Meaningful Use
Stage 2
Working With What You Get

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Where I’m Coming From
Indivo PCHR

- Personally *Controlled* Health Record
- Originally “Guardian Angel” (ga.org) in 1994
- API-based health record:
  - Permissioning
  - Apps
SMART

- **Substitutable Medical Apps, Reusable Technologies**

- “No Small Change for the Health Information Economy” – NEJM 2009

- API + Data Models built on Open Standards for health information exchange

- Funded by ONC
“An essential first lesson is that ideally, system components should be not only interoperable but also substitutable.”

Why Substitutability?
Cardio CRP

For Ages > 17 Years:

<table>
<thead>
<tr>
<th>CCRP mg/L</th>
<th>Risk According to AHA/CDC Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.0</td>
<td>Lower Relative Cardiovascular Risk</td>
</tr>
<tr>
<td>1.0-3.0</td>
<td>Average Relative Cardiovascular Risk</td>
</tr>
<tr>
<td>3.1-10.0</td>
<td>Higher Relative Cardiovascular Risk.</td>
</tr>
<tr>
<td>&gt;10.0</td>
<td>Persistent elevations upon retesting,</td>
</tr>
<tr>
<td></td>
<td>may be associated with infection and</td>
</tr>
<tr>
<td></td>
<td>inflammation.</td>
</tr>
</tbody>
</table>

RESULT (+ = OUT OF RANGE) UNITS

0.4 mg/L

REFERENCE RANGE
Bloodwork Cardiology Result

Patient info
NAME: John Doe
GENDER: M  AGE: 49  DOB: 01/10/1961

About this test
This report evaluates your potential risk of heart disease, heart attack, and stroke.

Your results

CRP level test
3.3

Total cholesterol level
265

LDL "bad" cholesterol
233

HDL "good" cholesterol
32

Your risk
You show an elevated risk of cardiovascular disease

Your risk would be lowered to
15% if your blood pressure were 120mm/Hg
10% if you quit smoking
6% if you reduced cholesterol to 160mg/DL

Use your CRP results and cholesterol level to calculate your 10 year risk of a cardiovascular event at ReynoldsRisk.org

What now?
Diet & exercise can improve your cholesterol levels
Quitting smoking can decrease your heart disease risk by 52% or more
Ask your doctor about statins or other medications that can lower cholesterol
Consider retesting in 1 to 2 weeks to exclude a temporary spike in blood levels
1 Developer

1 Week
Your Results
CRP level test
2.4

Your risk
You show an elevated risk of cardiovascular disease.
If you’re a smoker with normal blood pressure, (130 mm Hg) but family history of heart attack before the age of 60 (one or both parents) your risk over 10 years is:

1.9
Luke Skywalker  
5 months 27 days (born Apr 2, 2014)

Add Measurements  Collapse

<table>
<thead>
<tr>
<th></th>
<th>1 month 13 days</th>
<th>2 months 18 days</th>
<th>3 months 6 days</th>
<th>4 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56 cm</td>
<td>81.5 cm</td>
<td>64 cm</td>
<td>65.5 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>4.9 kg</td>
<td>5.7 kg</td>
<td>6.1 kg</td>
<td>7 kg</td>
</tr>
<tr>
<td>Head-Ø</td>
<td>39 cm</td>
<td>40.8 cm</td>
<td>41.9 cm</td>
<td>42.7 cm</td>
</tr>
</tbody>
</table>

Boys 0 - 24 months

![Head circumference for age - BOYS](image)

![Length for age BOYS](image)

![Weight for age BOYS](image)

Boys 0 - 36 months

![Head circumference for age percentage: Boys, birth to 36 months](image)

![Height for age BOYS](image)

![Weight for height BOYS](image)
HITECH
HITECH Act

• Financial incentives for demonstrating “meaningful use” of EHRs, starting in 2011

• After 2015, financial penalties for failing to demonstrate meaningful use

• 3 meaningful use stages. Stage 2 current focus, stage 3 about to be finalized

• Invest 25.9 to as much as 36.5 billion USD of taxpayer money
MU Stage 2

• Provide patients the ability to view online, download and transmit their health information

• Provide clinical summaries for patients for each office visit

• Provide summary of care record for each transition of care or referral

→ Export a standardized document
Where are we?

- HITECH Act overseen by ONC
  - With MU2, export of a “master” document
- SMART funded by ONC
  - Develop health information exchange API

→ See what you can do with what you’ll get: C-CDA
C-CDA
CDA

• CDA = cross-referenced materials
  • Ever growing, complex web of documentation
• CDA = multiple approaches for documenting
  • template requirements began to diverge

➔ Consolidation harmonized and balloted previous templates into a single IG: C-CDA
Initial Observations

- Ambiguous – statements difficult to interpret
- Complex – hard for developers to understand; multiple ways to say the same thing
- Not yet widely and inconsistently implemented
- Not implemented with an automated (programmatic) interface
- Not free to implement or distribute specifications
Still... Let’s Try!

- C-CDA “Receiver”: Expose C-CDA data as JSON
- Minimal data set (DMPAV)
  ➔ Problem: data fidelity

https://github.com/jmandel/json_ccda
C-CDA Scorecard

https://github.com/chb/ccdaScorecard

- Check C-CDA for schema, schematron and semantic errors; scored for correctness 0-100%
- 21 vendor-supplied samples: 63% [23, 100]
- Logical and terminology consistency errors
- 12 distinct patterns for telephone numbers

Not Good Enough

Not easy to understand, not adequately expressive, not consistent enough and not free for innovators and developers
Moving Forward
WEB API
SMART on FHIR

- **FHIR**: Free, open source specification under HL7
  http://www.hl7.org/fhir/

- **SMART** for authentication, context and dev tools
  http://www.smarthealthit.org

- See also: Argonaut Project
  http://www.argonautproject.org
Progress!

• FHIR DSTU 2 being finalized

• Growing ecosystem (clinical trials, genomics, ResearchKit, MedRec, …)

• Commitment from major US vendors to provide a SMART / FHIR API in next iterations

• SMART App Gallery with > 30 Apps
  https://gallery.smarthealthit.org
Thank You!

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http://smarthealthit.org