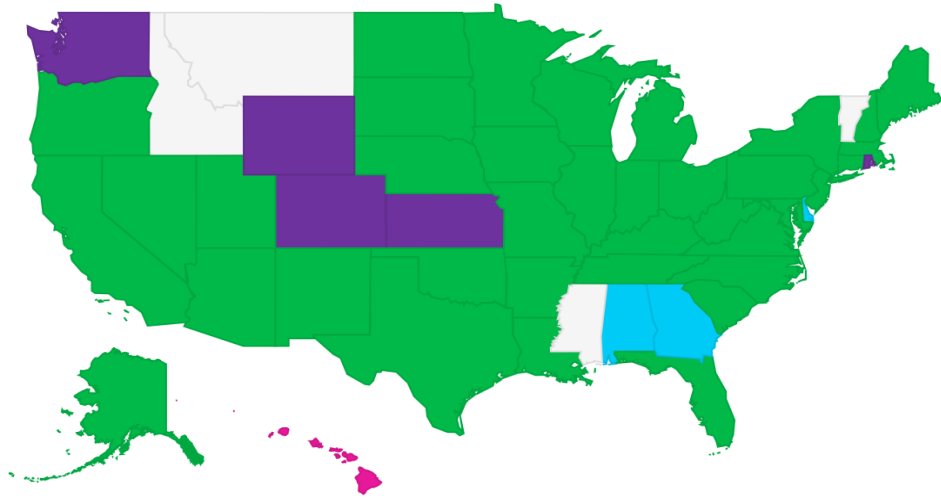
Patients without Critical Heart Disease



Webb CL, Waugh CL, Grigsby J, Busenbark D, Berdusis K, Sahn DJ, Sable CA. *J Am Soc Echocardiogr.* Jul 2013.

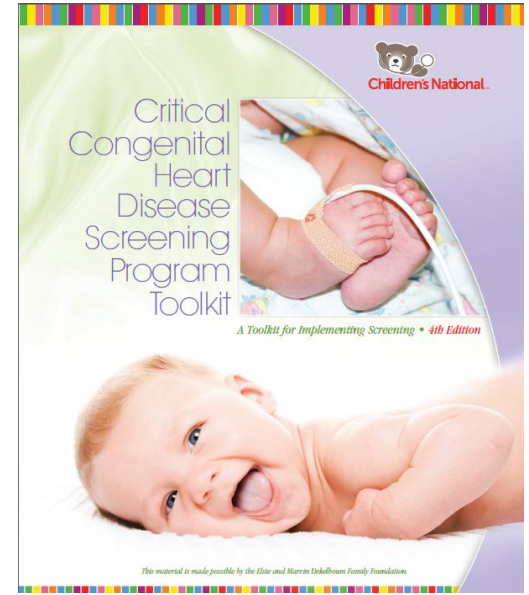
Pulse Ox Screening for CCHD

Demand for National Telemedicine Solution



Active Legislation Legislation Enacted Regulatory Addition to NBS Panel Multi-Center Screening or Pilot Project

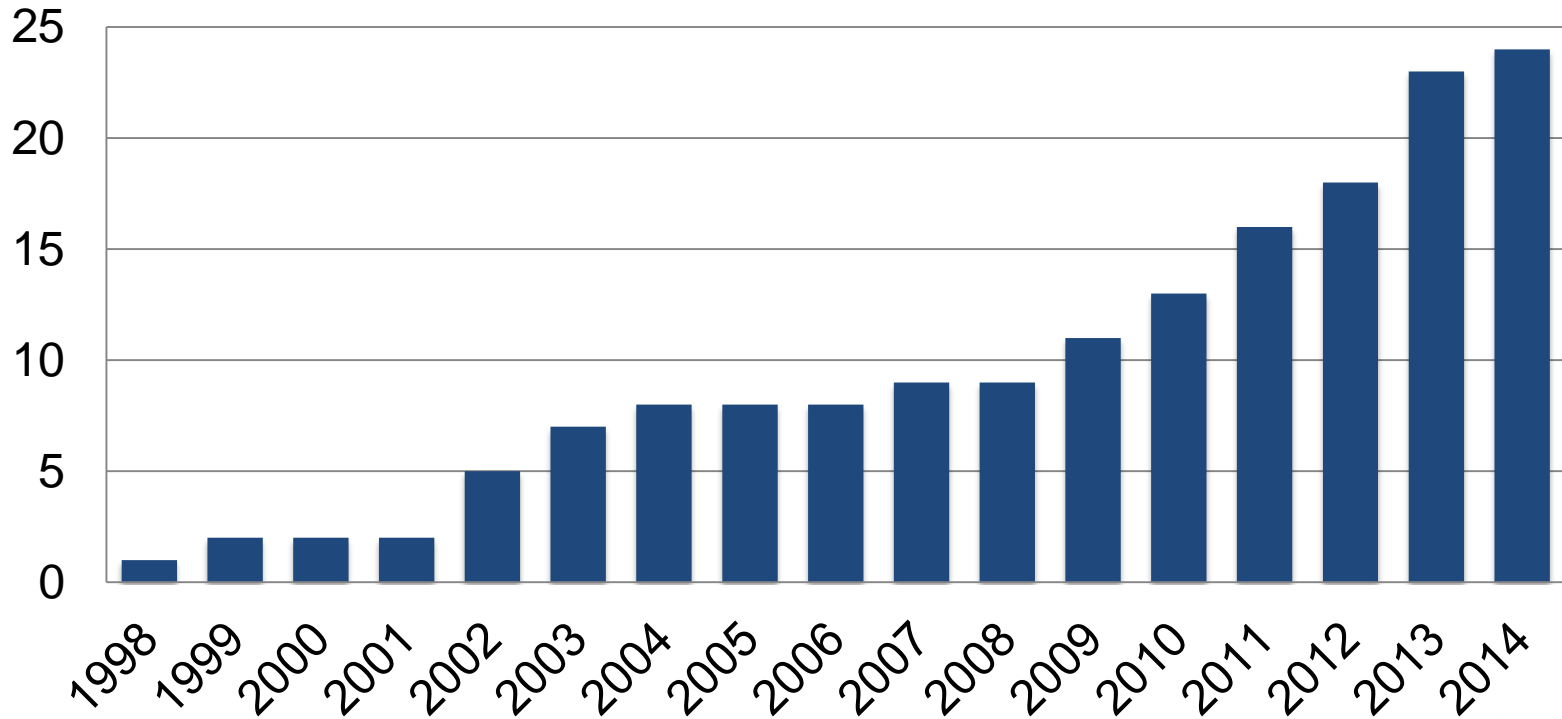
<http://cchdscreeningmap.org/>



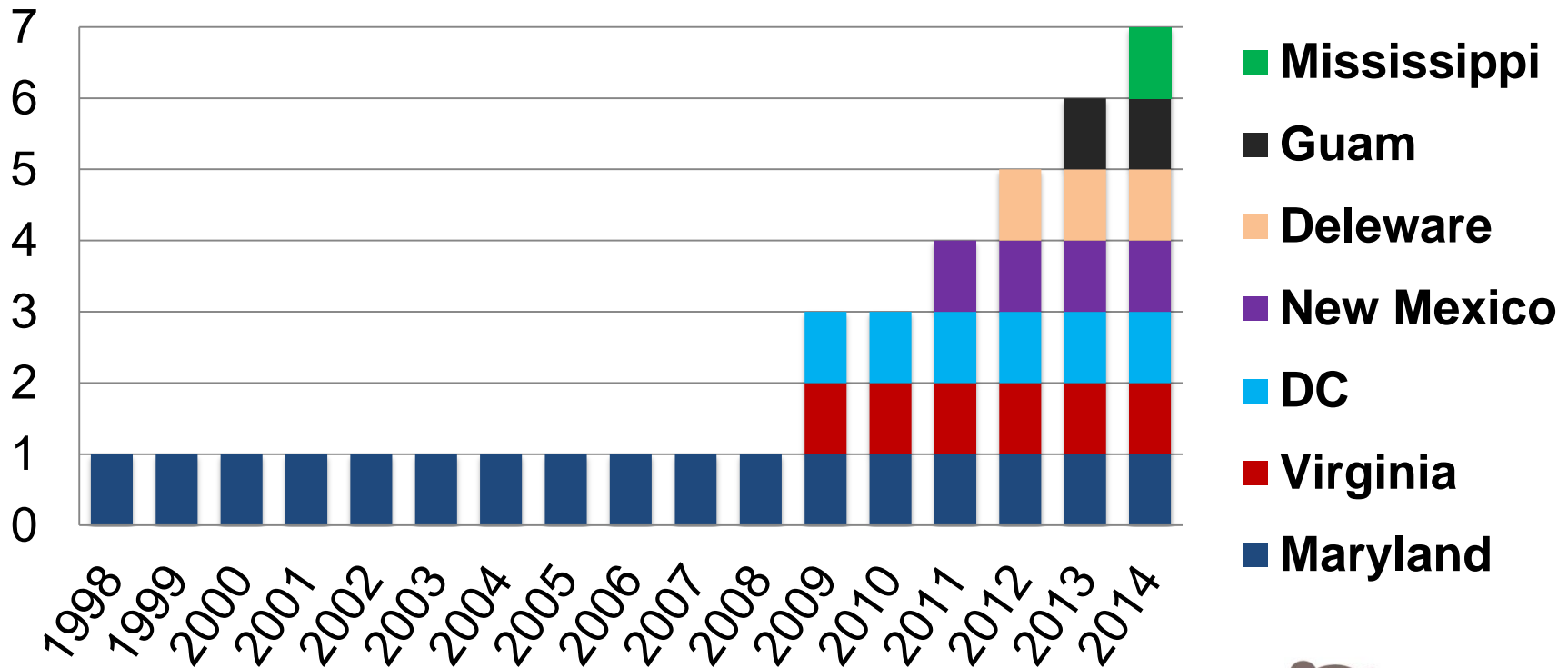
Our Regional Network



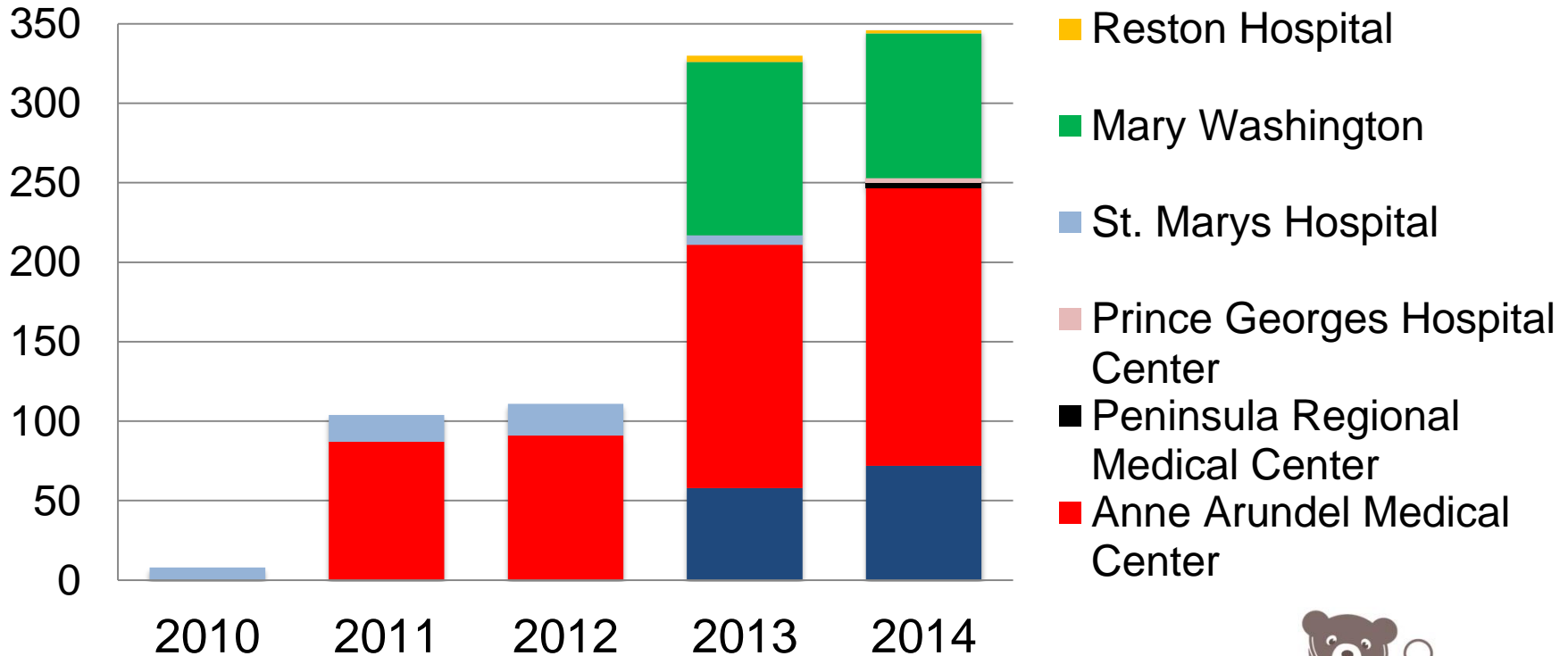
Number of Telemedicine Sites



Number of Telemedicine States/Territories



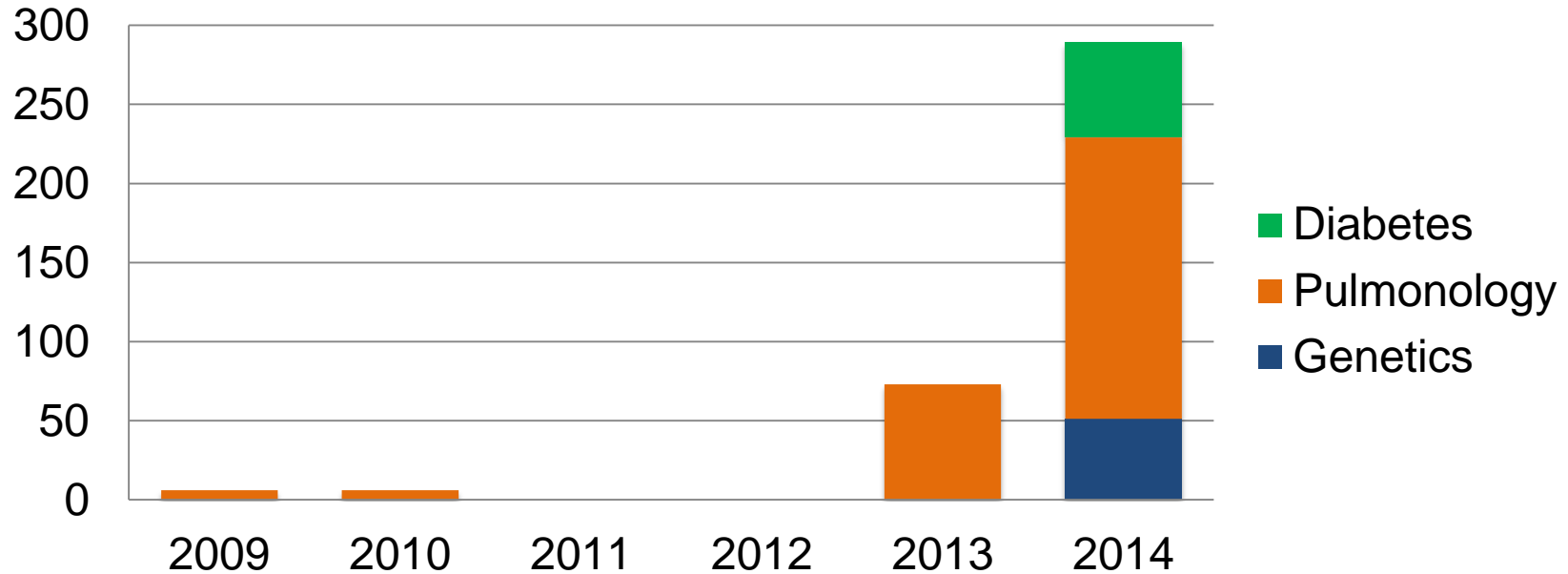
Neurology: EEGs



Neuro-Oncology Tumor Boards



Genetics, Pulmonary and Diabetes



Genetics APP

[← Back](#) **Edit Patient Details** [Done](#)

4 steps are involved in submitting the case to CNMC. 2 more step(s) to go! 

Step 3: Family History

[Add Sibling](#) [Edit](#)




Demographic Medical History Family History Photos CheckList

[← Back](#) **Edit Patient Details** [Done](#)

Exam Photos Supplemental Photos

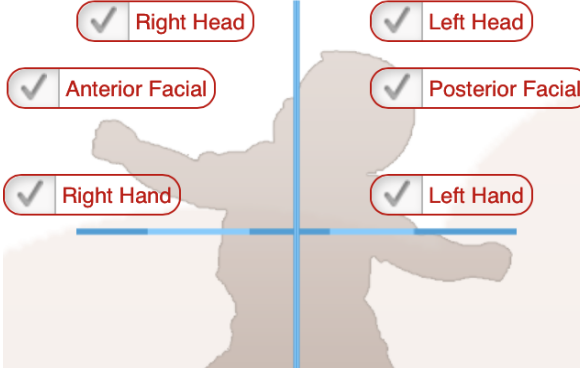
4 steps are involved in submitting the case to CNMC. 1 more step(s) to go! 






Step4: Exam Photos

Right Head Left Head

Anterior Facial Posterior Facial

Right Hand Left Hand



Demographic Medical History Family History Photos CheckList



Diabetes

Dear Flora-

I just wanted to talk to you and your entire team have done for me and my children. The diabetes program here at PRMC in conjunction with Children's Hospital in DC has been a godsend for me.

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 two daughters take good care of their health and it has allowed me to continue working full time. My oldest daughter was diagnosed at 3 ½ years old with type 1 diabetes my world was turned upside down. I found support here at PRMC back in 2008 so we traveled back and forth every 2-3 weeks until 1 pm. My daughter would miss 1 whole day of school and either myself or my ex-husband would come here every other visit so the strain was better. After Pam left to pursue other opportunities I was able to continue working full time.

This program at Children's Hospital had just started and that there was so little support here at PRMC in conjunction with Children's Hospital in DC has been a godsend for me.

I have worked here since 1996 in the capacity (with a short hiatus from here from June to August 2008) was also diagnosed with type 1 diabetes. I switched to Children's Hospital in DC and that there was so little support here at PRMC in conjunction with Children's Hospital in DC has been a godsend for me.

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!!! I wanted to say thanks for everything that you can ever do to help grow this service and support other parents/families I am willing to do whatever I can to help that Children's services are needed here at PRMC and it helps the community. I would be lost without the support of your team.

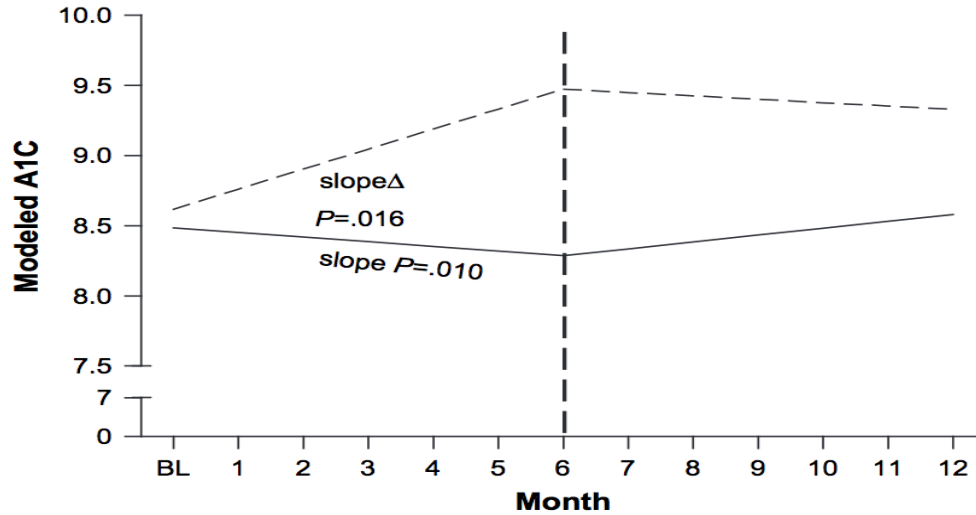
Kelly

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!!!



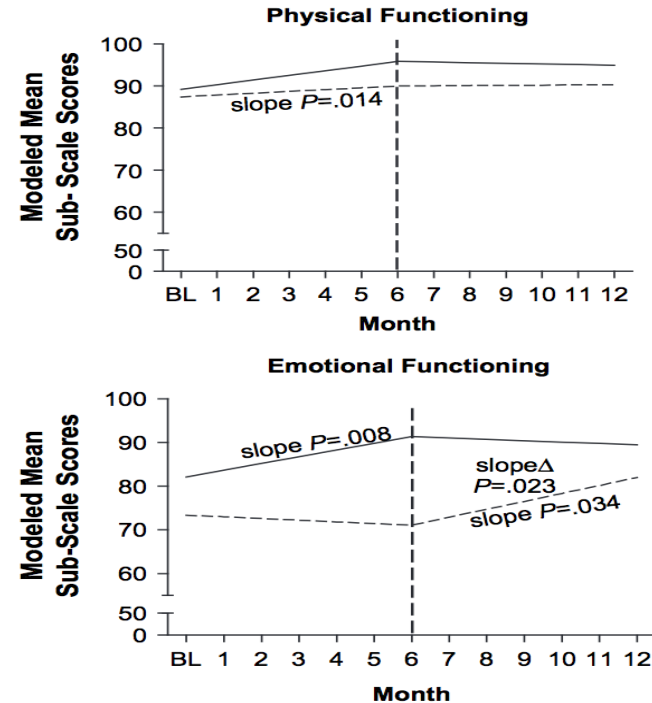
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TeleDiabetes: School



Telemedicine

- ↓ Urgent calls
- ↓ Hospitalizations
- ↓ ED visits



Business Modeling

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

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

Clinical efficiency
Patient satisfaction
Communication

Clinical
Revenue
*Direct
Downstream*

Grants/Philanthropy
Consultation
Education
Branding

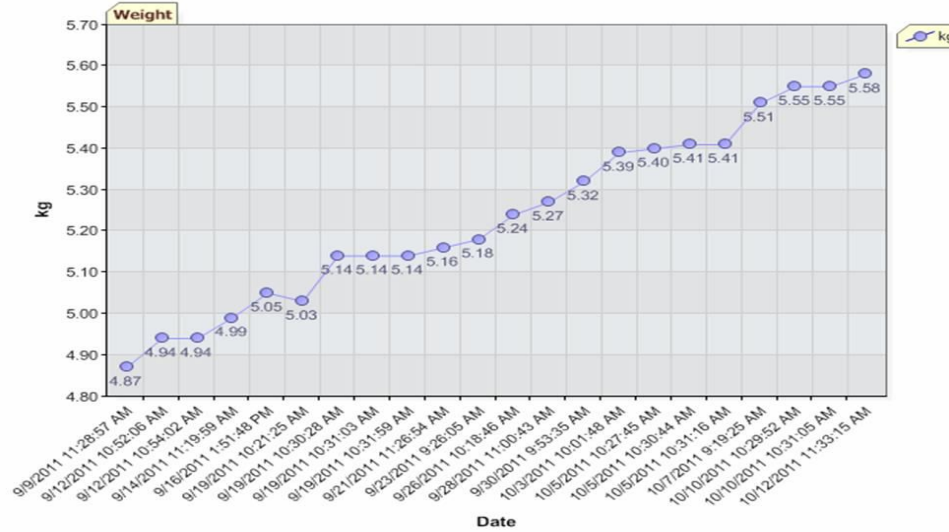
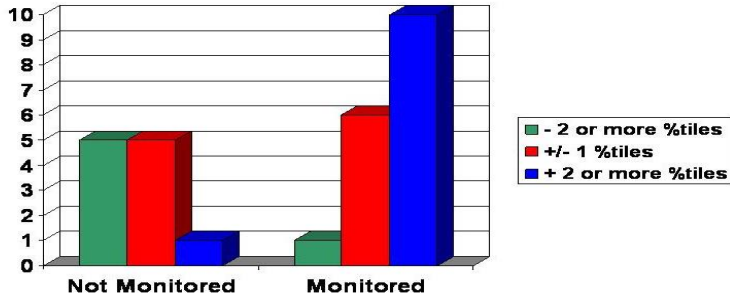
Practice
Efficiency

Non-
Clinical
Revenue



Home Health

Weight for Age Percentile Change Stage I Discharge to Stage II Admission



Cross R, Steury R, Randall A, Fuska M, Sable C.
Future Cardiol. 2012 Mar;8(2):227-35



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Remote Monitoring Devices



Reduced readmissions

Improved chronic disease-related mortality



Reduced ED visits

Improved care coordination

Remote Monitoring has Wide Reach

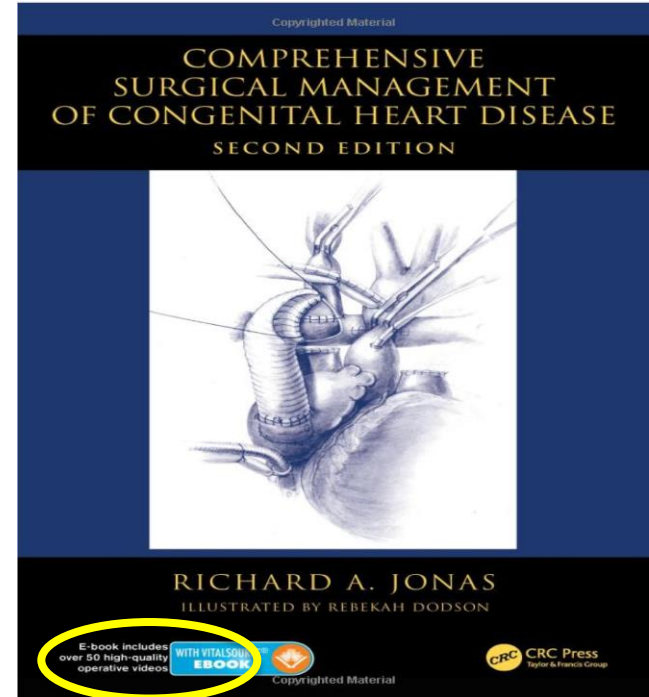
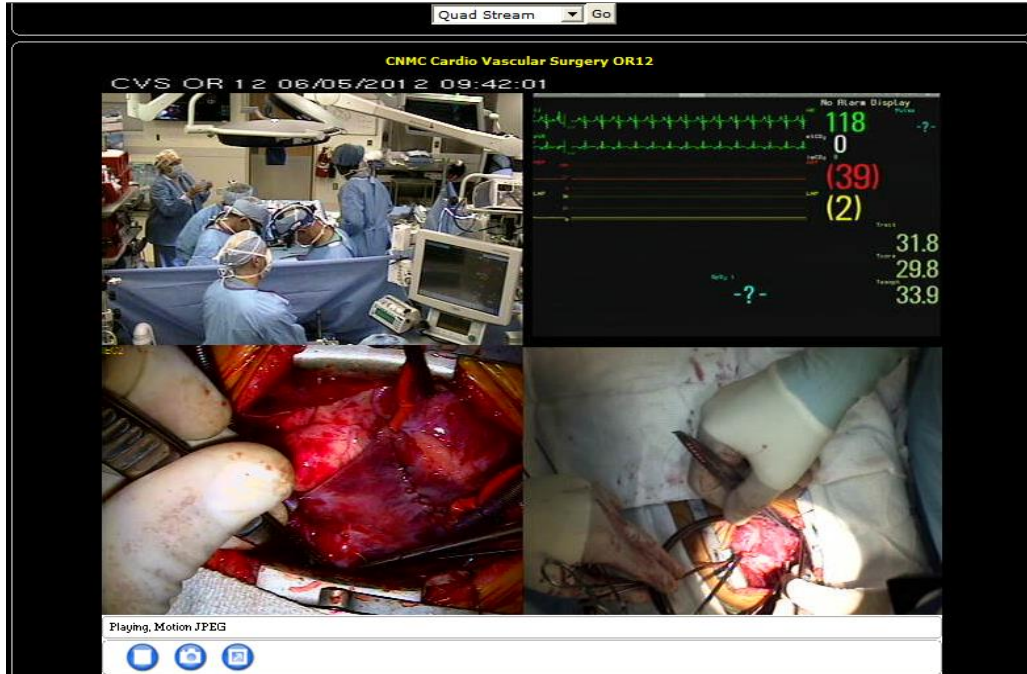
19 Million

Estimated patients connected to remote monitoring devices by 2018

\$5.85 Billion

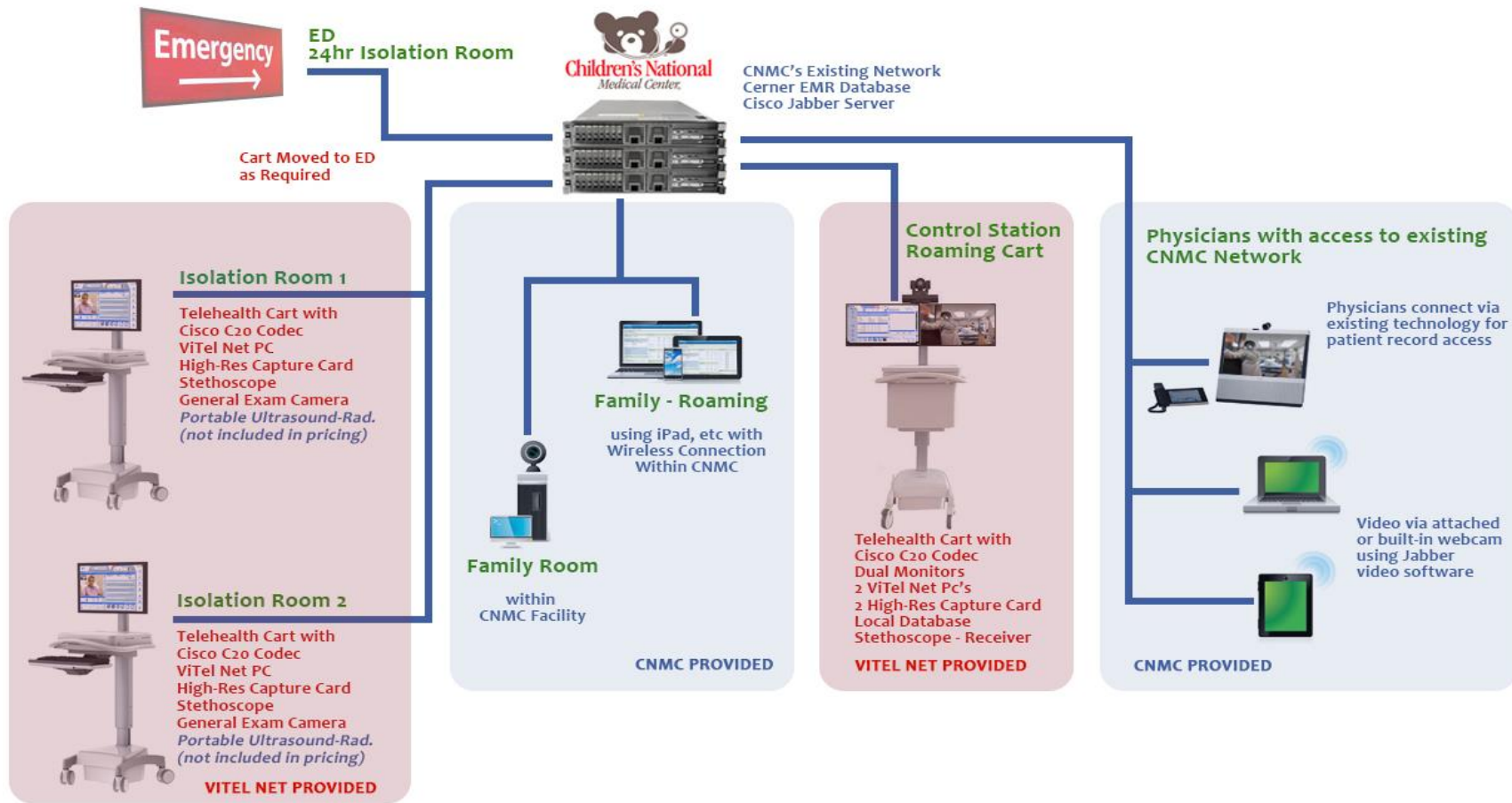
Total remote patient monitoring market in 2013

Surgery



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Communicable Disease Solution



Emergency Medicine



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Emergency Medicine

TABLE 4. Referring Provider's Perception of Quality of Care With Telemedicine and Telephone Consultations

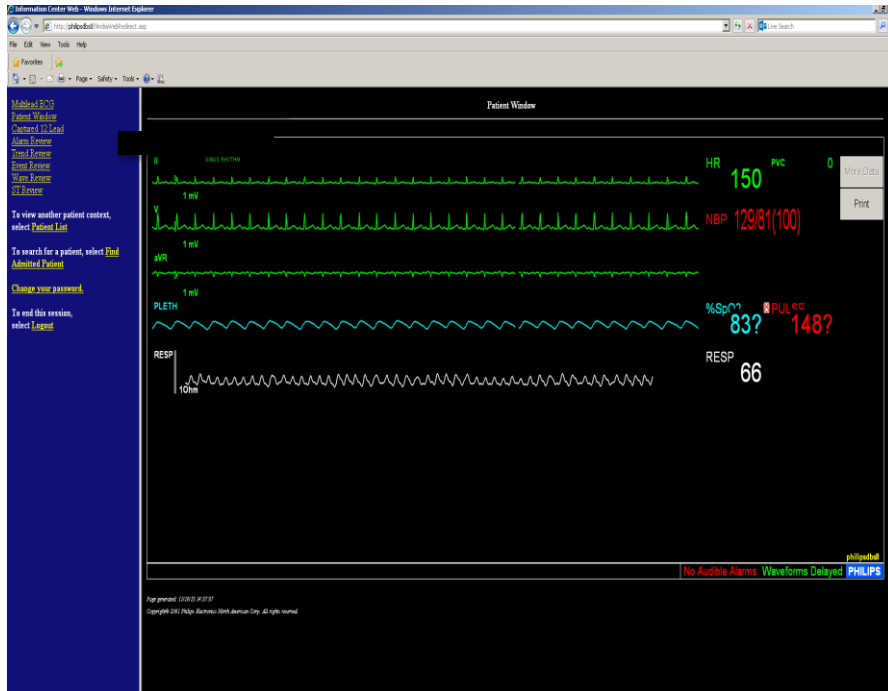
Provider Survey Questions	Telemedicine	Telephone	p
Clinical skills of the pediatric critical care physician, mean (95% CI)	6.82 (6.70–6.94)	6.13 (5.62–6.64)	<0.01
Overall telemedicine/telephone consult experience, mean (95% CI)	6.69 (6.48–6.89)	6.20 (5.77–6.62)	<0.05
Importance of the consultation for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

Dharmar...Marcin, et al. Crit Care Med 2013; 41:2388–2395



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Remote ICU Monitoring



Pediatric ICU

USE OF TELEMEDICINE TO PROVIDE PEDIATRIC CRITICAL CARE INPATIENT CONSULTATIONS TO UNDERSERVED RURAL NORTHERN CALIFORNIA

JAMES P. MARCIN, MD, MPH, THOMAS S. NESBITT, MD, MPH, HARRY J. KALLAS, MD, STEVEN N. STRUVE, MD,
CRAIG A. TRAUOGOTT, MD, AND ROBERT J. DIMAND, MD

“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

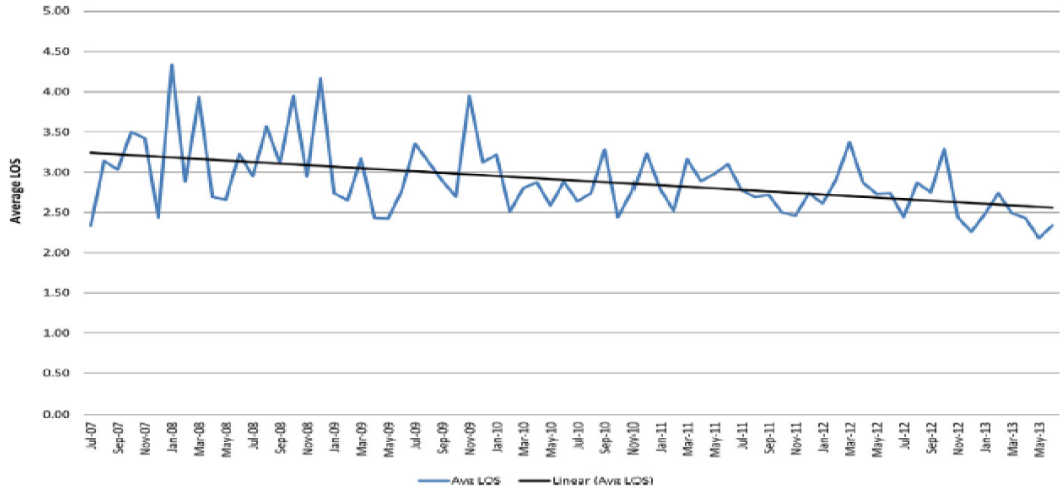
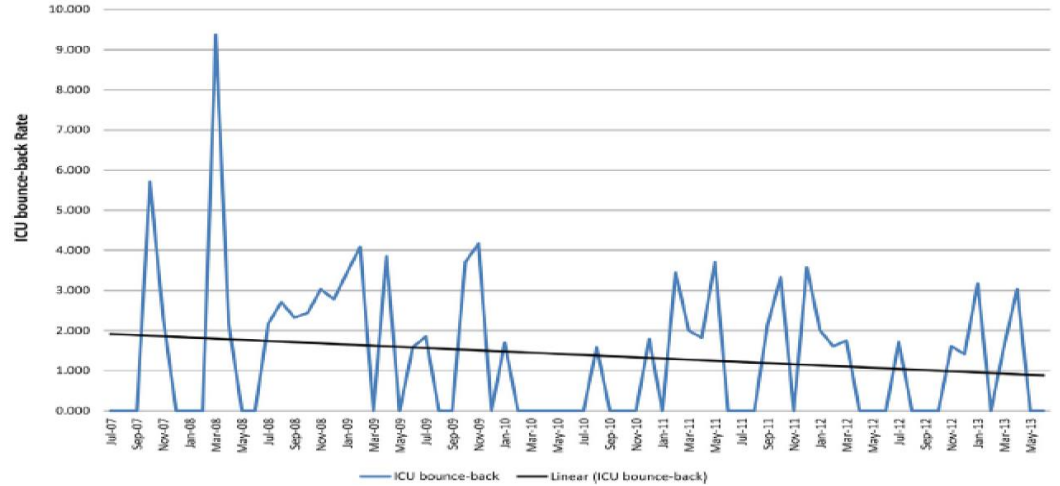


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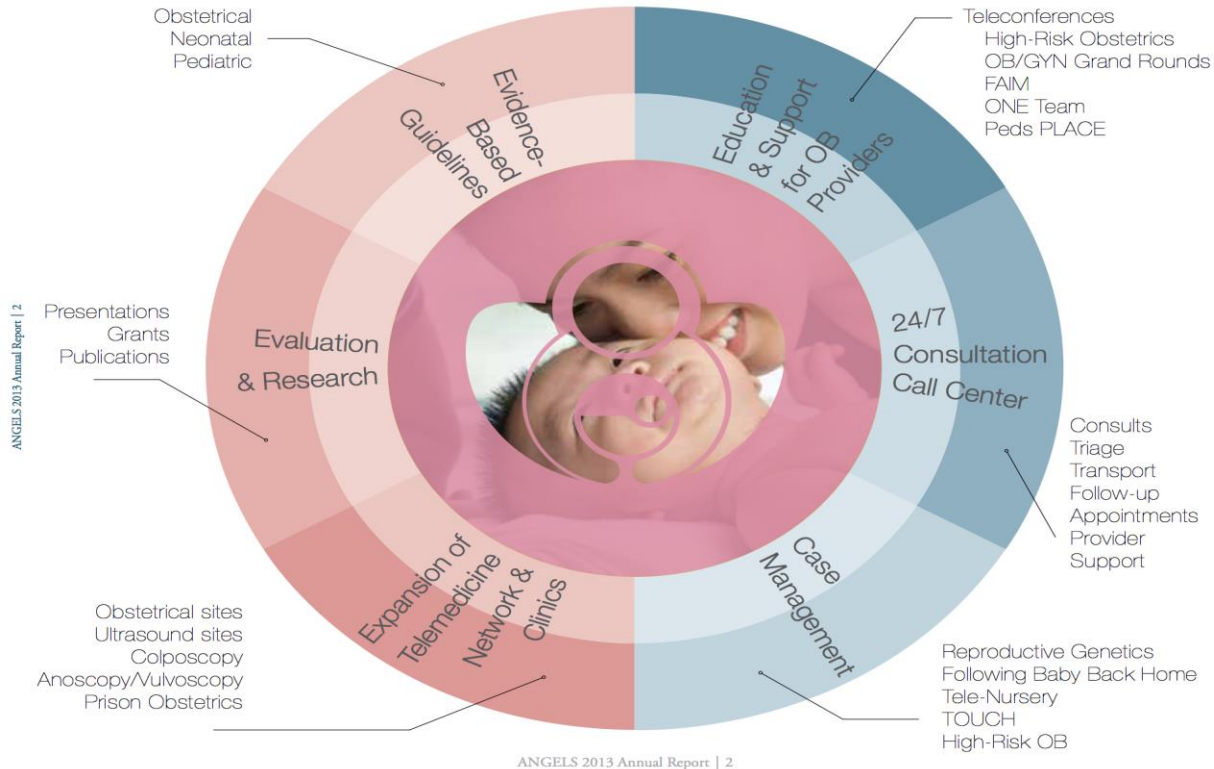
iRobot



Murray and Ortiz. Crit Care Nurs Clin N Am 26 (2014) 477–485



Arkansas's Antenatal and Neonatal Guidelines, Education and Learning System (ANGELS)



Arkansas's Antenatal and Neonatal Guidelines, Education and Learning System (ANGELS)

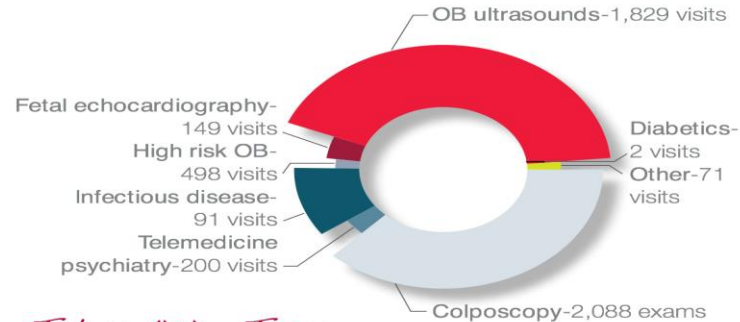
ANGELS 2013 Annual Report | 10



Telemedicine

Network and Clinics

In 2013 **4,928** telemedicine visits



Telemedicine Team



Rosalyn Perkins, M.N.Sc., A.R.N.



Mandi Dixon, R.D.M.S.



Stacie Ford, R.N.



Tessa Ivey, M.N.Sc., A.R.N.



Lori Hell, R.D.M.S.



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Orthopedic Surgery



JMIR Mhealth Uhealth. 2014 Apr-Jun; 2(2): e28.

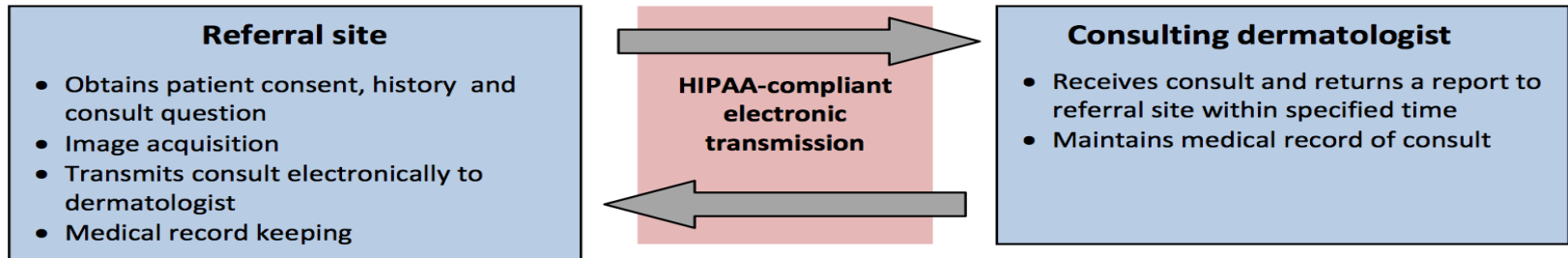
Dermatology



Quick Guide to Store-Forward Teledermatology for Referring Providers

Karen McKoy, MD, Scott Norton, MD, Charles Lappan, MBA, MPA
ATA Teledermatology Special Interest Group
April 2012

1. WORK FLOW



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 Heart Disease
- Education: clinical and didactic
- Telemedicine room opened Feb 2014



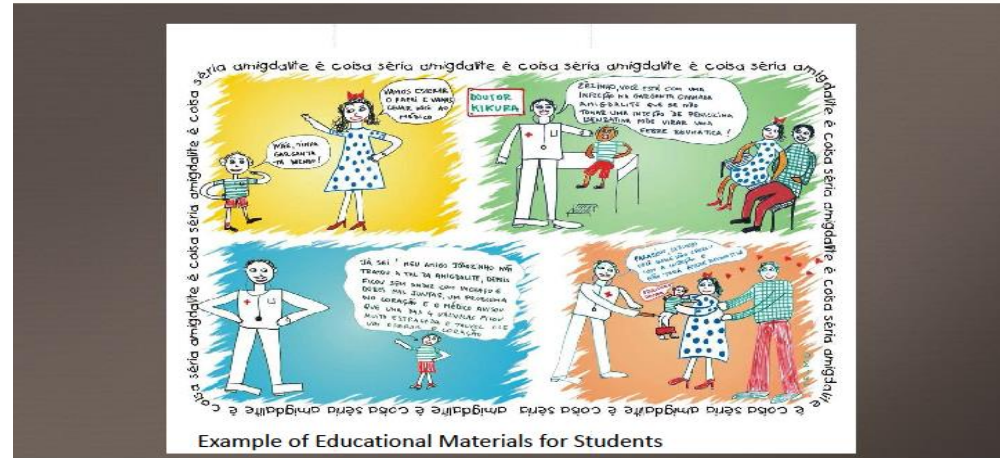
Morocco Telemedicine Program



- 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



PROVAR
Programa de Rastreamento
de Valvopatia Reumática



Children's National



verizon foundation

- 7 published manuscripts
- > \$1 million in grant funding
- Supported by cloud telemedicine



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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

Fujairah



Washington



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



State Telemedicine Gaps Analysis

Coverage & Reimbursement

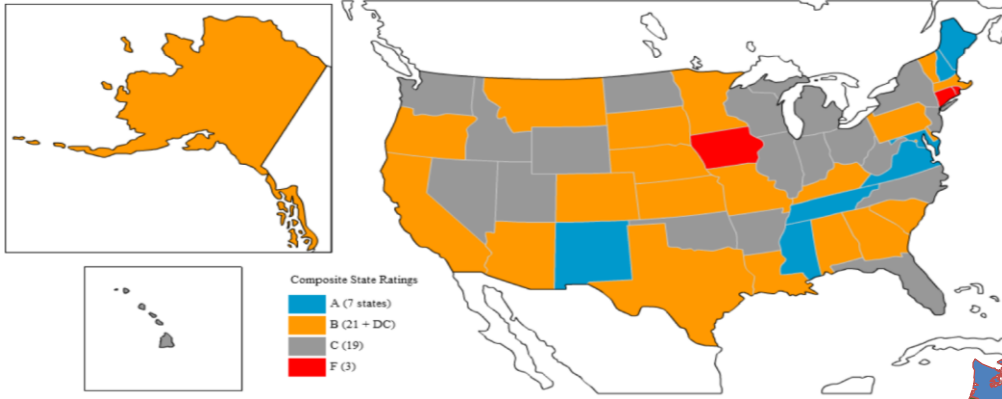
Latoya Thomas
Gary Capistrant

September 2014



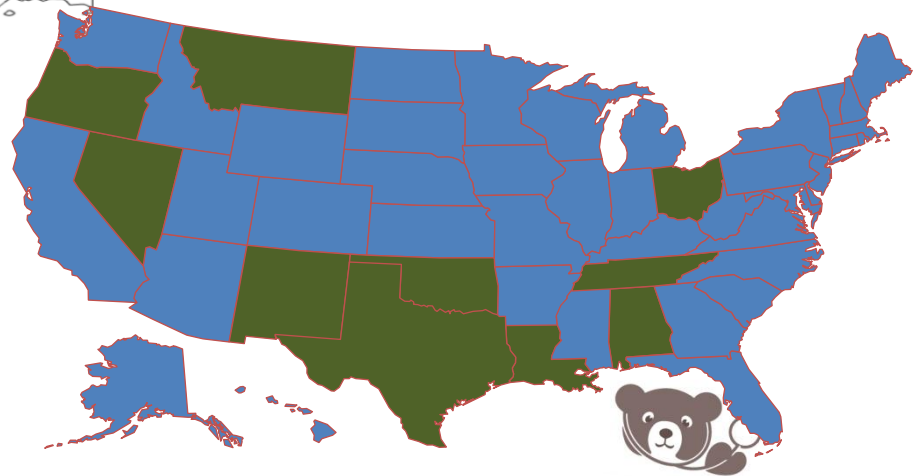
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Telemedicine Over all Grade and Licensing

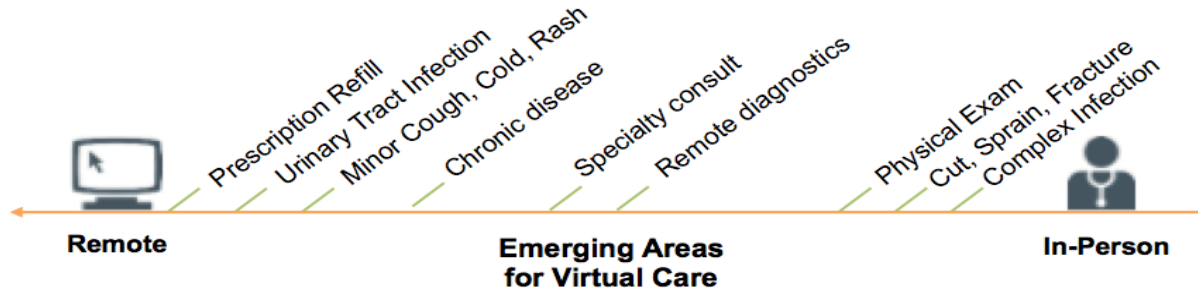


Only 10 states offer telemedicine license

Only 7 states get an "A"



Direct to Consumer Telehealth



NowClinic

First Name Last Name

Email

Confirm Email

Password

I agree to these [Terms of Use](#).

Sign Up

Already have an account? [Log In](#)

AT&T 11:35 AM 100%

[Providers](#) Details

Charles Wallace
Family Physician
★★★★★
Available Now
VIDEO

Select Provider

[Send a Message](#)

Visit Copay:
\$49.00 (before insurance)

Languages Spoken:
English

Professional Education:
University of Toledo, 1999

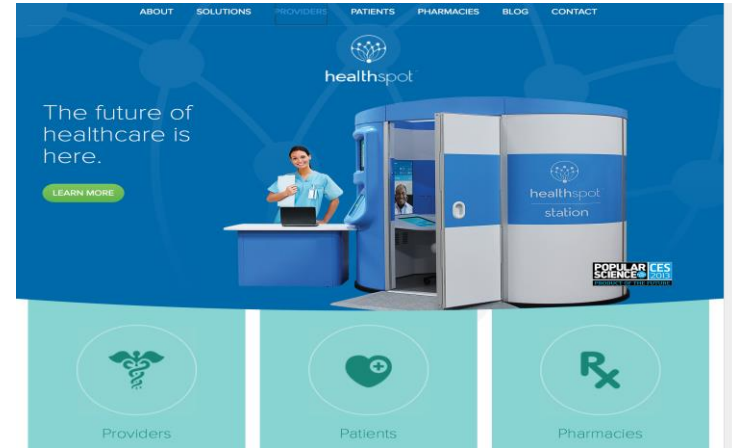
[Providers](#) [Messages](#) [Appts](#) [Settings](#)

**\$73
Million**

Coming to a Drug Store, Shopping Mall...Near You

“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%

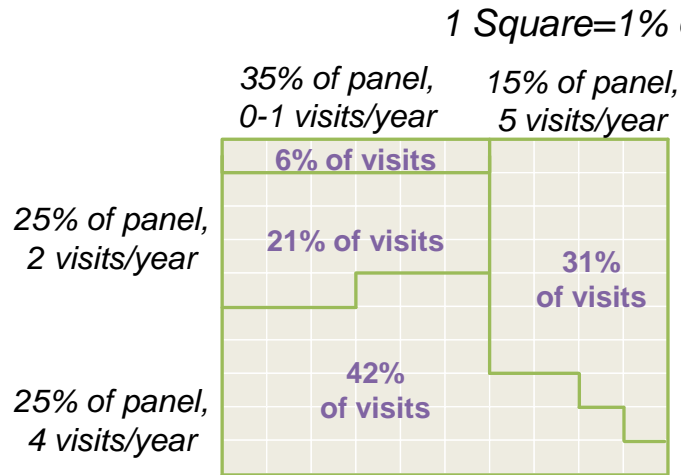
Of those making
>\$71K per year

53%

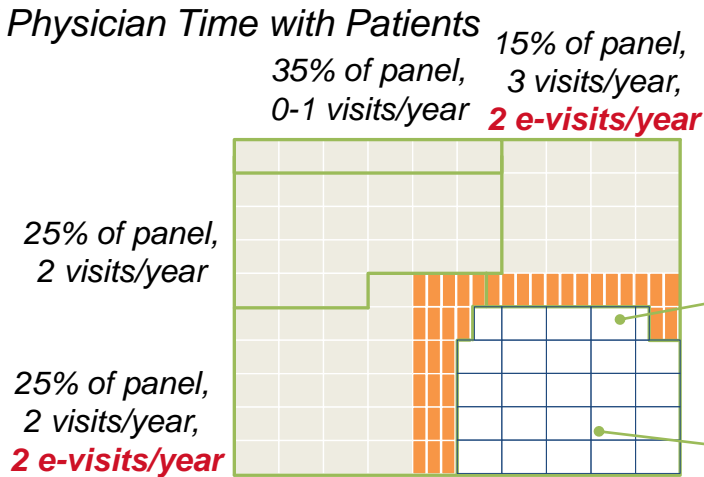
Of those working
>35 hours per week

E-Visits for Repeat Patients Maximize Capacity Gains

Typical PCP Workload



Workload with Remote Check-Ins



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”



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ATA's Accreditation Program For Online Patient Consultations

Home / Program Home



Online Patient Consultations

[Program Home](#)

[Frequently Asked Questions](#)

▶ [Accreditation Process](#)

[Information for Patients](#)

[Glossary of Terms](#)

[Accredited Training Programs](#)

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.



Register Now
For ATA Accreditation

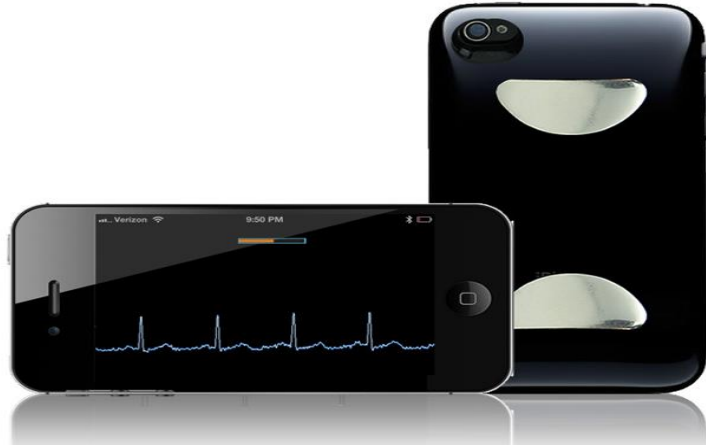


Patients
Find a safe, accredited provider

Mobile Health APPs: \$50 Billion by 2020

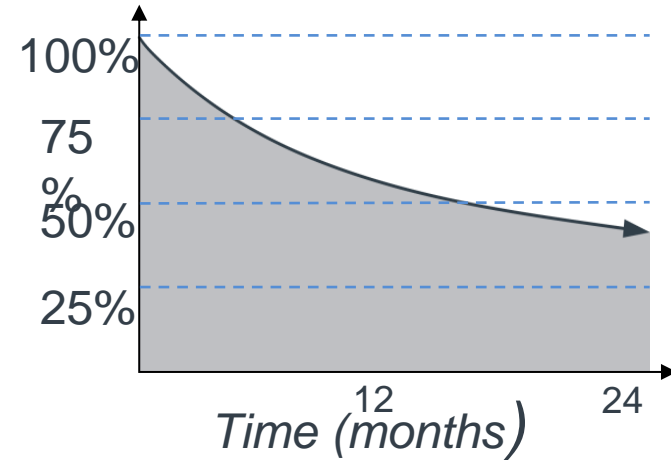
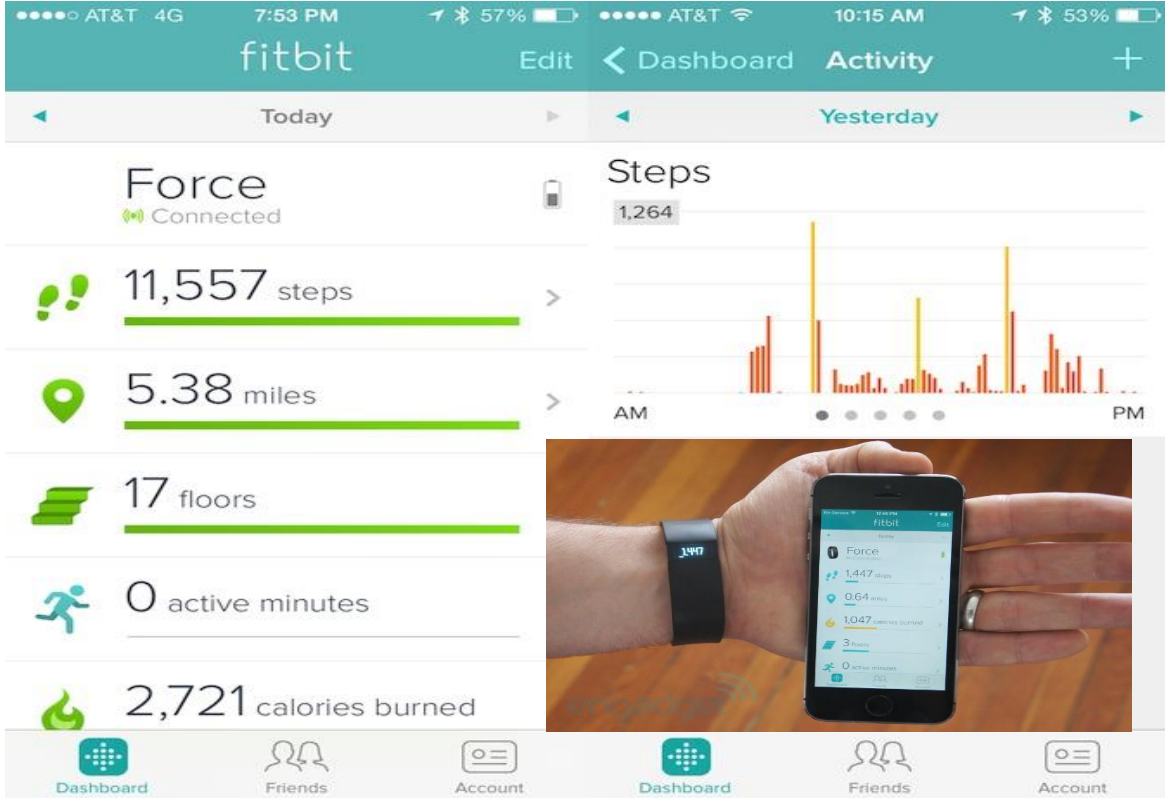
ECG Check iPhone Case Now Available as Prescription or OTC

by EDITORS on Jun 20, 2013 - 4:08 pm



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Personal Fitness Tracking



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Telemedicine Tools: If We Can Use These

Sony SmartEyeglass



i Watch



“Smart” Diaper



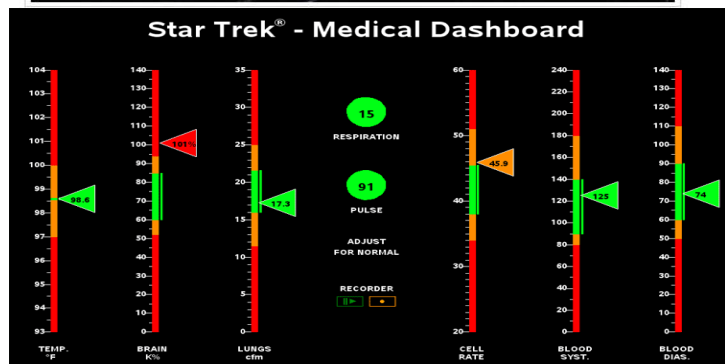
...“Star Trek Medicine” Is Not Far Away

The “Tricorder”



12 Star Trek gadgets that became reality

Posted in [Lists, Sci-Fi](#) by Conner Flynn on January 29th, 2008



THANK YOU!  Children's National™