Applying ICT & Innovation for the Aged –

Enabling better health and enhanced participation to create economic and societal multiplier effects

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Tokyo, 12th September 2012
Non-Communicable Diseases are Prevalent in Mature Economies

Global age-adjusted mortality rates by region and cause, 2008
(deaths per 100,000 population)

Source: Sheehan P. & Al; The return to investment in health innovations
Incidences of Chronic Disease is growing, as is the complexity, as the population ages!
This calls for an imminent need for innovative healthcare interventions and related technologies…

Classes of innovation

- 0-20%: Incremental
- 20-50%: Substantial, next generation
- 50%+: Radical, disruptive, revolutionary

Source: PwC, Jan 2011.
Defining Healthcare Technology

Medical **instruments, devices, and equipment**, including **medical diagnostic machines** (X-ray, CT scan, MRI); **medical therapeutic devices** (drug delivery, surgical instruments, pacemakers, artificial organs); and other health-related products, such as medical **monitoring equipment**, handicap aids, reading glasses, and contact lenses. Medical technology also includes molecular diagnostic devices and **health information technology**, such as smart phone and IT applications.

This broad range of products goes from simple, **noninvasive equipment**, such as wheelchairs, to high-tech and highly regulated **invasive devices**, such as pacemakers and insulin pumps.

Source: PwC, Jan 2011.
Applying Healthcare Technology Innovations needs to be structured...

**What?**
- Instruments
- Devices
- Equipment
- Health Information Technology Applications*

**Why?**
- Diagnostic
- Therapeutic
- Monitoring

**How?**
- Noninvasive
- Invasive

* Mostly not regulated

Source: Oracle Analysis
Tele-monitoring

Startrek Tricorder

Incremental       Substantial, next generation       Radical, disruptive, revolutionary
Challenge #1
Benefit claims are not always proven

A Randomized Controlled Trial of Telemonitoring in Older Adults With Multiple Health Issues to Prevent Hospitalizations and Emergency Department Visits

Paul Y. Takahashi, MD, MPH; Jennifer L. Pecina, MD; Benjavan Upatising, MSIE, PhD; Rajeev Chaudhry, MBBS, MPH; Nilay D. Shah, PhD; Holly Van Houten, BA; Steve Cha, MS; Ivana Croghan, PhD; James M. Naessens, ScD; Gregory J. Hanson, MD

Methods: A randomized controlled trial was performed among adults older than 60 years at high risk for rehospitalization. Participants were randomized to telemonitoring (with daily input) or to patient-driven usual care. Telemonitoring was accomplished by daily biometrics, symptom reporting, and videoconference. The primary outcome was a composite end point of hospitalizations and ED visits in the 12 months following enrollment. Secondary end points included hospitalizations, ED visits, and total hospital days. Intent-to-treat analysis was performed.

Conclusions: Among older patients, telemonitoring did not result in fewer hospitalizations or ED visits. Secondary outcomes demonstrated no significant differences between the telemonitoring group and the usual care group. The cause of greater mortality in the telemonitoring group is unknown.

Source: Arch Intern Med. Published online April 16, 2012.
Challenge #2
Market entry is defined by reimbursement decisions and not first adopters

Comparison of Time to Market in Premarket Approval and Reimbursement Processes

## Challenge #3
Market access to same technology varies widely between countries


<table>
<thead>
<tr>
<th>Device Name</th>
<th>Type of Device</th>
<th>France</th>
<th>Italy</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Submission for CE Marking</td>
<td>Reimbursement Decision</td>
<td>Months Elapsed</td>
</tr>
<tr>
<td>Ovatio CRT-D (6750)</td>
<td>Implantable defibrillator</td>
<td>March 25, 2005</td>
<td>Jan. 8, 2008</td>
<td>33.5</td>
</tr>
<tr>
<td>Valiant</td>
<td>Thoracic stent graft</td>
<td>Sept. 8, 2009</td>
<td>Jan. 6, 2011</td>
<td>15.9</td>
</tr>
</tbody>
</table>

*The date of submission for CE marking was estimated to be 1 month before the date of receipt of CE marking. This conservative estimate was used because data regarding actual CE marking review and sponsor-related time are not publicly reported. FDA approval was used as the end point for the U.S. process, since all the device types listed had already received National Coverage Decisions for CMS reimbursement and did not require further review. All devices had original premarket applications approved by the FDA between fiscal years 2006 and 2011, had not been recalled, were cross-referenced on publicly available reimbursement lists for devices in France and Italy, and were original devices with the same brand name and indication. Data on France are from the French government; data on Italy, from the Italian Ministry of Health; and data on the United States, from the FDA.*

In aging societies, different sub-groups have different needs

And long term interventions must aim at delaying and flattening this burden
# A Realistic Opportunity
From disease-specific to goal-oriented outcomes

<table>
<thead>
<tr>
<th>Measurement Domain</th>
<th>Examples of Diseases</th>
<th>Traditional Outcomes</th>
<th>Goal-Oriented Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival</td>
<td>Cancer, heart failure</td>
<td>Overall, disease-specific, and disease-free survival</td>
<td>None if survival not a high-priority goal; survival until personal milestones are met (e.g., grandchild’s wedding)</td>
</tr>
<tr>
<td>Biomarkers</td>
<td>Diabetes, COPD</td>
<td>Change in indicators of disease activity (e.g., glycated hemoglobin level, CRP level, and pulmonary-function tests)</td>
<td>None (not a meaningful outcome observed or felt by patient)</td>
</tr>
<tr>
<td>Signs and symptoms</td>
<td>Heart failure, COPD, arthritis</td>
<td>Inventory of disease-specific signs and symptoms (e.g., dyspnea, edema, and back pain)</td>
<td>Symptoms that have been identified as important by the patient (e.g., control of dyspnea or pain sufficient to perform an activity such as bowling or walking grandchild to school)</td>
</tr>
<tr>
<td>Functional status, including mobility</td>
<td>Cancer, heart failure, COPD</td>
<td>Usually none or disease-specific (e.g., Karnofsky score, NYHA functional classification, and 6-minute walk test)</td>
<td>Ability to complete or compensate for inability to complete specific tasks identified as important by the patient (e.g., ability to get dressed without help)</td>
</tr>
</tbody>
</table>

*COPD denotes chronic obstructive pulmonary disease, CRP C-reactive protein, and NYHA New York Heart Association.*

Achieving the multiplier effect in aging societies: practical thoughts

- Invest in *disruptive* healthcare innovation and enforce IP protection policies
- There’s no *one-size-fits-all* approach: Define age groups and goals
- Enhance x-geography collaboration to *assess the impact* of technology use in each age group
- *Harmonize policies* and processes for faster *reimbursement* in close OECD an APEC economies to drive wider adoption
The 21st Century Tricorder

http://www.youtube.com/watch?v=PRgJGAot83c
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