Implementing Boston Childrens Pediatric Growth Chart Application

HL7 Partners in Interoperability

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Intermountain Healthcare Profile

An Integrated Health System

- 22 hospitals
- 33,000 employees

Intermountain® Healthcare

1975

- 600,000 members
- 25% market share

selecthealth

1983

- 200 clinics
- 1,000 employed physicians

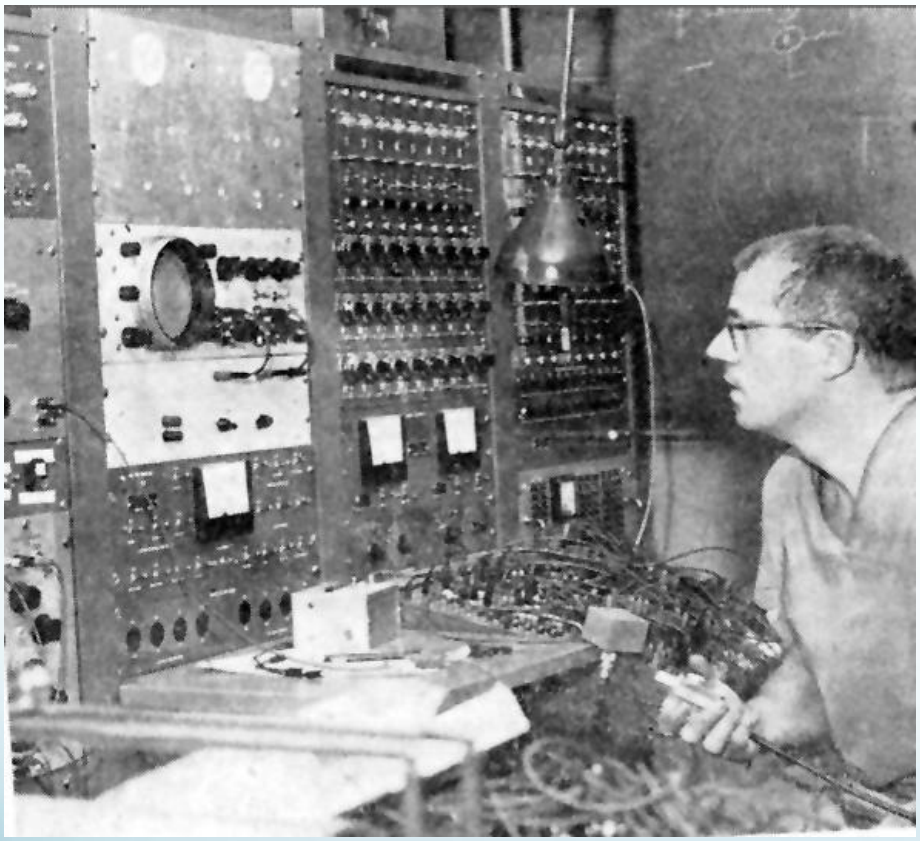
Intermountain® Medical Group

1994

Intermountain Mission

"To help people live the healthiest lives possible."

Homer Warner and HELP



Dr. Homer Warner

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

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

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

An Experiment

We wanted to try to import an outside application:

Boston Childrens Pediatric Growth Chart

Something New and Pow | SMART App Gallery

https://gallery.smarthealthit.org

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- Patient Education
- Genomics
- Open Source
- iPhone and iPad
- All Apps

Name A to Z

20 apps

Bilirubin Chart

BMJ Content Discovery

Cardiac Risk

Cerner HIE on SMART

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Name A to Z

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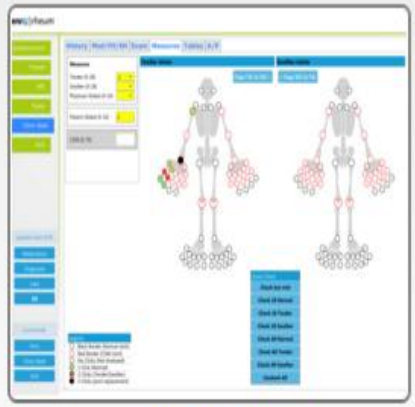
Crimson Care Management

Duke PillBox

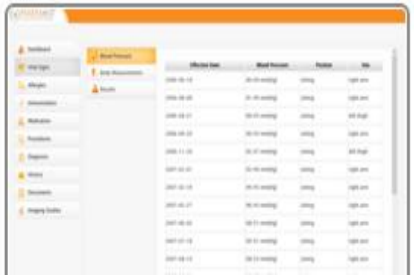


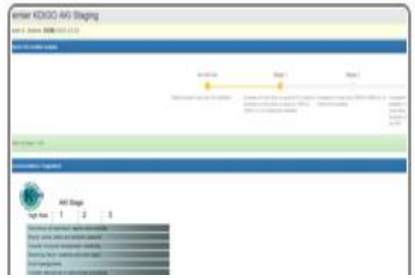
EnrG | Rheum

Growth Chart

Medication RS

Medication TimeView





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https://gallery.smarthealthit.org/boston-childrens-hospital/growth-chart

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Growth Chart

Growth Chart

Author	Boston Children's Hospital
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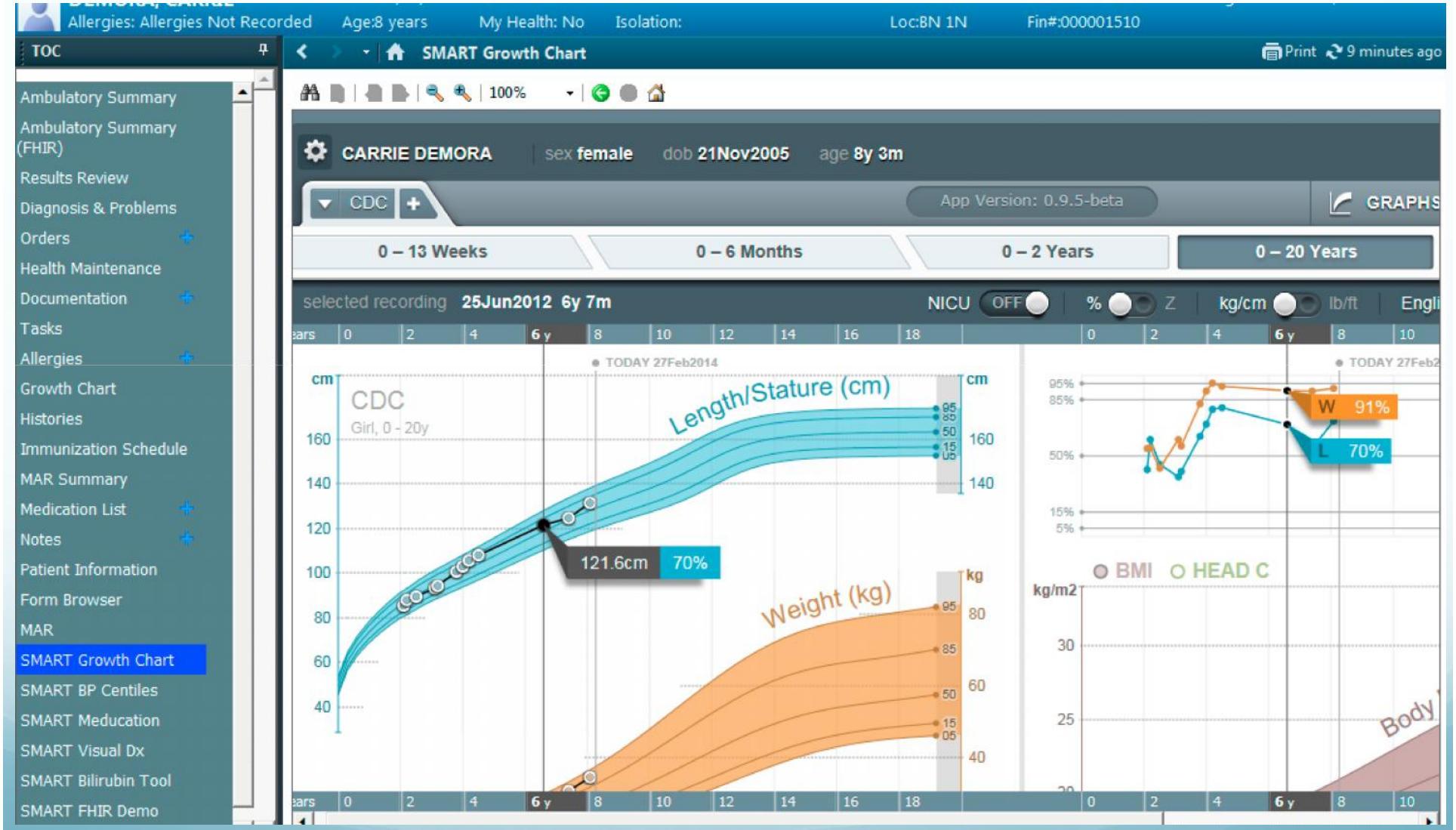
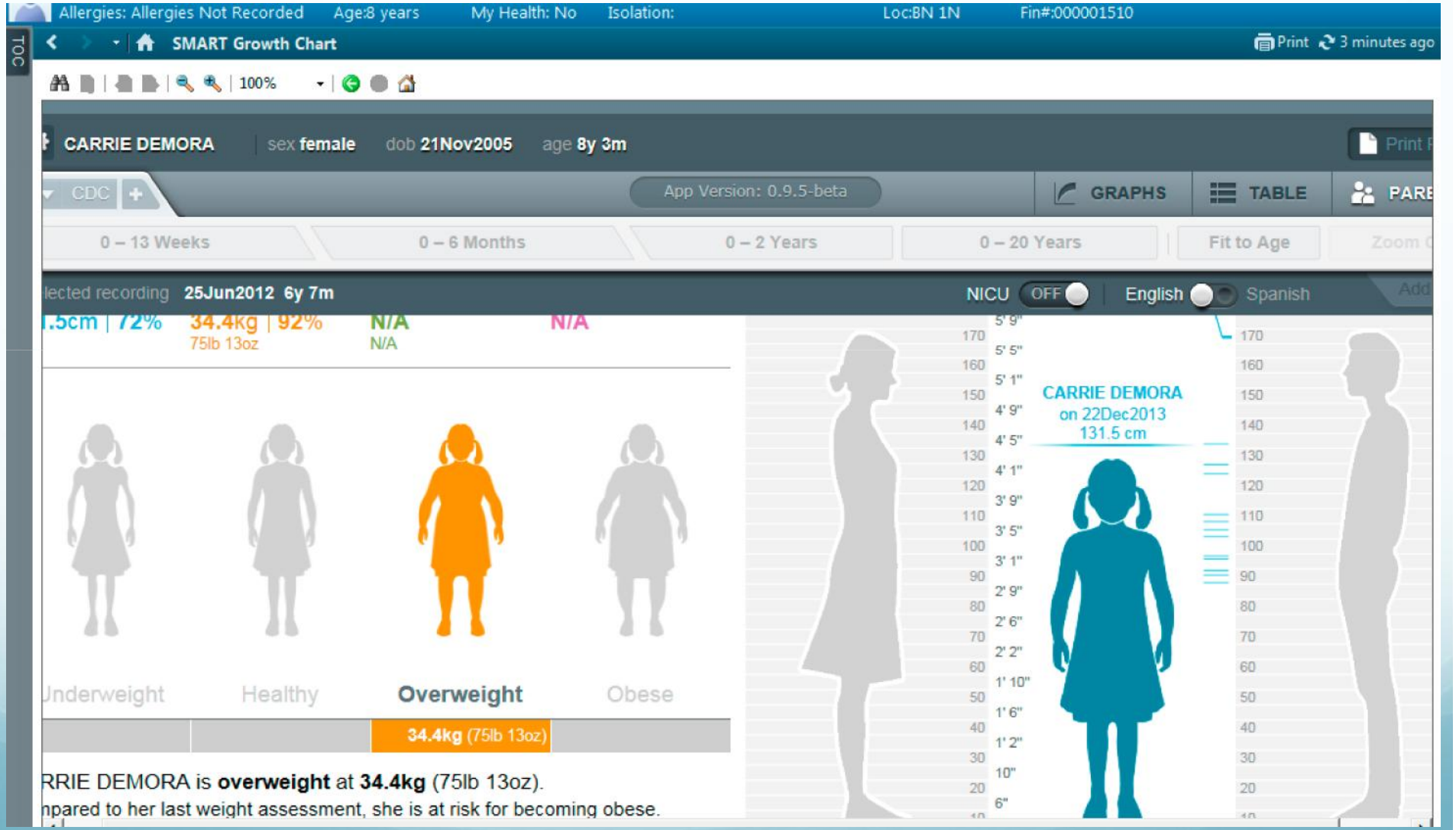
Try It

Boston Childrens: SMART Growth Chart



SMART Growth Chart – Parent's View



Process

- Downloaded the application source code
- We enhanced and modified the app
- We followed our usual testing procedures
- Installed the app in live parallel testing environment
- We fixed things
- We moved the app to the production environment
- We provided our source code back to the SMART team

Lesson 1: Agreement on terminology is essential

- Lying down height (length) vs standing height (height)
- Weight
  - Clothes on, clothes off? Diapers?
- Gestational age at a point in time
  - Do you accept all methods?
- Gestational age at birth
- Birthdate

Lesson 2: Integrate with workflow

- Are all of the needed data elements available?
- No one was entering gestational age at birth
  - Theoretically, this could be calculated from a point-in-time gestational age and the birthdate
- Needed to add an additional data element that was part of the data entered at time of birth

Lesson 3: FHIR is still new

(or never buy a low serial number)

- FHIR version 2 was available
- The services from Cerner were FHIR version 1
- Do we program to the new or the old?
  - We built the application using FHIR 2, and we made a converter from version 1 to version 2
  - We will take the converter out when we have the FHIR 2 services installed

Lesson 4: Isolate knowledge from the application

- In the original application, the growth charts were hard coded in the application
- Clinicians wanted a choice of CDC, WHO, Fenton
- We needed to design for newer versions of each kind of chart
- Needed to externalize the growth chart knowledge

Lesson 5: Environmental differences

- The first version of the app took 5+ minutes to print
  - Changes in a configuration environment and changes to the print routine reduce the time to ~ 5 seconds
- Printing workflow and architecture is not uniform across platforms
- Integrating the growth chart with graphics for printing was an issue

Summary and Conclusions

- The Pediatric Growth Chart app is beautiful!
  - Really well done, appealing graphics
- It took longer to implement than we thought
  - But it was a lot faster than if we had started from scratch!
- We learned a lot (see previous 5 lessons)
- The next app implementation should go much faster based on what we learned
- It was absolutely worth it!