The Green Revolution in Health Information Technology

greenCDA
A Standard for Sustainable Health Records

DATE: October 26, 2011
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Hi!

• Introduction
• Health Information Technology: green, yellow or brown?
• HIT Standards: a pivotal role in the greening of healthcare
  – greenCDA and the Revolution in Health Information Technology
    – What is it
    – What is to be done
• Some conclusions and next steps
HIT: green, yellow or brown?

• What’s happening today in HIT
  – Hospitals wired for basic administrative functions: “who, where, how much?”
  – Clinical data, the patient record, just coming on to the computer in electronic medical records (EMRs)
  – Outside acute care, Practice Management is in use, narrow adoption of EMRs

• The government would like this to change [1]
  – HITECH
  – Affordable Care Act
HIT: green, yellow or brown?

- As more clinical data moves onto the computer, what impact will this have on the color of healthcare?
  - Positives:
    - Eliminated 1,000 tons of paper,
    - Eliminated 68 tons of x-ray film,
    - Lowered gasoline consumption by 3,000,000 gallons/year
  - Negatives:
    - Higher energy consumption,
    - Generated additional 250 tons of waste
- Conclusion: net positive impact and the model is useful for evaluating impact
HIT: green, yellow or brown?

• To what extent is KP’s experience reproducible?
• KP HealthConnect
  – Implemented March 2010
  – 454 medical offices
  – 36 hospitals
  – 9 states + DC
• Provides
  – Seamless integration of physician offices, hospitals, radiology, lab, pharmacy
  – Secure email between patient & provider
  – Patient review of results, request Rx refills
  – PACS replaced conventional x-ray film in all regions
HIT: **green, yellow or brown?**

• **Study framework**
  – Used “Eco-Health Footprint” to identify areas of environmental impact [3]
  – Evaluated impact on
    • greenhouse gases,
    • toxic chemicals, and
    • water use

• **Largest effect on greenhouse gases from changes to:**
  – paper consumption,
  – energy use, and
  – plastic and electronic waste
HIT: green, yellow or brown?

• Effect of Kaiser’s HealthConnect on greenhouse gases through paper use, energy use
• Expressed as equivalent acres of carbon sequestration
• Positive:
  – 4,200 from decreased use of paper records
  – 257 from decreased use of x-ray covers and forms
  – 6,400-9,200 from fewer trips (less gasoline)
• Negative:
  – 810 from print out of summaries
  – 283 from PC packaging
  – 13,300 from PC and data center power usage
• Let’s focus on these critical factors
How reproducible are the Kaiser findings?

- **6,400-9,200 from fewer trips (less gasoline)**
- **HealthConnect:**
  - single entity spanning the full spectrum of care
  - Information flowing from clinic to hospital to consultant to lab to patient to pharmacy
- Estimated that in the care of a patient, 80% of the information needed will, at some point, cross an organizational boundary
- **Hypothesis:** to reproduce the positive impact
  - Information needs to be fluid
  - Organizations must have incentive to maintain quality while reducing visits
HIT Standards: pivotal in the greening of healthcare

• **Making information fluid**
• It works at your ATM, and approximately 2.2M other ATMs
• It works for your stock broker, whether the market is +/-
• But, “nobody knows the doctors I’ve seen…” at least, your MDs do not know
  – Who you have seen
  – When you have seen them
  – For what purpose
  – What meds you take, much less OTC and supplements
  – When your last diagnostic test was done, much less the results
  – Unless they themselves have generated this information or, typically, acquired it by phone, fax or _mail.

• Why is HIT so… backward?
HIT Standards: pivotal in the *greening* of healthcare

- **Making information fluid**
- **Interoperability**
  - “Syntactic interoperability is easy; semantic interoperability is darn near impossible.” Tim Bray, co-editor of XML and one of the first to index the web
- **The domain is BIG**
  - Typical exchange standard might have data dictionary of 10,000 terms
  - Just one of the HIT terminologies, and there are dozens in use, has over 250,000 concepts
- And expanding
- And relies heavily on narrative – human language – to convey critical information
HIT Standards: pivotal in the **greening** of healthcare

- **Making information fluid**
- So, how do you cope with that level of complexity?
- First wave HIT standards
  - Health Level Seven (HL7) messaging primarily for administrative, lab
  - X12 for claims processing
  - NCPDP for prescription ordering and fulfillment
  - DICOM for images
- What’s still missing? The core of the clinical data
  - Discharge Summaries
  - Consult Notes
  - Progress Notes
  - Procedure Reports
  - Diagnostic Imaging Reports
  - History & Physicals
greenCDA and the Revolution in Health Information Technology

• HL7’s Clinical Document Architecture [4]
• A standard for the exchange of clinical documents
• Universal – implemented around the globe
• Constrained by rules to fit specific requirements
  – Clinical:
    • Discharge Summary
    • Consult Note
    • Imaging Report, etc.
  – Public Health: Healthcare Associated Infections
  – Quality Reporting
  – Clinical Trials
greenCDA and
the Revolution in Health Information Technology
CDA: fundamental to national/regional exchange

<table>
<thead>
<tr>
<th>Country</th>
<th>System/Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>SCIPHOX</td>
</tr>
<tr>
<td>Finland</td>
<td>Aluetietojärjestelmä</td>
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<tr>
<td>Greece</td>
<td>HYGEIAnet/WebOnColl</td>
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<tr>
<td>Japan</td>
<td>MERIT-9 (MML)</td>
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<tr>
<td>Canada</td>
<td>Infoway</td>
</tr>
<tr>
<td>France</td>
<td>Dossier Médical Personnel</td>
</tr>
<tr>
<td>Italy</td>
<td>TeleMed Escape</td>
</tr>
<tr>
<td>U.S.</td>
<td>CHI, HITSP, IHE</td>
</tr>
<tr>
<td>Argentina</td>
<td>Hosp. Italiano de Buenos Aires</td>
</tr>
<tr>
<td>England</td>
<td>National Program for HIT</td>
</tr>
<tr>
<td>Turkey</td>
<td>National Health Information System (NHIS)</td>
</tr>
</tbody>
</table>

www.cdaacademy.com
greenCDA and the Revolution in Health Information Technology

- HL7’s Clinical Document Architecture
- Designated by the Department of Health & Human Services in the US for “meaningful use” of electronic health records
- Keystone standard for US healthcare reform
# Minimal Document for Exchange

## Good Health History & Physical

<table>
<thead>
<tr>
<th>Patient</th>
<th>Adam Everyman</th>
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<tbody>
<tr>
<td>Date of birth</td>
<td>November 25, 1954</td>
</tr>
<tr>
<td>Contact info</td>
<td>17 Daws Rd. Blue Bell, MA 02368, USA Tel: (781)555-1212</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>Patient IDs</td>
<td>12345 2.16.840.1.113883.19.5</td>
</tr>
<tr>
<td>Document Id</td>
<td>999021 2.16.840.1.113883.19</td>
</tr>
<tr>
<td>Document Created</td>
<td>March 3, 2005, 17:15:04 +0500</td>
</tr>
<tr>
<td>Performer (primary care physician)</td>
<td>Dr. Henry Seven</td>
</tr>
<tr>
<td>Author</td>
<td>Henry Seven</td>
</tr>
<tr>
<td>Contact info</td>
<td>21 North Ave Burlington, MA 01803, USA Tel: (555)555-1002</td>
</tr>
<tr>
<td>Encounter Id</td>
<td>9937012 2.16.840.1.113883.19</td>
</tr>
<tr>
<td>Encounter Date</td>
<td>From March 29, 2005 to March 29, 2005</td>
</tr>
<tr>
<td>Legal authenticator</td>
<td>Henry Seven signed at March 29, 2005, 22:44:11 +</td>
</tr>
<tr>
<td>Contact info</td>
<td>21 North Ave Burlington, MA 01803, USA Tel: (555)555-1002</td>
</tr>
<tr>
<td>Document maintained by</td>
<td>Good Health Clinic</td>
</tr>
<tr>
<td>Contact info</td>
<td>21 North Ave Burlington, MA 01803, USA Tel: (555)555-1212</td>
</tr>
</tbody>
</table>

```xml
<recordTarget>
  <patientRole>...
  </patientRole>
  <patient>
    <name>
      <given>Adam</given>
      <family>Everyman</family>
    </name>
  </patient>
</recordTarget>
```
REASON FOR VISIT/CHIEF COMPLAINT

Stomach ache.

HISTORY OF PRESENT ILLNESS

This patient was only recently discharged for a rectal bleed after ....... ....

He presented to the ER today c/o a dark stool yesterday.

Lab at discharge: Glucose 112, BUN 16, creatinine 1.25, hematocrit 29%. WBC 7300, platelet count 235,000.

He was transfused with 6 units of packed red blood cells.

GI evaluation 12 September: Colonoscopy showed a large polyp in the sigmoid colon.

PAST MEDICAL HISTORY

See HPI.

PAST SURGICAL HISTORY

See HPI.

CURRENT MEDICATIONS

1. Lisinopril 5 mg 1 tablet once a day
Achievable: Tomorrow

ALLERGIES AND ADVERSE REACTIONS
1. Levaquin
2. Lorazepam
3. Peanuts

SOCIAL HISTORY
Drug-abuse History: None
Smoking History: 1 pack per day 1972-2000, None 2001-

FAMILY HISTORY
None recorded.

REVIEW OF SYSTEMS
Patient denies recent history of fever or malaise. Positive for headaches. Positive for osteoarthritis in hips, knees and

PHYSICAL EXAMINATION
HEENT
All normal to examination.

HEART
RRR, no murmur.

THORAX & LUNGS

<entry typeCode="DRIV">
<observation classCode="OBS" moodCode="EVN">
<templateId
    root="2.16.840.1.113883.10.20.1.33"/>
<!-- Social history observation template -->
{id extension="123456789"}
    root="2.16.840.1.113883.19"/>
<code codeSystem="2.16.840.1.113883.6.96"
    codeSystemName="SNOMED"
    code="230056004"
    displayName="Cigarette smoking"/>
<statusCode code="completed"/>
<effectiveTime>
    <low value="1972"/>
    <high value="2000"/>
</effectiveTime>
<value xsi:type="ST">1 pack per day</value>
</observation>
</entry>
Incremental Interoperability

Coded Discrete Data Elements

HL7 CDA Structured Documents

Narrative Text

SNOMED CT

- Disease, DF-00000
- Metabolic Disease, D6-00000
- Disorder of carbohydrate metabolism, D6-50000
- Disorder of glucose metabolism, D6-60100
- Diabetes Mellitus, DB-61000
- Type 1, DB-61010
- Neonatal, DB-75110
- Carpenter Syndrome, DB-02324
- Insulin dependant type IA, DB-61020
Problem:

Creation of an instance conforming to a particular CDA Implementation Guide (IG) may require knowledge of:

- CDA R2 base specification
- HL7 Version 3 data type specification
- CDA templates defined in that IG
- CDA templates referenced by that IG
- Terminology code lists defined/referenced by that IG;

Validation of an instance conforming to a particular CDA IG may require:

- W3C Schema validation
- Schematron validation
Design a simple XML schema:

- Elements use business names (not abstracted);
- Take out the complex stuff required for extensibility

Create the companion transform that will:

- Re-insert static elements
- Transform to canonical CDA elements
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• greenCDA

What is it?

– An implementation methodology for generating templated CDA instances.
– A simplified XML Schema paired with a transform to normative CDA
– An 80% solution

What is it not?

– A replacement for normative CDA
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Complexity remains in design
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Simplicity in implementation

IMPLEMENT:
Create: myGreenCDA.xml
Validate: myGreenCDA.xsd

sender

recipient

myGreenCDA.xslt

myCDA.xml

CDA.xsd

myCDA.sch
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Simplicity in implementation
HIT Standards: pivotal in the *greening* of healthcare

- Early results: CDC’s National Healthcare Safety Network
  - Launched by CDC in 2005 for surveillance of healthcare associated infections (HAIs)
  - Rapid growth in participation from ~300 hospitals initially to over 4500 hospitals in 2011
  - Over 450 hospitals are reporting to NHSN via CDA
  - Initial estimate: *greening* can reduce impedance by up to 10:1
Use of greenCDA and supporting transformation tools shows great promise as an approach for reducing the effort required to implement fully normative CDA

CDC worked with the Lantana Consulting Group to develop a greenCDA for central line insertion practices (CLIP) and is exploring the usability of greenCDA for CLIP in vendor systems
HIT Standards: pivotal in the **greening** of healthcare

- So, standards can make the information move, but **what if** the providers don’t *WANT* to minimize visits?
  - Inaugurating pay for quality in healthcare
  - “If you cannot measure it, you cannot improve it.” Lord Kelvin
  - Requires clinical data, not claims codes

- Creating the incentive is as vital as creating the opportunity
- Standards that allow information to move among caregivers, patients and families is essential to both processes
The **green**ing of health IT

- Build IT requirements into infrastructure
  - Let’s get greater consideration in LEED for Healthcare [9]
  - Let’s get greater consideration in the Green Guide for Healthcare
- Realize interoperability through **green** standards
- Reward quality, not quantity
References & Resources

   - http://www.gpoaccess.gov/fr/
   - http://healthit.hhs.gov/media/MU/n508/MU_SCC_CombinedGrid.pdf


[8] Health Story: www.healthstory.com


Thank You!

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