



CENTER FOR
CONNECTED HEALTH





Seventeen years ago, when we established the Center for Connected Health, we dropped a pebble in the pond, and now we are experiencing the ripple effect that is bringing important changes to our healthcare system. Connected health represents a vibrant and growing discipline, that has the potential to truly transform care delivery.

I'm so pleased to see more and more providers using technology to more efficiently and effectively manage care, one patient at a time. Hospitals are adopting new strategies to connect with patients once they leave the hospital or doctor's office. And, increasingly, patients are where they should be—at the center of their healthcare. Payers are also seeking out and implementing programs to help individuals manage their health and stay healthy at home.

Here at the Center for Connected Health, we see our role as more than the arbiter of technology-enabled care delivery. We are creating the platform onto which others can innovate.

Partners HealthCare has been developing ways to redesign patient care, care that is valuable to the patient at a cost that is appropriate. I am happy to report that our Center is playing a vital role in this effort. Using connected health strategies, we are helping to integrate patient data, link patients at home to their providers, and improve efficiencies and clinical outcomes.

I have begun to think of life as a series of ripples widening out from an original center.

– Seamus Heaney

We also see the Center as a platform for innovation beyond the Partners network. As an advisor to companies with a desire to enter the connected health market place, we are a catalyst for harnessing technology to transform care. Our Consulting Services apply our experience, resources and practical insights to evaluate products and services to be used in medical settings and in the home. Clinicians, technologists and program managers at the Center provide expert opinions and real-world applications to help our clients successfully integrate their offerings into the healthcare delivery system.

I thank our highly dedicated team, our many partners and our providers and patients for helping broaden the reach of connected health, as we aim to achieve greater advances in health engagement and outcomes.

Joseph C. Kvedar, MD
Director, Center for Connected Health
Partners HealthCare



Activity Monitoring Gets Kids Moving “What Are You Going to Do? Step It Up!”

Nearly two hundred Dorchester, Massachusetts, elementary school students and teachers participated in Step It Up, using a wireless pedometer to help motivate young people to be more active—and keep moving.

“We are very excited about using this technology in the classroom. It’s a great way to give the students more ownership and control of their activity,” noted Elizabeth Reynolds Lupo, a physical education teacher at the Emily A. Fifield Elementary School, one of two participating schools.

In this inner city neighborhood, kids found creative ways to keep moving, at home and at school. To increase their activity and step count, students reported helping with chores around the house, playing outside in the park, running errands in the school and one third-grader even woke her mother up early to take her for walks before school.

“It became more than just a classroom program. The students brought the information home too. It’s been a big thing for these kids,” added Jen Gillingham, a teacher at the Oliver Wendell Holmes Elementary School.

The combined step count for students, grouped by classroom, was used in a competition to see who could “walk across America” faster. Many of the kids increased their step count week after week, especially during weekends, suggesting that the enthusiasm for the program continued even during off-school hours.

“We hope that by bringing the ‘sneaker chip’ technology into the classroom, we will enable young people to learn how activity relates to good health and nutrition in a fun and safe environment,” said Matt Fishman, Vice President, Community Health, Partners HealthCare. The program is also in collaboration with the Dorchester FAMILY School Initiative and DotWell.



Home Monitoring to Improve Hypertension Management

Many patients with high blood pressure readings in their doctor's office often attribute the higher readings to 'white coat hypertension' and dismiss the possibility that they actually have high blood pressure. Blood Pressure Connect is the home monitoring program enabling patients to easily collect frequent readings and review their personal health information. This not only helps patients come to terms with their condition, it provides the information and motivation they need to make lifestyle changes to better manage their health.

"It's very helpful—for patients and providers—to get more frequent readings. It gives everyone a better idea of what is really going on with the patient and as a result we are

better able to manage their care," said Amy Bilodeau, RPh (above), Clinical Pharmacist, Brigham and Women's Hospital at Newton Corner, who works with primary care physicians to manage patient care.

"By better understanding their hypertension, and how lifestyle choices can affect their readings, Blood Pressure Connect reinforces the need to do something. Patients become more willing to take the necessary steps to manage their condition," she added.

"Physicians appreciate the fact that their patients are being monitored regularly. We can titrate medications in a more timely way, and it's much more convenient for patients, not having to come in to the office for frequent blood pressure checks."

About The Center

The Center for Connected Health is working to create a new model for healthcare delivery, by developing programs and innovative strategies to move care from the hospital or doctor's office into the day-to-day lives of patients. Leveraging information technology—cell phones, computers, networked devices and simple remote health monitoring tools—the Center is helping providers and patients manage chronic conditions, maintain health and wellness, and improve adherence, engagement and clinical outcomes.

By collecting and presenting accurate physiologic and behavioral data to both patients and providers, our connected health initiatives are facilitating data-driven coaching and as-needed provider

involvement to help achieve patient care goals. Our technology-enabled programs in heart failure, hypertension, diabetes and other chronic conditions are being successfully integrated across the Partners HealthCare network and implemented by major employers.

The Center also offers expert online second opinions, virtual visits, and engages in innovative research to discover new pathways to better care.

Established in 1995, the Center for Connected Health is a division of Partners HealthCare in Boston, founded by Brigham and Women's and Massachusetts General Hospitals.



Connected Health Symposium: Focus on Healthcare Innovation and Technology

Each fall, over 1,000 health technology entrepreneurs, hospital administrators, healthcare providers, health plan executives, large employers, government policy-makers, academic researchers and investors gather in Boston at the annual Connected Health Symposium hosted by the Center.

Opinion leaders and innovators in healthcare and advanced technology discuss how to prepare for a new era of healthcare—via wireless, mobile, Internet and other technologies—to empower patients to become more involved in their health and wellness, better manage chronic conditions and improve clinical outcomes.

Speakers have included Brent James, MD, Intermountain Health Care, Clifford Nass, PhD, author of *The Man Who Lied to His Laptop*, Janet Dillione who leads the team at Nuance Communications that developed IBM's Watson artificial intelligence system, Nicholas Christakis, MD, PhD, MPH, one of *Time* magazine's Most Influential People in the World, BJ Fogg, PhD, Stanford University, Gary Gottlieb, MD, Partners HealthCare, and Dena Puskin, ScD, US Health and Human Services.

Innovative thinking, compelling discussion and lively networking opportunities are the hallmarks of the Connected Health Symposium.

We are creating a new model of care delivery, to better integrate quality care into the day-to-day lives of our patients.

Information Motivates Behavior Change



Home monitoring collects accurate patient data, allows providers to effectively review that data, and engages patients in their care.

Patients regularly collecting and submitting their vital signs enables providers to more effectively assess the patient's status and provide just-in-time care. Personal health data also helps to educate and motivate patients to make necessary lifestyle changes. Our data suggests that home monitoring can make a significant impact on patient care.

Eligible patients with heart failure throughout the Partners HealthCare network are automatically enrolled in our Connected Cardiac Care Program. These patients transmit weight, heart rate, pulse and blood pressure to their tele-monitoring nurse each day. As a result, we have seen a 48% reduction in hospital re-admissions for those patients participating in Connected Cardiac Care. In collaboration with Partners HealthCare At Home, the program continues to expand throughout the Partners provider network.

Similar remote monitoring programs for hypertension and diabetes are helping patients achieve positive behavior change in order to better manage their health. For these prevalent conditions, diet and exercise can play an important role in improving patient outcomes.

Diabetes Connect has demonstrated that patients actively engaged in this program can better manage their diabetes and reduce HbA1c (the clinical measure for blood sugar control) to achieve better clinical outcomes. In a recent study of 75 diabetes patients enrolled in the program, a group of patients actively engaged (as measured by uploading their readings more than 15 times over a 12 month period) had an average drop in A1c of 1.5%. Further, greater provider engagement, as measured by the number of times they logged into the Diabetes Connect data, also correlated to greater patient engagement and outcomes. A 1% decrease in a patient's glycemic control (HbA1c) is considered significant and reduces the risk of heart attack by 14% and diabetes-related death by 21% (UK Prospective Diabetes study).

Providers throughout the Partners network are now using Diabetes Connect to manage patients in a variety of ways, including transitioning patients from in-patient to out-patient care at Brigham & Women's Hospital. At Hawthorne Medical Associates, providers are initiating insulin therapy via Diabetes Connect, and Massachusetts General Hospital uses the program to establish individual care plans for patients.

To reach even more patients, and those without Internet access in their homes, the Center is expanding these programs to offer patients the ability to connect via cellular transmission, not just via telephone 'land lines.'



Connecting with Diverse Patient Populations



Combining our commitment to improving access to quality and cost-effective healthcare, the Center has teamed up with Partners Community Health to create programs targeting underserved communities.

Fitness and activity monitoring

Step It Up is an activity program that incorporates technology, educational feedback and a fun, team-oriented foot race to raise awareness about the importance of daily activity and good health.

Second through fourth graders at two inner-city Boston public schools received 'sneaker chip' pedometers and step-meters to track their individual steps. The mini wireless pedometers clip onto shoes and measure the number of steps and count the minutes of activity. The data on the sneaker chips are automatically uploaded to designated computers throughout the schools when students walk by them.

This is the first of its kind, technology-enabled connected health program helping school-aged children in an underserved community be fit and active.

Text messaging programs

The Center is also employing mobile health to reach more diverse patient populations, leveraging technology that is already a part of everyday life—cell phones and texting.

At the Lynn Community Health Center, in an urban community north of Boston, a text messaging program offers young at-risk pregnant patients support, motivation and timely education when they need it most.

Participating women and teens receive text messages throughout their pregnancy, providing positive reminders and educational messages that are customized to each patient, to encourage these women to get appropriate prenatal care. The program is being expanded throughout the Lynn Community Health Center practice after a pilot suggested that participating patients attended more recommended prenatal visits more often than those who did not.

Similar text messaging programs have helped to improve self-care behavior. A text messaging program nearly doubled the adherence of patients applying sunscreen; another program significantly improved treatment adherence, skin severity and quality of life for dermatology patients with atopic dermatosis, a common form of eczema. Patients enrolled in an opioid addiction treatment program felt better connected to their case managers.

Texting programs have great potential for providing low-cost, accessible educational messaging to patients, and the Center expects to expand these programs significantly over the coming months.



Expanding Access with Virtual Visits

From video-based real time virtual visits to online consultations, the Center is providing patients with non-traditional access to specialty care.

Real-time video-based visits

This fall, two new programs will give patients real-time access to their psychiatrists using a web-cam and a personal computer. At McLean Hospital in Belmont, Massachusetts, a virtual visit pilot will allow patients and their families to connect with their psychiatrist using this simple off-the-shelf technology. The Center's Collaborative Media Services team is enabling the secure connection between patients and providers, to maintain patient privacy.

In addition, veterans and their families who are patients of the Red Sox Foundation and Massachusetts General Hospital Home Base Program will be able to have their follow-up visits via video, from the comfort of their home (above). The Home Base Program serves veterans and family members affected by combat and deployment stress or traumatic brain injury. Thanks to a grant from the Robert R. McCormick Foundation and Major League Baseball's Welcome Back Veterans initiative, veterans of the Iraq and Afghanistan conflicts will have access to the same quality care, in a more stress-free and convenient environment, reducing their need to travel into Boston for their care.

The Collaborative Media Services team is expanding our capabilities in this area, using new technology to allow patients and physicians to use popular free video applications such as Skype and FaceTime, while incorporating the privacy and security measures we require. This makes the technology easier to use and reduces the level of resources required to coordinate the visits.

Video-based and online consultations

For over 10 years, Partners Online Specialty Consultations (POSC) has provided thousands of patients and their providers virtual access to specialty care at Partners-affiliated hospitals. POSC is available to anyone with access to the Internet—patients from throughout the U.S., as well as places such as Turkey, Israel, Saudi Arabia and Uruguay have utilized this program. A number of innovative employers and insurance plans now offer POSC as a member benefit, providing their members with peace of mind and more options for their care. The POSC team recently welcomed several new clients, including a national retailer, supermarket chain, hotel chain, and insurance companies.

A recent review of POSC consultations found that in only 5% of the cases, the specialist opinion was in complete agreement with the patients' current recommended treatment plan. In more than half of the cases, the consulting specialist recommended a complete change in treatment plan, suggesting profound implications for clinical care. This year, POSC expanded its offering to include video-based consultations, using PC-based webcams and off-the-shelf video services to provide more access to Partners' world-class specialists.

Selected Recent Publications

Watson AJ, O'Rourke J, Jethwani K, Cami A, Stern TA, Kvedar JC, Chueh HC, Zai AH. **Linking Electronic Health Record-Extracted Psychosocial Data in Real-Time to Risk of Readmission for Heart Failure.** *Psychosomatics*. 2011 Jul-Aug;52(4):319-27.

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“Mothers-to-Be Are Getting the Message”

The New York Times, February 7, 2011

“New ideas to help people take medications correctly”

Los Angeles Times, March 21, 2011

“Sneaker chips track grade-schoolers’ movement, health”

Dorchester Reporter, April 14, 2011

“Texting for healthy babies”

Boston Business Journal, November 8, 2010

“Text Messages May Be Way to Improve Eczema Management”

The Wall Street Journal, September 28, 2010

“Video program puts docs at bedside 24/7 at MassGeneral”

Healthcare IT News, February 3, 2010

“Acne patients fare well in virtual office visits”

The Boston Globe, April 26, 2010

“Telehealth heads toward the mainstream”

Government Health IT, August 18, 2011

“Kvedar: Collaborative environment vital to mHealth”

MobiHealthNews, August 17, 2011



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