Re-engineering U.S. Health Care with Healthcare Information Technology – Promises and Peril

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Chairman, Center for Information Technology Leadership
Partners Healthcare System
Harvard Medical School
A Simple Clinical Encounter in the US Healthcare Delivery System
Three Dilemmas: Patient, Provider, Purchaser
Information Technology Systems
The Promise and the Peril
Discussion, Q&A
Clinical Encounter

Imaging Center

Order

Exam notes
Diagnosis:
Mild Pneumonia
Treatment:
Amoxycillin, fluids & rest
Claims and Billings

Primary Care Group Administrator

Aggregated claims

Aggregated billing

Encounter Report

Results

Order

Lab

Third Party Administrator or PBM

Imaging Center

Order

Results

Pick-up script

Pharmacy

Claim

Order

Pharmacy

Primary Care Group Administrator

Aggregated billing

Lab

Third Party Administrator or PBM

Imaging Center

Order

Results

Pick-up script

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Pharmacy

Primary Care Group Administrator

Aggregated billing

Lab

Third Party Administrator or PBM

Imaging Center

Order

Results

Pick-up script

Pharmacy
Health Plan Transactions

- Primary Care Group Administrator
  - Aggregate Group Encounter data
  - Enrollment data
  - Capitation payments
- HMO
  - Aggregate Encounter data
  - Enrollment data
  - Capitation payments

Lab
- Aggregated billing
- Results
- Order
- EOB / payment
- Co-payment

Third Party Administrator or PBM
- Aggregated claims
- EOB / payment
- Claim

Pharmacy
- Co-payment
- EOB / payment
- Order

Imaging Center
- Aggregated billing
- Encounter Report
- Order
- Results
- Pick-up script

Consumer satisfaction survey
- Health Plan Brochure
- Enroll data
- Co-payment
- Salary & Bonus

Capitation payments
- Aggregate

Health Plan Transactions
The Patient’s Dilemma

- Average American consumers $6240/yr of healthcare, or $12,200 for the ave. family
  - Health premiums rising 4x faster than salary over past 6 yrs
  - 50% of personal bankruptcy due to healthcare costs
  - 42% of the public have experienced medical error themselves or in their family (24% with serious consequences)
- 45M Americans lack Healthcare insurance
  - 80M lack at some time during each year
- Increasing exposure to tiered pharmacy plans, consumer directed care, define contribution plans... without transparency
  - Absent reliable quality data
  - No value-based choices
Americans Spend More Out-of-Pocket on Health Care Expenses, 2004

Total health care spending per capita

Out-of-pocket spending per capita

Source: The Commonwealth Fund, calculated from OECD Health Data 2006.
<table>
<thead>
<tr>
<th>Percent reporting:</th>
<th>Only minor changes needed</th>
<th>Fundamental changes needed</th>
<th>Rebuild completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>16</td>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td><strong>Annual income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$35,000</td>
<td>11</td>
<td>51</td>
<td>38</td>
</tr>
<tr>
<td>$35,000–$49,999</td>
<td>13</td>
<td>50</td>
<td>36</td>
</tr>
<tr>
<td>$50,000–$74,999</td>
<td>16</td>
<td>51</td>
<td>31</td>
</tr>
<tr>
<td>$75,000 or more</td>
<td>19</td>
<td>52</td>
<td>28</td>
</tr>
<tr>
<td><strong>Insurance status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insured all year</td>
<td>18</td>
<td>52</td>
<td>29</td>
</tr>
<tr>
<td>Uninsured during year</td>
<td>10</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td><strong>U.S. region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>13</td>
<td>51</td>
<td>35</td>
</tr>
<tr>
<td>North Central</td>
<td>16</td>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>South</td>
<td>15</td>
<td>51</td>
<td>33</td>
</tr>
<tr>
<td>West</td>
<td>21</td>
<td>48</td>
<td>29</td>
</tr>
</tbody>
</table>

The Provider’s Dilemma

- Unexplained variation, disparities in access and utilization, medical error, patient safety, and quality issues vex US Healthcare
  - 18% of medical errors are estimated to be due to inadequate availability of patient information.
  - Patient data unavailable in 81% of cases in one clinic, with an average of 4 missing items per case.
  - Medical error the 8th leading cause of death
  - 1 in 4 prescriptions taken by a patient are not known to the treating physician
  - 1 in 5 lab and x-ray tests ordered because originals can not be found
  - 40% of outpatient prescriptions unnecessary
  - Patients receive only 54.9% of recommended care
Unwarranted Variation in Care

Chart 1–13

Medication to Prevent Recurrent Heart Attack

In half the states during 1998–1999, over one-quarter of Medicare heart attack patients who were ideal candidates for medication to prevent recurrent heart attacks did not receive it.

Percent of Medicare heart attack patients prescribed a beta-blocker at hospital discharge when indicated*

High: 93 (D.C., Mass.)
Median: 72
Low: 47 (Miss.)

Sources: Medicare claims and hospital records (Jencks et al. 2000). *Ideal candidates are those without contraindications, for whom treatment would almost always be indicated based on clinical guidelines. U.S. data includes the 50 states plus the District of Columbia (D.C.).
60% Variation In Medicare Resource Use Intensity For Equivalent Populations

SOURCE: Wennberg et. al. Annals Of Internal Medicine 2/18/03
EXHIBIT 1
Relationship Between Quality And Medicare Spending, As Expressed By Overall Quality Ranking, 2000–2001

Overall quality ranking

<table>
<thead>
<tr>
<th>1</th>
<th>11</th>
<th>21</th>
<th>31</th>
<th>41</th>
<th>51</th>
</tr>
</thead>
</table>

Annual Medicare spending per beneficiary (dollars)

3,000 4,000 5,000 6,000 7,000 8,000


NOTE: For quality ranking, smaller values equal higher quality.
…driven primarily by local norms that tend towards heavier use of discretionary services—such as diagnostic testing and surgical versus less invasive interventions—for which there are no clear clinical guidelines.

Peter Orszag, OMB Blog http://www.whitehouse.gov/omb/blog/

El Paso, McAllen
TEXAS
790 mi., 1271 km
Medical literature doubling every 19 years
  - Doubles every 22 months for AIDS care

2 Million facts needed to practice

Covell study of LA Internists:
  - 2 unanswered clinical questions for every 3 pts
    - 40% were described as questions of fact,
    - 44% were questions of medical opinion,
    - 16% were questions of non-medical information.

Covell DG, Uman GC, Manning PR.
Generally, with direct observation, or interview immediately after clinical encounters, physicians have approximately one question for every 1-2 patients:

- Independent estimates: 0.6, and 0.62 Q/pt
- Holds across PCP and specialty care
- Holds across urban and rural

Gorman, 1995
Gorman and Helfand 1995
Converting evidence to care

Original research

Submission

Negative results

Dickersin, 1987

18%

Variable

Submission

46%

0.5 year

Kumar, 1992

17 years to apply 14% of research knowledge to patient care!

Lack of numbers

Balas, 1995

50%

Inconsistent indexing

Poynard, 1985

Bibliographic databases

6.0 - 13.0 years

Antman, 1992

Reviews, guidelines, textbook

9.3 years

Patient Care

Balas Yearbook Medical Informatics 2000, courtesy M Overhage
“What information consumes is rather obvious: it consumes the attention of its recipients.

Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.”

Changing clinician roles:

- From Omniscient Oracle... to Knowledge Broker.
"...The curse of medical education is the excessive number of schools. The situation can improve only as weaker and superfluous schools are extinguished."

“Society reaps at this moment but a small fraction of the advantage which current knowledge has the power to confer.”

Paper-based Medicine

- Prone to error
- Lots of information but no data
- Limited decision support, or measurement
- Does not integrate with eHealthcare...
- Will not transform healthcare
The Purchaser’s Dilemma

- US healthcare is $1.7T, 16% GDP
  - 5% in 1963; Industrialized societies average less than 10%
  - Costs rising 7-9%/yr, expected to double in 10yr
  - 25% of premium is for administrative overhead (limited value)
- Public expenditure on healthcare now 43% of total (up 10% in past decade)
- GM healthcare costs now $1500/automobile, most expensive component
- Where will additional value be found in, or costs taken out of, the system?

Notes:

(1) Australia, Japan, Korea 2001; Turkey 2000.

(2) Netherlands: Public/private split of total health expenditure in unavailable.

Purchasing power parities (PPPs) provide a means of comparing spending between countries on a common base. PPPs are the rate of currency conversion that equalise the cost of a given ‘basket’ of goods and services in different countries.
The Cost of a Long Life

Average Life Expectancy vs. Per Capita Spending (International Dollars)

United States

http://ucatlas.ucsc.edu/spend.php
• Purchasers are paying into a disease system rather than a wellness system

• 4% of health care dollar is spent on prevention and public health
Health Care Costs Concentrated in Sick Few

Distribution of Health Expenditures for the U.S. Population, By Magnitude of Expenditure, 1997


www.cmwf.org
"By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care."

President George W. Bush
State of the Union Address
January 20, 2004
US Motivation for Healthcare Information Technology

- Medical error, patient safety, and quality issues
  - 98,000 deaths related to medical error
  - 40% of outpatient prescriptions unnecessary
  - Patients receive only 54.9% of recommended care
- Fractured healthcare delivery system
  - Medicare beneficiaries see 1.3 – 13.8 unique providers annually, on average 6.4 different providers/yr
  - Patient’s multiple records do not interoperate
- An ‘unwired’ system
  - 90% of the 30B healthcare transactions in the US every year are conducted via mail, fax, or phone
Reforming health care

This is going to hurt
VA’s Success with Healthcare Information Technology

<table>
<thead>
<tr>
<th>Evidence for and against HIT</th>
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<tr>
<td>55-83% decrease in hospital non-intercepted serious ADEs using CPOE</td>
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<tr>
<td>73% of outpatient drug interaction alerts led to change in prescriptions</td>
</tr>
<tr>
<td>22-78% increased adherence to preventive health reminders</td>
</tr>
<tr>
<td>Fewer medical errors through computerized physician order entry and clinical decision support systems</td>
</tr>
<tr>
<td>Savings of approximately $5000 using CPOE in hospital</td>
</tr>
<tr>
<td>Reduced length of stay in critical care, and overall LOS with CPOE</td>
</tr>
<tr>
<td>15% overall reduced hospital fatality with HIT</td>
</tr>
<tr>
<td>CDS in hospitals resulted in 16% fewer complications, and $538 less expense</td>
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</tbody>
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CPOE: Unintended Consequences

- 5 mature CPOE sites surveyed, 2004-5

<table>
<thead>
<tr>
<th>Event</th>
<th>Frequency (%)</th>
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<tbody>
<tr>
<td>work for clinicians</td>
<td>19.8</td>
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<tr>
<td>unfavorable workflow issues</td>
<td>17.6</td>
</tr>
<tr>
<td>never ending system demands</td>
<td>14.8</td>
</tr>
<tr>
<td>problems related to paper persistence</td>
<td>10.8</td>
</tr>
<tr>
<td>untoward changes in communication patterns and practices</td>
<td>10.1</td>
</tr>
<tr>
<td>negative emotions</td>
<td>7.7</td>
</tr>
<tr>
<td>generation of new kinds of errors</td>
<td>7.1</td>
</tr>
<tr>
<td>unexpected changes in the power structure</td>
<td>6.8</td>
</tr>
<tr>
<td>overdependence on the technology</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Campbell EM, Sittig DS et al., JAMIA 2006
How Does HIT Save Money?

- **EHR Effects**
  - Completeness, correctness, decision support, formulary, brand to generic, duplicate/redundant meds and tests, charge display
  - Workflow support, messaging (pt/provider), referral, A/R, team

- **CPOE Effects**
  - Reduction in hospitalization/LOS due to ADEs, clinical decision support

- **HIEI Effects**
  - Reduction in unnecessary and redundant tests and procedures
  - Labor cost savings

- **Telehealth Effects**
  - Reduction in patient transport, utilization of hospitals, and physician office visits

- **PHR Effects**
  - Administrative time savings
  - Reduction in hospitalizations and physician visit utilization
  - Improved medication safety
  - Reduction in redundant laboratory tests

www.citl.org
Net US could save $150B with HIT adoption, or approximately 7.5% or US Healthcare Expenditure

- The Value of Ambulatory Computerized Order Entry (ACPOE)
  - $44B US nationally; $29K per provider, per year
- The Value of HealthCare Information Exchange and Interoperability (HIEI)
  - $78B/yr
- The Value of IT-enabled Chronic Diabetes Management (ITDM)
  - $8.3B Disease Registries; Advanced EHR $17B
- The Value of Physician-Physician Tele-healthcare
  - >$20B*
- The Value of Personal Health Records
  - Approx. $20B

www.citl.org
4% of physicians use fully functional electronic health records
13% use some form of basic electronic records

Assessment and recommendations generated from rules engine

- Lipids
- Anti-platelet therapy
- Blood pressure
- Glucose control
- Microalbuminuria
- Immunizations
- Smoking
- Weight
- Eye and foot examinations

Assessment:

- No recent LDL measurement
- Patient is on anti-platelet therapy
- Blood Pressure is above goal (avg. over last 2 visits 130/80, goal < 130/80)
- Patient is due for Pneumovax (older than 65, no record of prior vaccination)
- Patient is due for Influenza Vaccine (high risk medical condition)
- Patient may be Current Smoker, not thinking of quitting. Last counseled on 10/10/06.
- Patient is overweight or obese (BMI 27.1 on 10/31/06, goal < 25)
CAD/DM Smart Form

Medication Orders
75 yo man with CAD, DM, and elevated CK. He is not happy about any of his medications. I last saw him 3 months ago.

Review of Systems
ROS: No F, C, N, V, SOB, cough, CP, palpitations, abdominal pain, bowel changes, vision changes, hearing changes, MS pain.

Past medical history: CAD, DM, CK.

Diagnosis
Diabetes mellitus type 1
Coronary artery disease

Lab Orders
CAD-related
- Diabetes mellitus type 1
- Coronary artery disease

DM-related
- Diabetes mellitus type 1

Referrals

Handouts/Education

Blood Pressure Management
Blood Pressure is above goal (avg. over last 2 visits 130/80, goal < 130/80)

Start an Other Anti-Hypertensives (Help Me Choose)

Adjust Oretic 25 MG (25MG TABLET take 1) PO QD

Adjust Lisinopril 20 MG (20MG TABLET take 1) PO QD

Adjust Acebutolol HCL 200 MG (200MG CAPSULE take 1) PO QD

Order Chem 7 now
Order Chem 7 in 4 Weeks
Referral to Nutritionist
Referral to Cardiac Rehab (Help Me Choose)
Referral to Blood Pressure Specialist (Help Me Choose)

Print "Control High Blood Pressure"
Print DASH diet instructions
Print exercise "prescription"
### CAD Quality Dashboard

**Targets are 90th percentile for HEDIS or for Partners providers**

Red, yellow, and green indicators show adherence with targets.

<table>
<thead>
<tr>
<th>Measure</th>
<th>My Value (N)</th>
<th>Clinic Average (N)</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE Inhibitor/ARB Management: % of patients on ACE Inhibitor/angiotensin-receptor blocker</td>
<td>52% (55)</td>
<td>59% (1033)</td>
<td>&gt; 78%</td>
</tr>
<tr>
<td>BMI Documentation: % of patients with BMI documented</td>
<td>22% (23)</td>
<td>45% (339)</td>
<td>&gt; 76%</td>
</tr>
<tr>
<td>Smoking Status Documentation: % of patients with smoking status documented</td>
<td>18% (19)</td>
<td>32% (387)</td>
<td>&gt; 87%</td>
</tr>
<tr>
<td>Anti-platelet Management: % of patients on anti-platelet</td>
<td>81% (85)</td>
<td>79% (1479)</td>
<td>&gt; 94%</td>
</tr>
<tr>
<td>Beta-blocker Management: % of patients on beta-blocker</td>
<td>69% (72)</td>
<td>75% (1392)</td>
<td>&gt; 80%</td>
</tr>
<tr>
<td>Zero Defect Care: % of patients with zero deficiencies</td>
<td>27% (28)</td>
<td>50% (329)</td>
<td>&gt; 68%</td>
</tr>
<tr>
<td>75% (79)</td>
<td>72% (1352)</td>
<td>&gt; 62%</td>
<td></td>
</tr>
<tr>
<td>0% (0)</td>
<td>1% (14)</td>
<td>&gt; 47%</td>
<td></td>
</tr>
</tbody>
</table>

**Zero defect care:**
- Aspirin
- Beta-blockers
- Blood pressure
- Lipids

Total # of CAD Patients: **105**
Introducing Patient Gateway - the fast, efficient, and secure way to reach your doctor’s office. Developed by Partners HealthCare System, Patient Gateway uses the power of the Internet, so you can renew prescriptions, request referral authorizations for specialist appointments, and access quality health and wellness information - at your convenience. With Patient Gateway, connecting with your doctor’s office has never been easier.

Enroll online today at: www.patientgateway.org

or

email us at: patientgateway@partners.org
Discrepancy

Details
More medication changes in visits after diabetes journal submission:

Grant RW et al. Practice-linked Online Personal Health Records for Type 2 Diabetes: A Randomized Controlled Trial. *Arch Intern Med.* 2008 Sep 8;168(16):1776-82.
The Peril?

- HIT Workforce
- HIT Technologies
  - Applications
  - Platforms
- Interfaces
- Knowledge Management
- Failure of ARRA-HITECH Stimulus to achieve HIT sustainability
- Others?
DEVELOPING a National Roadmap for Clinical Decision Support

**MED. INFO**
- Valid
- Credible
- Updated continuously (ex: ethnographic data)

**SOLUTIONS**
- Technology
- Info
- Knowledge
- Workflow
- Practice

**FRAMEWORK**

Our Mission
- Make evidence easy to use.
- All Americans depending on our work.
- Knowledge Management Job

Quality of Care
What does the NAS need to do to help with informatics to improve patient experience?

Policy Considerations
- Benefits to H.C. System; What H.I.T. innovations are appropriate?
- Who should be implementing change? (private? public? hybrid?)

Legal & Regulatory Considerations
Predic the obstacles and evolve creative strategies

Clear & Impactful Deliverables
- Contracts may be awarded, and we want an open, fair record
- Visual Roadmap
  - Multimedia value props
  - Simple explanations
- Strategic Whitepaper
  - Multitude audiences

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Amia
Oct. 26, 2005

Peter Dourand
www.alphademp.com

Today, we are at the crossroads.

Healthcare 10

Information provided by information

They need choices.

Patients and their families will become more engaged in managing their medical info.

5 years from now, we'll be in the crosshairs!

What is the right move? What do we do next?

Aging boomers

Tech bloom
“I conclude that though the individual physician is not perfectible, the system of care is, and that the computer will play a major part in the perfection of future care systems.”

Clem McDonald, MD NEJM 1976

Thank you!
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