FHIR Transforms the Business of Healthcare for Clinicians

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FHIR Applications Roundtable

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Interoperability:

The meaning of the data is understood, and data is usable in the workflow of the receiver
All clinical domains have data that is important to them and usually their workflow dictates how that information is best presented
Usability: Data views that fit the workflow
# Pediatric Growth Table

<table>
<thead>
<tr>
<th>Entry Date</th>
<th>0 - 13 Weeks</th>
<th>0 - 6 Months</th>
<th>0 - 2 Years</th>
<th>0 - 20 Years</th>
<th>Fit to Age</th>
<th>Zoom Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3y 2m</td>
<td>3y 9m</td>
<td>3y 11m</td>
<td>4y 2m</td>
<td>4y 5m</td>
<td>6y 7m</td>
</tr>
<tr>
<td>Annotation</td>
<td>See all</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Length</td>
<td>cm</td>
<td>98.3</td>
<td>100.7</td>
<td>103</td>
<td>105.7</td>
<td>108.1cm</td>
</tr>
<tr>
<td>Percentile</td>
<td>%</td>
<td>77</td>
<td>62</td>
<td>70</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>Z Score</td>
<td>Z</td>
<td>0.7</td>
<td>0.3</td>
<td>0.5</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Velocity</td>
<td>cm/yr</td>
<td>7.5</td>
<td>10.6</td>
<td>10.3</td>
<td>8</td>
<td>To here</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>14.5</td>
<td>17.5</td>
<td>19.1</td>
<td>21</td>
<td>21.3kg</td>
</tr>
<tr>
<td>Percentile</td>
<td>%</td>
<td>56</td>
<td>82</td>
<td>90</td>
<td>95</td>
<td>93</td>
</tr>
<tr>
<td>Z Score</td>
<td>Z</td>
<td>0.2</td>
<td>0.9</td>
<td>1.3</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Velocity</td>
<td>kg/yr</td>
<td>5.2</td>
<td>5.5</td>
<td>4.4</td>
<td>1</td>
<td>To here</td>
</tr>
<tr>
<td>Head C</td>
<td>cm</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Percentile</td>
<td>%</td>
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</tr>
<tr>
<td>Z Score</td>
<td>Z</td>
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</tr>
<tr>
<td>Velocity</td>
<td>cm/yr</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BMI</td>
<td>kg/m²</td>
<td>15.1</td>
<td>17.3</td>
<td>18.1</td>
<td>18.8</td>
<td>18.2</td>
</tr>
<tr>
<td>Bone Age</td>
<td>y - m</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
Pediatric Growth Chart
Context: The app knows about the patient
VisualDx and FHIR for Decision Support

VisualDx uses the FHIR standard to obtain:
- patient’s age
- gender
- problem list (conditions encoded with SNOMED-CT)
- medication list (medications encoded with RxNorm)

Result: provides the user with VisualDx data and images matching their specific conditions or drug eruption/reaction differentials.
Differential Builder Image Results in VisualDx

Differential Diagnosis of Multiple Skin Lesions in a 50-59 year old Female

with Blanching Patch, Targetoid Configuration, Leg  Edit Patient Information or Findings

2 Diagnoses match 4 of 4 Findings

Lyme Disease
Early Localized

Southern Tick-Associated Rash Illness

42 Diagnoses match 3 of 4 Findings

Cellulitis

Deep Vein Thrombosis

Livedo Reticularis

Poison Ivy - Oak - Sumac Dermatitis

Acute Meningococcemia
FHIR Genomics: Data from heterogeneous sources
SMART: Substitutable Medical Applications, Reusable Technology

**API**
Resource oriented, everything a URL

**Data Model**
Context (container, user, patient)
Medical (problems, allergies, ...)

**Authentication**
Consistent delegation, web standards (OAuth)

**UI**
Standards-based integration (HTML5)
SMART Architecture

- **SMART Container**
  - Data Source 1
  - SMART Genomic API
  - EMR App

- **SMART Container**
  - Data Source 2

- **SMART Container**
  - Data Source 3
SMART on FHIR Genomics

Clinico-Genomic Apps

1. Order Genetics Labs
2. Return Genetics Lab Results
3. Present & Contextualize Genetics Lab Results

- FHIR Data Order
- Demographics
- Sequence

- Diagnostic Order App
- Diagnostic Reporter App
- FHIR Data Report Sequence

- EMR System
- Sequencing Lab

- SMART on FHIR Clinico-Genomics Apps

SMART Precision Cancer Medicine App
(Warner & Alterovitz, JAMIA, 2016)
What next for FHIR apps?

The ability to access data for an individual across systems and across organizations.
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THANK YOU!

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