



CENTER FOR  
CONNECTED HEALTH



FOUNDED BY BRIGHAM AND WOMEN'S HOSPITAL  
AND MASSACHUSETTS GENERAL HOSPITAL

**Written Testimony of  
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**Before the  
Clinical Operations Workgroup of the  
Health IT Standards Committee**

**Medical Device Hearing  
Barriers and Enablers for Medical Device Interoperability**

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## ***Background***

Through our work at the Center for Connected Health at Partners HealthCare, as well as the work of others, we have clinical evidence demonstrating that connected health is a powerful strategy to empower patients to better manage their own care, and to engage providers to facilitate just-in-time care. There are now ample data showing that connected health can help providers, patients and consumers manage chronic conditions, maintain health and wellness, and improve adherence, engagement, and clinical outcomes.

In just one example, heart failure patients receiving care in the Partners network (including Massachusetts General and Brigham and Women's Hospitals in Boston) are automatically enrolled in a remote monitoring program. Each day, patients transmit their weight, heart rate, pulse and blood pressure to their provider using remote, wireless monitoring devices. This program not only promotes greater patient engagement, just-in-time education, and nursing interventions to improve care, but it has also helped to reduce hospital readmissions by 48%. There are numerous connected health programs under way demonstrating that simple, easy-to-use technologies at home can help to reduce blood pressure, improve pre-natal care for at-risk pregnant women and teens, lower glucose levels for diabetics and even reduce the risk of skin cancer by increasing the use of sunscreen.

By solving the challenge of interoperability and thereby making connected health strategies easier to use and available on the broadest range of communications technologies, we can offer valuable and sometimes life-saving programs to patients and consumers.

## ***Purpose of Standards***

Interoperability standards for medical devices and their data systems have many goals, perhaps best summarized as, "to support the electronic exchange of patient summary information among caregivers and other authorized parties via potentially disparate EHR systems and other systems to improve the quality, safety, efficiency, and efficacy of care delivery."<sup>1</sup> This definition expresses a manufacturer and health care provider point of view. The users of medical devices and medical record systems, including personal health records (PHRs), demand only that standards support simplicity of use and accessibility of data.

## ***Changing Communications Technology***

For years, analog landline telephone service (known as POTS or Plain Old Telephone Service) was the workhorse of in-home telemedicine, and the rigorous adherence by service providers to a single standard insured near total interoperability. Throughout the United States, any telemedicine device could be plugged into any working phone outlet with a high degree of confidence that it would work without significant intervention. This is no longer the case.

In the last decade, the communications landscape has grown increasingly complex. Traditional POTS has been supplanted by a proliferation of cell phones and other digital technologies. Even landline telephone service offerings from traditional carriers may now be a new variety of digital service (Voice Over IP or VOIP) which may or may not be compatible with existing medical devices. In 2010, the Federal Communications Commission reported that only 71.9% of residential landline customers retained some form of traditional POTS service, while 28.1% had some form of VOIP service.<sup>2(p8)</sup> Simultaneously, 24.5% of US residential customers have become wireless or cellular-only customers, foregoing landlines completely.<sup>3</sup>

It is into this fragmented communications landscape that medical devices are introduced to consumers

and patients with varying results. Universal interoperability with a simple telephone line can no longer be guaranteed. If the device is designed to transmit data over a channel other than a traditional POTS line, the potential for incompatibility with the transmission network increases still more. Will the user have a broadband connection available? Will they have a data network? Will it be wired or wireless? Cellular devices promise some relief, but the fragmented American cellular market introduces its own complexities. What carrier does a patient use? Do they have a smart phone? What operating system?

Our experience has demonstrated that as this complexity has increased, it has also become less visible to users. Even the first step in deploying a technology into the home can be fraught with difficulty. Simply asking a patient what kind of telephone service they have or whether they have high-speed internet access often leads to confusion for the patient and a confusing answer for the provider. Trying to understand subtleties such as whether or not there is digital voicemail on the line (which can disrupt some medical device data transmission) can be nearly impossible. This has led to frustration among medical providers and among patients, neither of whom wish to become IT experts. Together, providers and patients would like to simply choose the devices which are medically necessary and have them “just work” regardless of the communications network to which the patient has access.

## ***Patients and Consumers***

Patients and consumers are different. If one considers consumers to represent the general population of the United States, then patients, or those individuals living with one or more, often chronic, illnesses, are a less technically connected subset of that population.

Internet adoption has been used as a gauge of the overall technology adoption of societies.<sup>4</sup> So too can it serve as a measure of the technology adoption among subsets of society. By this measure, patients use technology less than their consumer counterparts. 81% of healthy American adults (consumers) report that they go online or use e-mail occasionally. Only 68% of adults with one chronic disease report the same Internet use. The number drops to 52% for those with two or more chronic diseases.<sup>5(p10)</sup> Among alternate forms of communication technology, including cell phone usage, this trend continues. We also know that patients with one or more chronic illnesses are older and less affluent than the population in general.<sup>6</sup>

Because patients are less connected to the Internet than consumers, we can infer that, as a group, they likely possess less technical affinity than consumers. Living with a chronic illness presents a continuum of physical, financial, and emotional challenges to individuals and families, often escalating as the disease progresses throughout life. In many cases, adapting to new technology is one more challenge that patients don't need. The cruel irony is that this happens at precisely the moment patients may benefit most from adopting these new technologies.

Thus the first mission of device interoperability standards should be to encourage the broadest possible compatibility with existing communications networks to answer the common patient question, “Why can't this just work.”

## ***Data Accessibility***

Internet users, patients included, care about privacy.<sup>7</sup> But patients also care that data can be easily shared with their care providers. If a patient overcomes the hurdles of device adoption, he or she will become more engaged in their healthcare. In fact, Americans living with a chronic disease who do use the Internet are more likely to write on a blog or contribute to an online health discussion compared to other Internet users.<sup>5(p13)</sup> As patients engage further in their own care, exploring the Internet for treatment options is common. This often entails seeking care from multiple providers or moving from

one provider or network to another. Even for consumers, this is important as families move from place to place or switch providers for a myriad of reasons. The current process of moving data from one medical record system to another is daunting to say the least, even between electronic systems. One recent example posted on the Internet details the ten months it took a savvy technology user to move his family's medical records from one provider in Boston to another in California.<sup>8</sup>

Beyond the current practical reality affecting the movement of data between EHRs, patients are concerned about helping others. Their participation in online information exchanges is clear evidence of this. Among the most connected patients, there is a belief that open data will lead to “patient-driven disruption” of the healthcare system.<sup>9</sup> Luminaries of the Internet including Tim Berners-Lee agree, and together these movements are the vanguard for what Berners-Lee describes as a “linked data revolution” beginning with individuals demanding, “Raw data now.”<sup>10</sup>

Although seemingly different, these two desires for portable data and open data can be united under the idea of data accessibility. Patients want to be able to access their data and do with it as they please. To use it for routine care by moving it from provider to provider, and to share it, while maintaining privacy, for uses not yet conceived.

Thus standards addressing this area should satisfy the desire for portability and accessibility, pushing towards a common format for the access of raw, computable health data.

## **Conclusion**

If the Center for Connected Health could imagine a perfect solution to eliminate the barriers to device adoption that we see every day, we would create a magic box. An updated version of IBM's famous, fictitious Universal Business Adapter which could “connect anything to everything.”<sup>11</sup> Sitting passively in a patient's home, it would collect data from a variety of sensors, wired or wireless, and forward that data via the most economical means, seamlessly leveraging the most effective communications technology available. With no user interface, no complex menus, and no action needed by patients. Until such a device becomes practical, standards which encourage the broadest compatibility with whatever communications system a patient has are a critical step. Beyond the devices in the home, the systems which aggregate data should make it available to users in a raw, computable, portable form, allowing current patients to contribute to new and novel medical investigations if they choose.

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