

Digital Home Health and Telemedicine: Prospects and Challenges in the U.S.

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Corporate Members of CTM



Drivers and obstacles to the adoption of Remote Digital Home Healthcare and Tele-Health

1. What are the key “tension points” that may retard end user adoption of these applications, including machine-to-machine communications?
2. Are there technological issues related to access (both wireless and wireline) and delivery?
3. What are the key accelerators and roadblocks for health care service providers, insurance companies and network operators?
4. What are the regulatory trends and possible outcomes for this application?
5. What is the value proposition of “mobile health?”

Definition

Telemedicine: Use of telecommunications and computer technologies with medical expertise to facilitate health-care delivery.

Digital Home Health: Incorporates remote sensing, collaborative patient care and access to electronic libraries and medical databases.

CyberMedicine: Science of applying Internet and global networking technologies to medicine and public health, of studying the impact of Internet, and evaluating opportunities and challenges for health care.

U.S. Health-Care Challenges

- Current total health-care spending in the U.S is expected to exceed US\$2.6 Trillion in 2010
- Health-care spending estimated to reach US\$4 Trillion by 2013-2014
- Declining number of qualified nurses and doctors
- Digital home-health (and telemedicine) provides a solution to escalating costs, specifically to early detection and health maintenance
- “Aging in place”

- Increase in life expectancy and rapid growth of elderly population. Each additional year of life increases health care costs by 3%.
- End-user surveys suggest cost and time savings from reduced hospital admissions, emergency department and medical practitioner visits and reduced travel costs.
- Digital home-health is not seen by end-users as means to replace “physician-patient” contact. Applications designed to support and enhance “face-to-face” contact have yet to be fully developed
- Estimated that over 25% of all material accessed on the net is health-related

Services

ICT and Applications

Specialist referral Services

Patient seeing a specialist over live, remote consult or transmission of diagnostic images and/or video to specialist

Direct patient care

Sharing of audio, video and medical data between patient and health professional for diagnosis, treatment plan or advice

Remote patient monitoring

Devices to remotely collect and send data to a monitoring station for interpretation. Applications include telemetry devices to capture blood pressure, glucose, vital signs

Medical education and mentoring

Provision of continuing medical education credits for health professionals and special medical education

Consumer medical and health information

Use of internet for consumers to obtain specialized health information and on-line discussion groups for peer-to-peer support

Digital Home-Health

Value Proposition

- Managing Chronic Disease
 - Heart Disease and Stroke
 - Cancer
 - Diabetes
 - Arthritis

The top 4 chronic diseases collectively cost \$969 Billion and affect over 152 million Americans per year!

Quality of Life & Burden of Chronic Disease

Heart Disease and Stroke: Number of Americans affected: 70 million⁵

Diabetes: Number of Americans affected: 23.6 million and 57 million pre-diabetic²

Arthritis: Number of Americans affected: 46 million⁴

Cancer: Number of Americans affected: 10.8 million with a history of cancer⁷

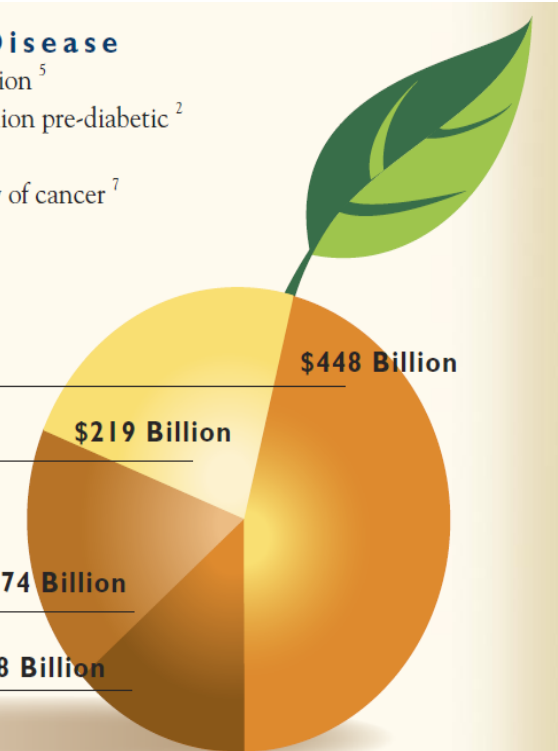
Financial Burden of Chronic Disease

Heart Disease and Stroke Annual Cost:
\$448 billion dollars-medical costs at \$296 billion
and indirect costs of \$152 billion⁶

Cancer Annual Cost: \$219.2 billion⁷

Diabetes Annual Cost: \$174 billion-
medical costs at \$116 billion
and indirect costs of \$58 billion³

Arthritis Annual Cost: \$128 billion⁴



Value Proposition

- Enables monitoring of indicators of human health condition, such as blood pressure.
 - Hypertension tends to lead to coronary heart disease, apoplexy and nephropathy. 45% of hypertension patients die from cardiovascular disease
 - Hypertension patients are 8 times higher than normal people to get apoplexy.
- Allows “aging in place.”
 - *95% of older adults surveyed prefer to live in their own homes as long as possible*

Digital Home-Health

- 34 Million Adults in the U.S. Live with a Disability or Chronic Disease
- 51% of Adults with Chronic Disease Go Online
- Chronic Diseases account for 75% of Health Care Spending

Illness Categories	Device or Peripherals
Cardiology, such as hypertension, CHF and stroke	Blood pressure monitor, weight scale, digital electronic stethoscope
Respiratory disease, such as asthma, and COPD	Peak flow meter, monitor, weight scale, digital stethoscope, digital spirometer
Diabetes and wellness	Blood glucose monitor, weight scale
Post-acute recovery, such as wound care, post-surgical and organ transplant	Video camera or image-capturing devices
Mental health, such as chronic depression and schizophrenia	Video camera for live interactive sessions

Digital Home-Health Value Proposition

Patients As
Active
Participants in
Treatment

- 75% of e-patients with chronic conditions report information they found in their last search affected a decision about how to treat an illness or condition compared with 55% of e-patients with no chronic conditions

Digital Home-Health



Glucose levels are continuously monitored.

When Glucose levels deviate from normal levels, patient / nursing staff is notified to take action. Insulin is administered manually or automatically via insulin pump.



Value Proposition

YouTube: How to use an Inhaler

Inhaler Technique

Added July 23, 2006
From [BuithSurgery](#) **SUBSCRIBE** to BuithSurgery

Asthma is a common condition that can cause variable and intermittent symptoms such as cough, wheezing and breathlessness. Chronic Bronchitis is similar but usually related to smoking. In both conditions, inhaled medication can be effective in controlling symptoms. This medication is given by pumps or inhalers. Their effectiveness relies on good user technique. In this episode we show how to correctly use a common type asthma pump, or metered dose inhaler.

Buith and Llanwrtyd Medical Practice has made every effort to ensure that the information in these episodes is accurate, up to date, and as helpful as possible. However we will not be responsible for any inaccuracies or omissions. In particular if you are unwell, it is important that you do not rely on information from the Internet - you should seek professional medical advice from your Doctor. If your condition is getting worse, or if you are seriously ill, you should call or visit your Surgery. [\(less\)](#)

Category [Howto & DIY](#)

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Digital Home-Health Value Proposition

YouTube - What causes a heart attack? - Mozilla Firefox

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http://www.youtube.com/watch?v=LA2DuxCc04g

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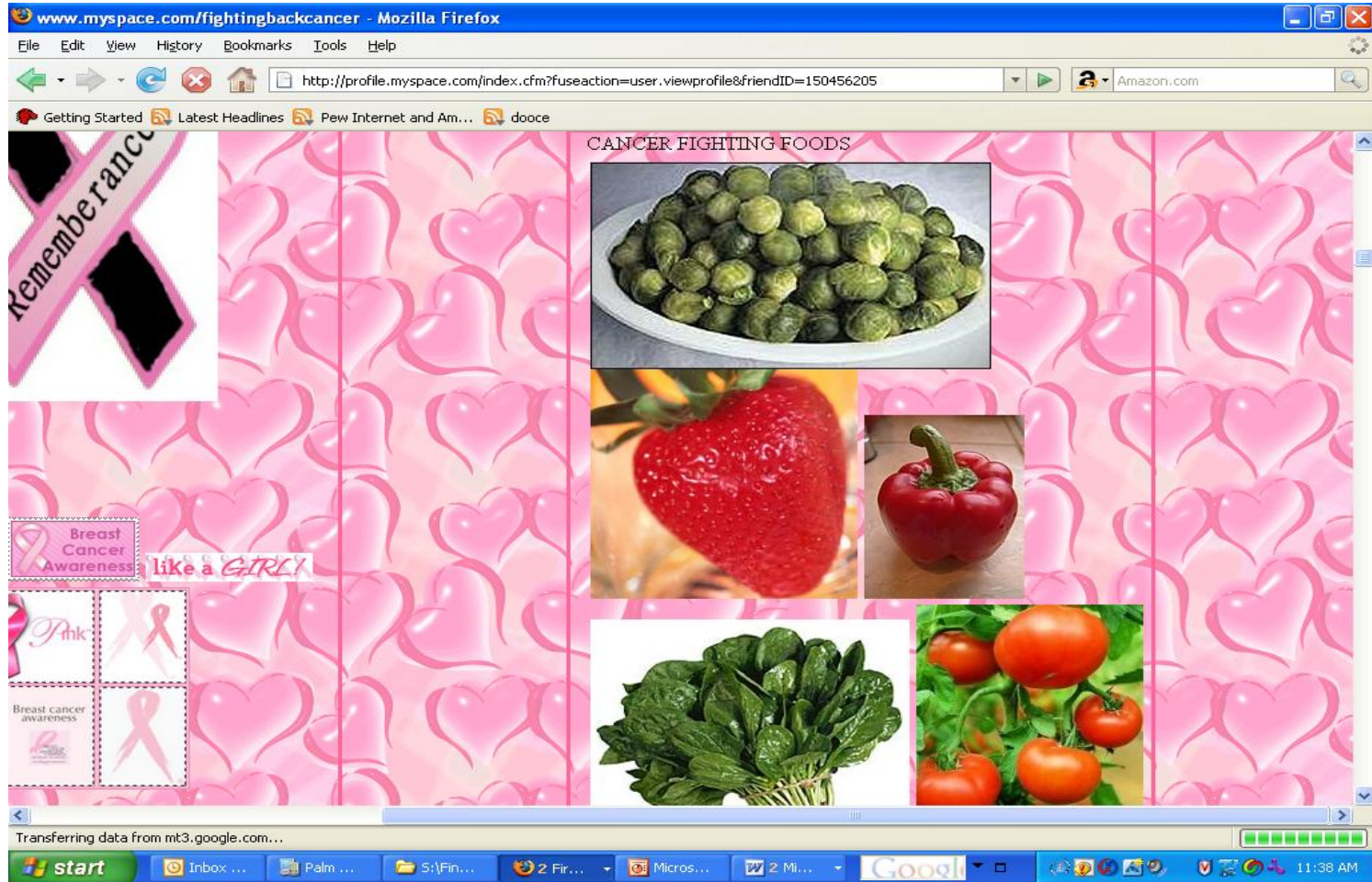
start YouTube - What caus... Microsoft PowerPoint ... 8:37 PM

Create Account or Sign In

52% of internet users watch videos online

Digital Home-Health Value Proposition

MySpace: Fighting Back Cancer



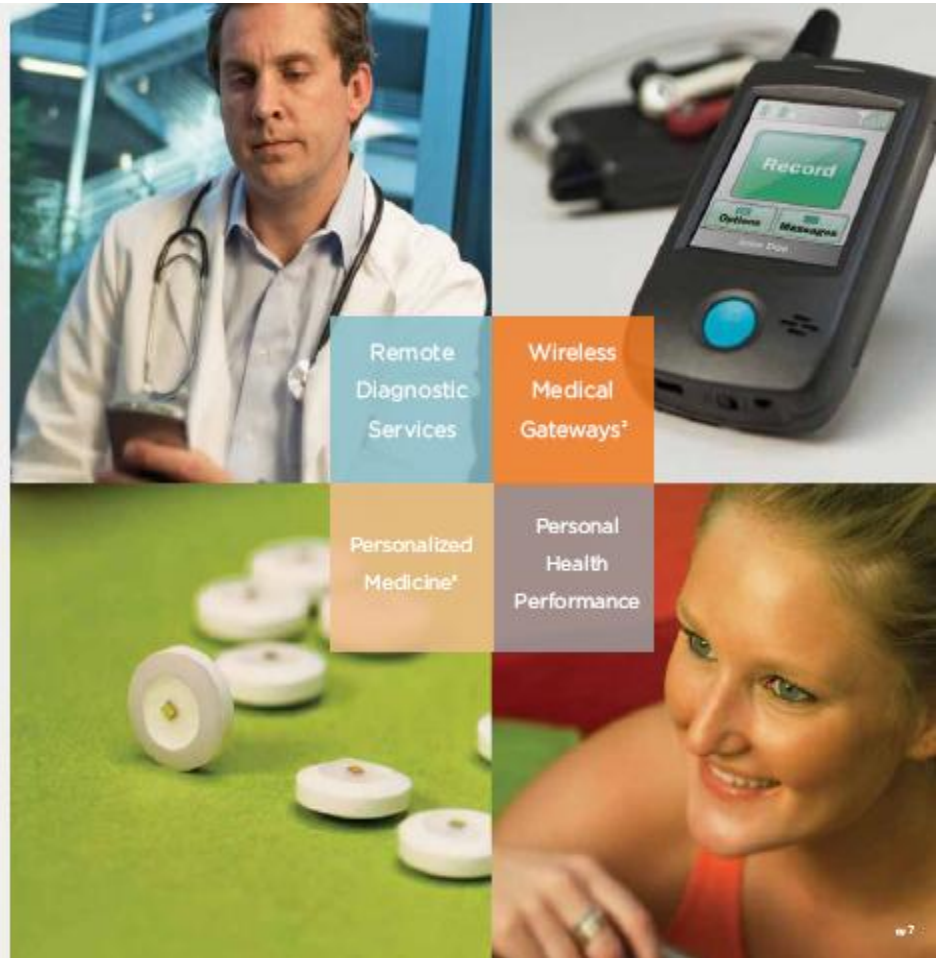
Digital Home-Health

Qualcomm Wireless Health

Applying the power of wireless to health & fitness

Modern healthcare is at a critical juncture and bold solutions are needed to augment strained resources and address inefficiencies in the system. Today's advanced wireless devices, applications and services have captured the imagination of the public! And the benefits of "always on, always with you" connectivity are becoming increasingly apparent to medical professionals, caregivers and healthcare consumers alike. Leveraging our global leadership in wireless innovation, Qualcomm is working with visionary companies to bring new ideas to market that are helping to accelerate the convergence of mobile technology, medicine and personal health.

¹ Over 700 million people worldwide already carry 3G devices enabled by Qualcomm, and the number is expected to exceed 1.6 billion by 2012.
² CardioNet's services include Remote Cardiac Outpatient Telemetry (RCOT), event monitoring, and Holter monitoring services.
³ Proteus Biomedical, maker of the wireless pill shown here, is developing intelligent medicine products in partnership with device, pharmaceutical and biotechnology companies.



Cost of Inpatient Care (per patient per month) Compared to Home Care for Select Conditions

Conditions	Hospital Costs	Home Care Costs	Dollar savings
Low birth weight	\$26,190	\$330	\$25,860
Ventilator-dependent adults	\$21,570	\$7,050	\$14,520
Oxygen-dependent children	\$12,090	\$5,250	\$6,840
Chemotherapy for children with cancer	\$68,870	\$55,950	\$13,920
Congestive heart failure in the elderly	\$1,758	\$1,605	\$153
Intravenous antibiotic therapy for cellulitis, Osteomyelitis, others	\$12,510	\$4,650	\$7,860

<h3>Diabetes</h3>	<ul style="list-style-type: none"> •Appropriate disease management is critical
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Pennsylvania Tele-home Project (171 patients)

<p>Traditional Care Per patient \$232, 872</p>	<p>Remote Monitoring Care per patient \$87,327</p>	<p>Savings/Patient \$145, 500</p>
<p>Traditional Care Per patient \$2,365</p>	<p>Remote Monitoring Care per patient \$1,668</p>	<p>Savings/Patient \$697</p>

Challenges

- Health industry in U.S. is highly structured and extremely complex. Challenging to bring together consortium of health care providers, private and state insurance companies, and equipment providers
- HIPPA and privacy requirements pose potential impediments
- Tele-Health defined as “bringing doctor to the patient” as opposed to “patient to the doctor.”
- Interface devices generally have low compatibility to existing medical practices – health care professionals have to “adapt” to the devices and not vice-versa

Challenges

- Standards remain key issues. Interoperability across software, devices using proprietary specifications and lack of agreed protocols and guideline still persist
- Ability for OEMs to scale up to meet potential demands of major health-care providers will be key hurdle (over 300 OEM produced some 100K units to date)
- Possible interference between devices caused by different transmission technologies – Bluetooth, WiMax etc.

Challenges

- Current cost-benefit studies are limited in scope.
- Most studies are small and involve samples of between 30 to 450.
- Need more comprehensive and extensive studies of savings to patients/health care providers due to early detection of diseases as well as health maintenance.
 - *Medicare Health-Buddy program only half-way through 3 year pilot shows promise*

Challenges

- Multiple Federal regulatory agencies, up to twelve, have oversight on specific aspects (DEA, FDA, FCC, etc) of home-health
- States regulate health related issues within own borders. Multiple and different legal definitions between states.
- U.S. Federal Government and ability to invoke Dormant Commerce Clause

Profits vs. Free

- Potential comprehensive cost-savings at the Federal and State levels have not been fully established.
- Medicare has recently only begun re-imburement for some services. In 2006, out of more than \$400 billion in total spending, only \$2 million on electronically conducted medical services
- Aetna Inc. and Cigna Corp has recently agreed to reimburse doctors for on-line visits.
- New comprehensive revenue and payments models need to be developed.

Potential for digital home-health remains high but key constraints remain:

- Lack of comprehensive and extended studies to show cost-savings and economic benefits of digital home health.
- Multiple Federal and State agencies, up to twelve, with different legal mandate, regulate digital home-health and tele-health.
- Absence of major OEMs exacerbate existence of multiple standards and present interoperability issues.
- Reimbursement for most services must be accepted by insurers. Several insurers have begun to reimburse digital home-health services

Current Studies

- **Patient Value-Proposition:** examine the cost-savings and patient satisfaction of tele-health treatment versus traditional hospital care, and involved predominantly treatment of chronic diseases
- ***Interoperability and Technical Issues:*** Studies explore the technical issues of device compatibilities and connectivity.
- ***Institutional Constraints:*** These studies generally attribute the slow adoption rates of tele-health to the complexity of the U.S. Health industry and the organizational or institutional obstacles in hospitals

Current Studies

Limitations

- They do not comprehensively analyze the obstacles or accelerators to Tele-Health from a “business model” perspective
- Few studies that extensively analyze the issues faced by major health service providers, such as Health Maintenance Organizations, in implementing Tele-medicine
- No current comprehensive studies of the economic benefits of Tele-medicine to society in general and specifically, on the extent to which Tele-medicine can reduce the total health care bill

Current Studies

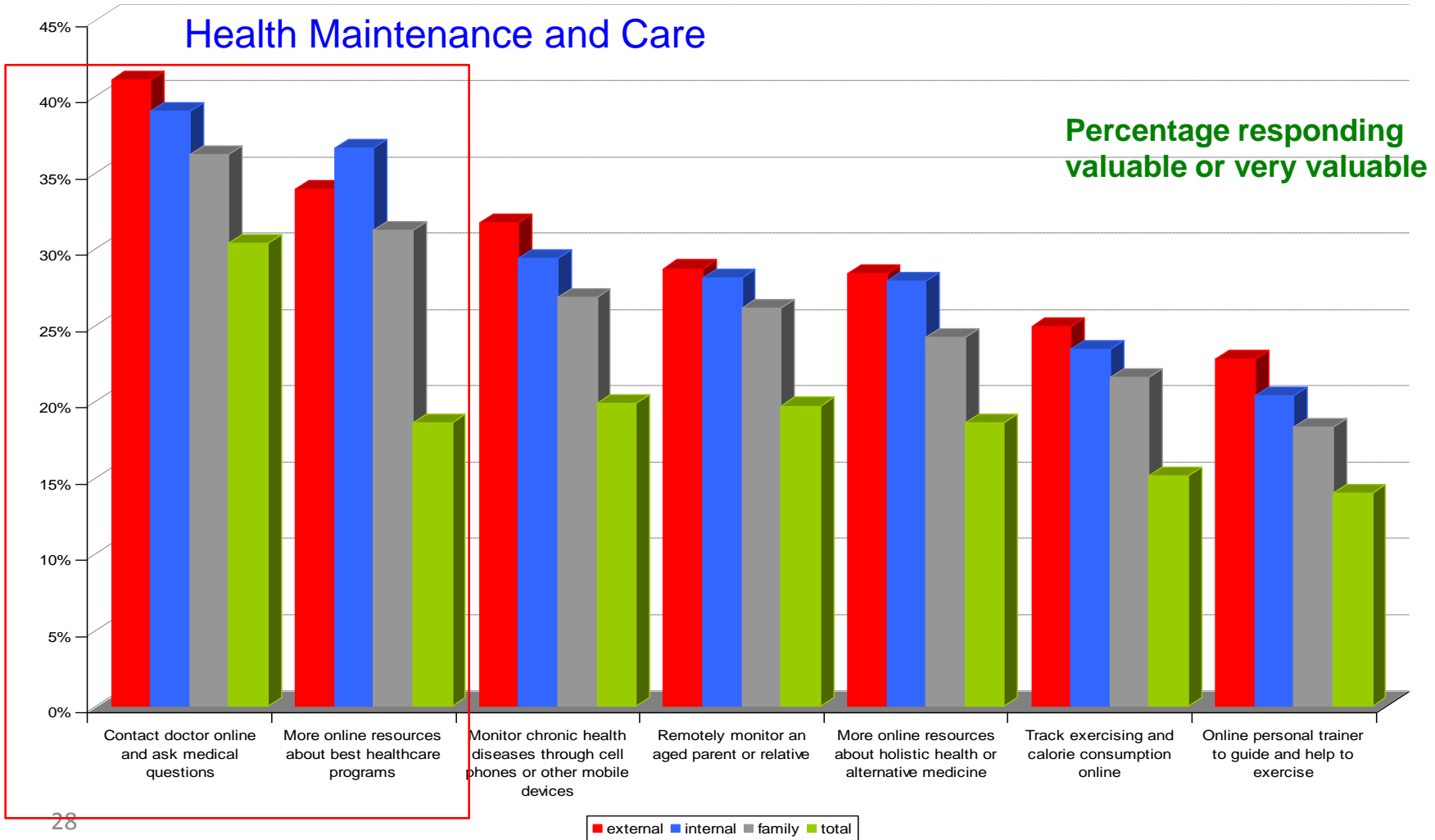
CTM-Center for Body Computing Proposal

- Identify the respective value propositions of Tele-medicine players in the health eco-system (patients, health care providers and insurers, etc)
- Applying business model framework to identify significant challenges that have to be overcome to the widespread adoption of Tele-Medicine
- Evaluate the extent of use of information communication technologies in the health care system to establish their ability to increase efficiencies in health care delivery
- Evaluate the economic benefits of Tele-medicine and develop possible revenue models for Tele-medicine that are independent of Third-party grants
- Develop an econometric model for potential benefits of Tele-medicine and the extent to which Tele-medicine may reduce total health expenditure

CTM Research

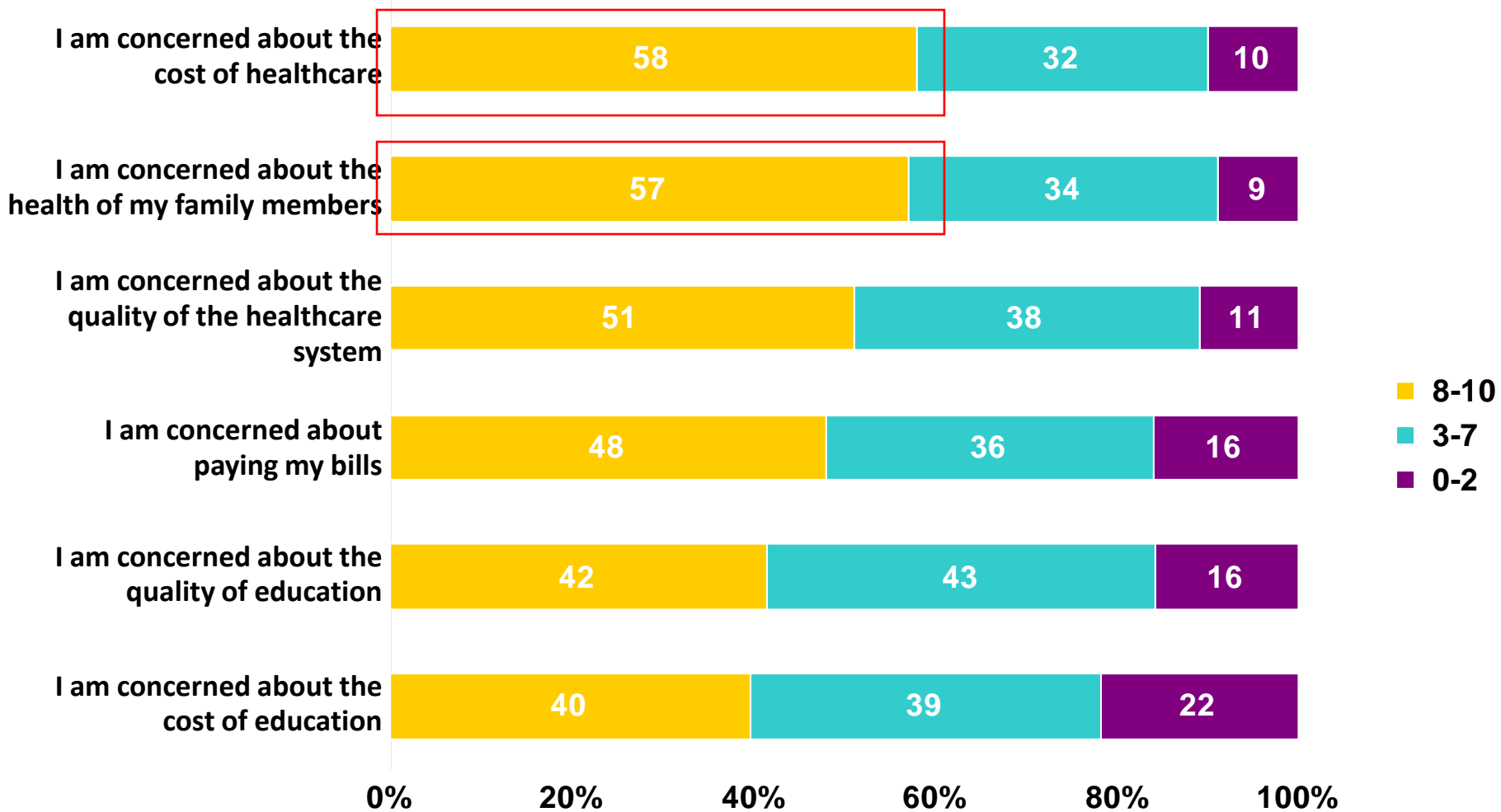
More interest in health on-line applications and digital home-health

Health Maintenance and Care



CTM Research

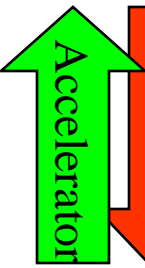

All aspects of health are key concerns



Need to have comprehensive studies on cost-savings as result of health maintenance. Reimbursement issues need to be resolved

Multiple standards present interoperability problems and issues

No current indication of issues related to this domain

		PUBLIC		DOMESTIC		INTERNATIONAL			
	Individual Privacy		National Security	Jobs			Free-Trade		
	Universal Service		Taxes	National Security			Globalization		
	Choice	Green	Mandate	Nationalism			Internationalism		
		ENTERPRISE		USER		LIVING		WORKING	
 	Profits	Red	Green	Free	Entertainment	Green	Green	Efficiency	<p>Enables effective management of chronic diseases between in-person physician check-ups</p>
	Data-Mining	Green	Red	Privacy	Convenience	Red	Green	Necessity	
	Share-Holders			Society	Innovation	Green	Green	Cost-Effectiveness	
	Market	Red	Red	Regulation					

Federal government's ability to invoke Dormant Commerce Clause has ability to resolve State issues .

Need for resolution on HIPPA requirements

Allows for early arrest of medical conditions that would be more costly to treat at later stages