What is a Standards-based Healthcare Services Platform, and Why should it Matter to You?

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Speaker Introduction

Stanley M. Huff, MD
CMIO
Intermountain Healthcare

Chair of the Board
Healthcare Services Platform
Consortium (HSPC)
Conflict of Interest

Stanley M. Huff, MD

Has no real or apparent conflicts of interest to report.
Agenda

• Introduction
• Current situation
• A vision for the future
• Real applications
• The danger
• Why we need a new ecosystem
• Questions and discussion
Learning Objectives

- Identify a standards-based platform as it applies to health care information, the main standards that are pertinent, and use cases for organizations striving for value-based care
- Initiate standards-based development to proceed at your home institution
- Identify the importance of standard data sets to facilitate continuity of care
STEPS™ - Patient Engagement and Population Management

Standards based services improve patient care by sharing data so that patients and clinicians have the right data at the right time.
Who am I?

• BS in Chemistry from Brigham Young University
• MD from the University of Utah
• Board certified in Clinical Pathology
• Joined Intermountain in 1987
• Chief Medical Informatics Officer since March 2006
• Co-chair of the LOINC committee, Chair of the Board of the Healthcare Services Platform Consortium
Intermountain Healthcare Profile
An Integrated Health System

- 22 hospitals
- 35,000 employees

- 600,000 members
- 25% market share

- 200 clinics
- 1,400 employed physicians

1975
1983
1994
Goal

“To help people live the healthiest lives possible.”
Current Situation

• Each EHR vendor uses a proprietary database schema, proprietary models and unique terminology to represent clinical data
  – Some standardization of codes is now occurring, **but**
  – Data is not consistent vendor to vendor, or even organization to organization within the same vendor
Current Situation

• This means that:
  – Sharing of data is difficult
  – Sharing of executable software across vendors is impossible
  – Each useful application is created or re-created on each different platform (and we all pay the cost!)
  – There are unmet needs for health care applications and decision support
  – Software costs are higher than they need to be
Current State of the Industry

HIMSS 2015 FLOOR

Epic
Allscripts
Cerner
McKesson
Meditech
GE

The Center Isle

The Center Isle Syndrome

Disruptive Technology
Innovation
Disruptive Technology
Innovation
Future Ecosystem: SMART® on FHIR®

Mobile Apps

Web Apps

OAuth

REST API

HL7® FHIR®

Standard FHIR Data Profiles (LOINC, SNOMED CT, RxNorm)

Supporting Health IT Systems

http://smarthealthit.org
Booth# 2084-185 in Interop Showcase
SMART Apps for Data Integration

Patient Care Application

- Cerner
  - SMART App
  - Care Plan
  - Local Data
  - SMART HTML
  - FHIR

- Allscripts
  - SMART App
  - Care Plan
  - Local Data
  - SMART HTML
  - FHIR

- NextGen
  - SMART App
  - Care Plan
  - Local Data
  - SMART HTML
  - FHIR
FHIR is real, it works!

- FHIR is easy to implement
- FHIR has unprecedented support from EHR vendors
- SMART on FHIR Applications at Intermountain Healthcare
  - In use - Pediatric growth chart, Pediatric drug card, BP Centiles
  - In development – HIE viewer, Pulmonary Embolus diagnosis and management
  - University of Utah collaborations
    - ONC Challenge grant: Neonatal bilirubin app
    - ONC High Impact grant: Surgery transition app
The danger: different semantics (codes)
### LOINC Codes for Blood Pressure

<table>
<thead>
<tr>
<th>LOINC</th>
<th>LongName</th>
<th>Component</th>
<th>Property</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>76532-1</td>
<td>Blood pressure device Cuff pressure</td>
<td>Cuff pressure</td>
<td>Pres</td>
<td>Pt</td>
</tr>
<tr>
<td>8470-7</td>
<td>Diastolic blood pressure 10 hour mean</td>
<td>Intravascular diastolic</td>
<td>Pres</td>
<td>10H*mean</td>
</tr>
<tr>
<td>8471-5</td>
<td>Diastolic blood pressure 12 hour mean</td>
<td>Intravascular diastolic</td>
<td>Pres</td>
<td>12H*mean</td>
</tr>
<tr>
<td>8468-1</td>
<td>Diastolic blood pressure 1 hour mean</td>
<td>Intravascular diastolic</td>
<td>Pres</td>
<td>1H*mean</td>
</tr>
<tr>
<td>8472-3</td>
<td>Diastolic blood pressure 24 hour mean</td>
<td>Intravascular diastolic</td>
<td>Pres</td>
<td>24H*mean</td>
</tr>
<tr>
<td>8469-9</td>
<td>Diastolic blood pressure 8 hour mean</td>
<td>Intravascular diastolic</td>
<td>Pres</td>
<td>8H*mean</td>
</tr>
<tr>
<td>8488-9</td>
<td>Systolic blood pressure 10 hour mean</td>
<td>Intravascular systolic</td>
<td>Pres</td>
<td>10H*mean</td>
</tr>
<tr>
<td>8489-7</td>
<td>Systolic blood pressure 12 hour mean</td>
<td>Intravascular systolic</td>
<td>Pres</td>
<td>12H*mean</td>
</tr>
</tbody>
</table>

Search generated 465 hits in 0.028 secs.
The danger

• No true interoperability because
  – Vendors use different models/profiles
  – Government agencies use different models/profiles
  – Provider organizations use different models/profiles
  – Professional organizations use different models/profiles
Healthcare Services Platform Consortium (HSPC)

MISSION

Improve health by creating a vibrant, open ecosystem of interoperable applications, content, and services
HSPC Initiatives

• Be a provider led collaboration agent
• Create a reference implementation of common SOA platform
• Develop terminology and information models for true semantic interoperability
• Support authoring and sharing of knowledge content
• Obtain implementation and adoption of approved standards
• Create a shared technical environment to enable simple and efficient development
How to Get Involved

• HL7
  – Partners in Interoperability
    • March 21-22, 2017 Georgia Tech, Atlanta, GA
    • Meeting on data standardization across medical specialties (co-sponsor with HSPC)
      • July 2017, Washington DC
  – Argonauts
    • Working on implementation of SMART on FHIR services
    • http://argonautwiki.hl7.org/index.php?title=Main_Page

• Healthcare Services Platform Consortium
  – Wiki: https://healthservices.atlassian.net/wiki/display/HSPC/Healthcare+Services+Platform+Consortium
  – Website: http://hspconsortium.org/#/
Why a new ecosystem?
Clinical System Approach

Intermountain can only provide the highest quality, lowest cost health care with the use of advanced clinical decision support systems integrated into frontline workflow.
Decision Support Modules

- Antibiotic Assistant
- Ventilator weaning
- ARDS protocols
- Nosocomial infection monitoring
- MRSA monitoring and control
- Prevention of Deep Venous Thrombosis
- Infectious disease reporting to public health
- Diabetic care
- Pre-op antibiotics
- ICU glucose protocols
- Ventilator disconnect
- Infusion pump errors
- Lab alerts
- Blood ordering
- Order sets
We can’t keep up!

• We have ~150 decision support rules or modules
• We have picked the low hanging fruit
• There is a need to have 5,000+ decision support rules or modules
• There is no path from 150 to get to 5,000 unless we fundamentally change the ecosystem
• Becker’s Health IT & CIO Review
  – Partners HealthCare: $1.2 billion
    Boston-based Partners HealthCare is one of more recent implementations, going live the first week of June to the tune of $1.2 billion. This is the health system’s biggest investment to date. The implementation process took approximately three years, and in that time, the initial price tag of $600 million doubled.

• Intermountain Medical Center $550 million
MD Anderson Cancer Center to cut 900 jobs due to losses from EHR rollout

Modern Healthcare
By Maria Castelucci | January 6, 2017
The University of Texas MD Anderson Cancer Center will cut about 800 to 900 people from its payroll, or 5% of its workforce, as it tries to recover from financial losses after implementing its electronic health record.

The Houston-based cancer center reported significant losses in fiscal 2016 partly because of a difficult adaptation of its new Epic Systems network, the Wall Street Journal reported.

Dan Fontaine, chief financial officer of MD Anderson, said physician productivity suffered last year as they struggled to adapt to the new EHR system. MD Anderson went live on its massive Epic EHR implementation last March.

Physicians and nurses won't be affected by the layoffs. Cuts will be among administrative positions such as billing employees.

MD Anderson reported a $266 million operating loss on $4 billion in revenue at the end of 2016.
Medical and Health Research vs. Health Care Spending in the U.S.

(from Research America)
The start of a Learning Healthcare System is accurate, computable, data.
“EHRs are becoming commodity platforms. The winner will be the EHR vendor that provides the *best platform for innovation* – the *most open and most extensible* platform.”

--- CEO of a major IDN

- Self determination – ability to meet own needs
- Desire for vendor independence
- Don’t want to rely on proprietary extensions or process
- Need clean separation of IP rights (commercialization)
STEPS™ - Patient Engagement and Population Management

Standards based services improve patient care by sharing data so that patients and clinicians have the right data at the right time.
Questions

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Please complete the online session evaluation!
Appendix
The Future Ecosystem

• Standards are defined that enable “truly” interoperable systems using standards based services
• Old and new EHR vendors:
  – Support standards based services (HL7 FHIR®)
  – Support SMART® applications
• Thousands of people develop software that runs on truly interoperable platforms
  – Open source, academics, and for profit developers
  – Apps, including clinical decision support algorithms, are for sale in a vendor neutral app store
  – Apps can be certified as HSPC compliant
  – Platform vendors certify apps as safe for use in their platform
The Future Ecosystem (2)

• People buy a patient data platform
  – Includes auditing, security, authorization, patient selection, etc.
  – May include some core apps: order entry, results review, notification, etc.

• People buy the apps they need

• There is also a marketplace for sharing knowledge, especially protocols, workflows, order sets, ontologies

• Patients receive better care at a lower cost because lower cost higher quality apps are available as driven by market forces
What is HL7 FHIR®?

- A set of modular components called “Resources”
- Resources refer to each other using URLs
  - Build a web to support healthcare process
- Exchange resources between systems
  - Using a RESTful API (e.g. web approach)
  - As a bundle of resources (messages, documents)
FHIR: Core Resources

AdverseReaction
Alert
AllergyIntolerance
CarePlan
Composition
ConceptMap
Condition
Conformance
Device
DeviceObservationReport
DiagnosticOrder
DiagnosticReport
DocumentReference
DocumentManifest
Encounter
FamilyHistory
Group
ImagingStudy
Immunization
ImmunizationRecommendation
List
Location
Media
Medication
MedicationAdministration
MedicationDispense
MedicationPrescription
MedicationStatement
MessageHeader
Observation
OperationOutcome
Order
OrderResponse
Organization
Other
Patient
Practitioner
Procedure
Profile
Provenance
Query
Questionnaire
RelatedPerson
SecurityEvent
Specimen
Substance
Supply
ValueSet
Example: Fetch a systolic blood pressure

GET https://open-api.fhir.me/Observation/8567?_format=json

```
{
  "resourceType": "Observation",
  "text": {
    "status": "generated",
    "div": "1999-07-02: Systolic blood pressure = 109 mm[Hg]"
  },
  "name": {
    "coding": [
      {
        "system": "http://loinc.org",
        "code": "8480-6",
        "display": "Systolic blood pressure"
      }
    ]
  },
  "valueQuantity": {
    "value": 109.0,
    "units": "mm[Hg]"
  },
  "appliesDateTime": "1999-07-02",
  "status": "final",
  "subject": {
    "reference": "Patient/1186747"
  }
}
```
Observation Resource

**Observation (DomainResource)**

- **identifier**: Identifier [0..*]
- **status**: code [1..1] « ObservationStatus! »
- **code**: CodeableConcept [1..1] « LOINC ?? »
- **subject**: Reference [0..1] « Patient | Group | Device | Location »
- **encounter**: Reference [0..1] « Encounter »
- **effective[x]**: Type [0..1] « dateTime | Period »
- **value[x]**: Type [0..1]
  - « Quantity | CodeableConcept | string | Range | Ratio | SampledData | Attachment | time | dateTime | Period »
- **interpretation**: CodeableConcept [0..1] « Observation Interpretation+ »
- **method**: CodeableConcept [0..1] « Observation Methods?? »
- **specimen**: Reference [0..1] « Specimen »
- **device**: Reference [0..1] « Device | DeviceMetric »
Profile for “Blood pressure”

**Observation = Blood Pressure**  
Subject.reference: Patient URL  
Coding: LOINC 55284-4

**Related:**
- **Observation = Systolic BP**  
  name: “Systolic”  
  coding: LOINC 8480-6  
  value.units: “mmHg”
- **Observation = Diastolic BP**  
  name: “Diastolic”  
  coding: LOINC 8462-4  
  value.units: “mmHg”
About HSPC
HSPC History

• HSPC was incorporated as a not-for-profit corporation on August 22, 2014
• Meetings
  – May 2013 Salt Lake City
  – ... 
  – June 17-19 2015, Washington DC
  – August 10-13 2015, Salt Lake City
  – September 28-30 2015, Phoenix
  – January 20-22, 2016 New Orleans, Louisiana, hosted by LSU
  – **July 25-27, 2016 Washington DC, hosted by the ACS**
Membership

• 3 Benefactor members
  – Veterans Administration
  – Louisiana State University Health
  – Intermountain Healthcare
• Key alliances
  – Center for Medical Interoperability (C4MI)
  – OSEHRA (open source initiative)
• 3 Associate (organizational) members
  – Regenstrief
  – Allscripts
  – Cerner
• 11 Individual members
• Society Members: AMA (PCPI), MHII and ACOG