Interoperability

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What are we trying to do?

“To help people live the healthiest lives possible.”
Why interoperability?

- Improve the quality and safety of care
- Decrease the cost of care
- Enable a Learning Health System
- Make providers happier
- Make patients happier and healthier
- There are many more reasons...
‘The complexity of modern medicine exceeds the inherent limitations of the unaided human mind.’
~ David M. Eddy, MD, Ph.D.

‘... man is not perfectible. There are limits to man’s capabilities as an information processor that assure the occurrence of random errors in his activities.’
~ Clement J. McDonald, MD
Intermountain can only provide the highest quality, lowest cost health care with the use of advanced clinical decision support systems integrated into frontline clinical workflow.

Dr. Homer Warner circa 1960
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
- Patient worksheets
- Post MI discharge meds
- **Occult sepsis in the ER**
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
• There is no scalable path from the leading institutions to community hospitals
Medical errors

BMJ 2016;353:i2139 doi: 10.1136/bmj.i2139 (Published 3 May 2016)  Page 1 of 5

ANALYSIS

Medical error—the third leading cause of death in the US

Medical error is not included on death certificates or in rankings of cause of death. Martin Makary and Michael Daniel assess its contribution to mortality and call for better reporting.
Deaths during inpatient admissions: ~251,454

Table

<table>
<thead>
<tr>
<th>Study</th>
<th>Dates covered</th>
<th>Source of information</th>
<th>Patient admissions</th>
<th>Adverse event rate (%)</th>
<th>Lethal adverse event rate (%)</th>
<th>% of events deemed preventable</th>
<th>No of deaths due to preventable adverse event</th>
<th>% of admissions with a preventable lethal adverse event</th>
<th>Extrapolation to 2013 US admissions†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Grades¹¹</td>
<td>2000-02</td>
<td>Medicare patients</td>
<td>37 000 000</td>
<td>3.1</td>
<td>0.7*</td>
<td>NR</td>
<td>389 576</td>
<td>0.71</td>
<td>251 454</td>
</tr>
<tr>
<td>Office of Inspector General¹²</td>
<td>2008</td>
<td>Medicare patients</td>
<td>838</td>
<td>13.5</td>
<td>1.4</td>
<td>44</td>
<td>12</td>
<td>0.62</td>
<td>219 579</td>
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<tr>
<td>Classen et al¹³</td>
<td>2004</td>
<td>3 tertiary care hospitals</td>
<td>795</td>
<td>33.2</td>
<td>1.1</td>
<td>100</td>
<td>9</td>
<td>1.13</td>
<td>400 201</td>
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<tr>
<td>Landrigan et al¹⁴</td>
<td>2002-07</td>
<td>10 hospitals in North Carolina</td>
<td>2341</td>
<td>18.1</td>
<td>0.6</td>
<td>63</td>
<td>14</td>
<td>0.38</td>
<td>134 581</td>
</tr>
<tr>
<td>Point estimate from all data</td>
<td>2000-08</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.71</td>
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</tbody>
</table>

http://hspconsortium.org
Eileen
What we need to do
SMART on FHIR® – Open Platform Architecture

SOA Orchestration

OAuth

FHIR® REST API

FHIR Profiles from detailed clinical models

Heterogeneous Systems

Cerner

Allscripts

Epic

Others...

mHealth

Web Apps

Real Impact

- Occult sepsis
- Community Acquired Pneumonia
- Pulmonary Embolus
- ICU Glucose
- Ventilator management

http://smartplatforms.org/smart-on-fhir/
The Compliance Pyramid

1. Preferred structure, standard extensions, explicit LOINC and SNOMED, units, magnitude, ...

Common resources, extensions and some specific LOINC and SNOMED

Structure(s), Generic LOINC

Structure, No terminology Constraints
More than just the EHR

- Core EHR
- SMART on FHIR App
- Enterprise Service Bus
- Knowledge Services
  - BPMN2 Engine
  - Terminology Ontology
  - DROOLS
  - More...

- Core Shared Services
  - Security
  - Auditing
  - Data Drive
  - Time Drive
  - Pub - Sub Notification, Etc.

- Other Enterprise Apps and Services
  - Finance
  - Payers
  - RIS/PACS
  - Etc.
The incredible value of interoperability?

- Save 100,000 lives a year?
- Make the right decision 80% of the time?
- Save $5 billion in chart abstraction costs?
- Learn something from the $3.2 trillion that we spend each year on healthcare?
- Install a new EHR for millions instead of billions?
Questions?

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