Pilot Project: At home telemedicine and health monitoring

Meeting with Herb Schultz at UC Irvine

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Problem Statement

Can technology be used to improve the quality of health care delivered at home, and can this reduce costs associated with health care?

Target technologies: Information technologies, telecommunications, home medical monitoring, assistive medical devices (“personalized telemedicine”).

Target demographic: Seniors with limited mobility and advanced medical needs.

Secondary demographic: Broader constituency of patients with at-home medical needs.
Goals of the project

1. Identify and integrate technologies for at-home telemedicine.
2. Learn what works and what doesn’t, and why.
3. Develop or modify technologies as necessary.
4. Demonstrate that at-home telemedicine
   a) works,
   b) is practical and affordable,
   c) improves quality of health care delivery, and
   d) reduces long term costs associated with medical care.
Technology Overview

**Home teleconferencing**
Affordable, easy to use video and medical accessories that can run on consumer grade telecom infrastructure.

**Home monitoring**
Portable, unobtrusive devices for continuous monitoring of vital signs and health.

**Medical assistive devices**
Smart systems that encourage good health activity, or that provide assistance to impaired patients.
What’s wrong with technology? Why can’t it deliver health care solutions at home? Does more technology need to be developed?
There is plenty of technology...

There are thousands of medical devices and gadgets on the market or in development, all designed to improve health and medical care.

In addition, many thousands of consumer technologies available.
Examples in teleconferencing
Examples in home health monitoring
Examples in assistive medical devices
The problem with technology

Too many niche solutions
Companies offer unique technologies for specific problems. For home-based health care to work, need integrative solutions, not lots of unique gadgets.

No common standard or platform
Every device has its own way of doing things, its own protocols, its own software, its own interface, its own instruction manual. Difficult to integrate, even for Ph.D. engineers!

Not practical
Many technologies are simply not practical. Health care systems should be designed around humans and their lifestyles, not around the technology, especially when deployed at home by non-specialists.

Too expensive
Most medical and health devices are far more expensive than they need to be, making them unaffordable for many patients.
Integrate the technologies
Product suite should work as an integrated system to deliver health and medicine to the home. Technologies chosen not just because they solve a problem, but also because they work well together.

Medical devices, meet Web 2.0
The world wide web allows the most diverse number of products to be delivered to the consumer in the least complicated way. Use web standards in medical devices for true “plug and play” and a single user interface.

Simplify the human interface
Non-experts should be able to use the technology. Turn the switch and everything should work.
UCI Technology Strategy, cont.

**Field test and assess**
Find out what really works and what doesn’t, and why. No sitting in the “Ivory Tower”.

**Exploit consumer technologies**
Add consumer technologies to health devices (e.g., bluetooth, wifi, media devices, etc.) to target low cost products.

**Invent where necessary**
Utilize technology developments at UCI if necessary. Add or combine with other technologies.

**Open source, open standards**
Encourage integration and innovation while keeping development costs down by making advancements available to the public.
The “H-Box”
We will produce an easy to use console that handles all communication and telemetry among accessories. It will provide videoconferencing over standard internet infrastructure.

TV-like interface
The H-Box interface will utilize a simple, “TV-like” interface, based on web browser technology.

Embedded Web 2.0
We will modify accessories to communicate using WWW standards, enabling them to have simple or rich data transfer to the H-Box (e.g., static data, dynamic data, Java, etc.)

Wi-Fi, Bluetooth, Wireless USB
Consumer standards will be utilized to enable as much wireless connectivity as possible.
Proposed devices

Data sharing
Data sharing over WWW based on patient’s personal data website.

Video
High end consumer webcams and directional microphones for teleconferencing.

Portable wireless AO-scope
Wireless camera unit with detachable macro optics for close inspection. Specially designed acoustics for wireless stethoscope.

Body monitoring
Several wireless monitoring devices for monitoring pulse rate, blood pressure, temperature, etc. Activity monitoring as well as balance, falls, etc. (with alarm mode).

Assistive devices
Smart pillbox to assist in drug compliance. Physical therapy aids such as balance assistance, sight assistance. Other devices as determined by cases.
“Personalized telemedicine”

When telemedicine leaves the institutes and comes to the home, then it’s personal, and it has special requirements.

UCI has excellent medical and technological expertise and resources. We believe we can make technology work at home to deliver improved medical and health care, to make care more accessible, and to reduce the long term costs associated with health care.
At home telemedicine
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