Smart on FHIR enables Innovative Solutions

APEHC

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FHIR: The web, for Healthcare

Open Community

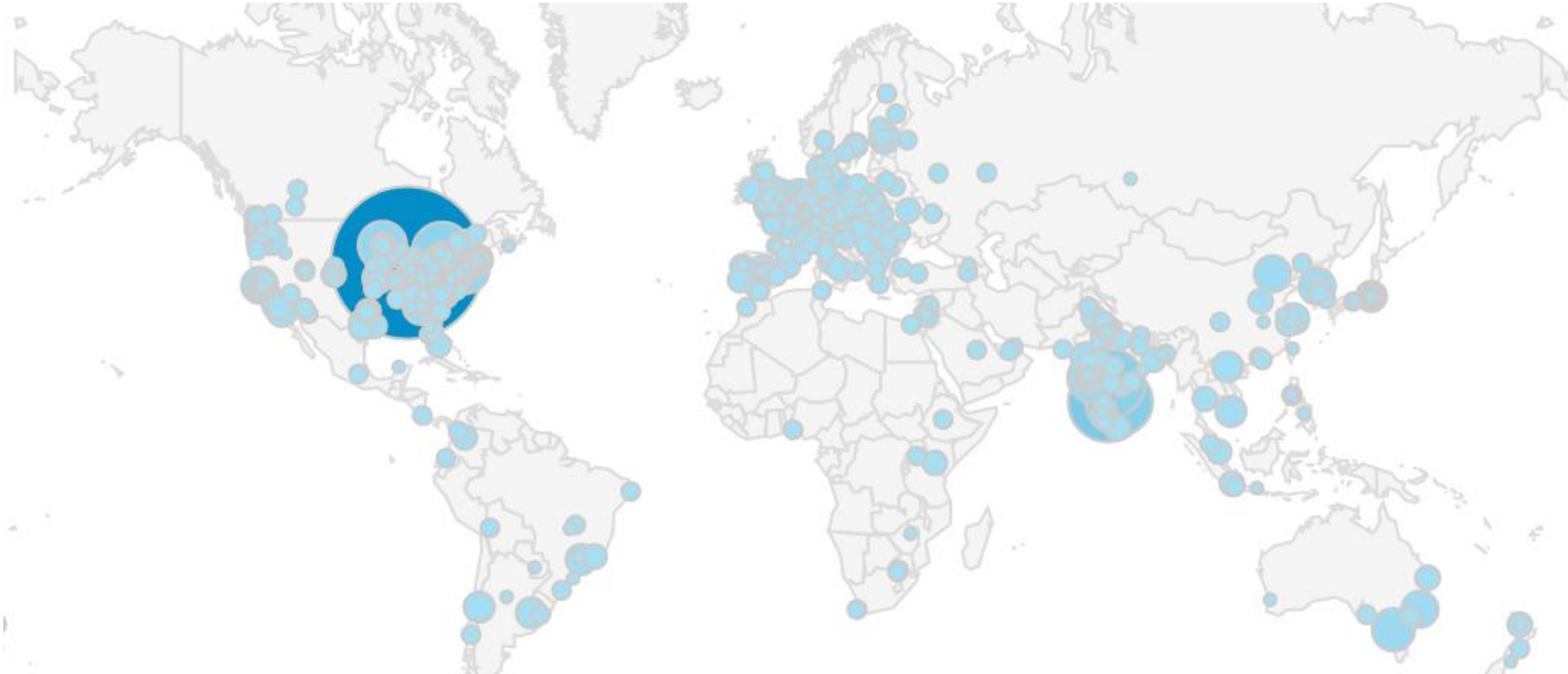
- Make it easier to exchange healthcare information
- Open Participation - uses web infrastructure (social media)
- Lead by HL7 - deeply connected to world wide health community

Open Standard

- Describes how to exchange healthcare information
- Public Domain (http://hl7.org/fhir)
- A web API - web standards where possible
- Continuity with existing healthcare standards

Origin of FHIR: the state of Healthcare

- Health care has broken processes
- Other industries are being transformed
  - IT enables process transformation
- “Paitent Centered Ecosystem” is happening very slowly in healthcare
  - IT standards to integrate B2B and C2B do not exist
  - IT is not properly implemented
  - There are many other blockers (culture, business process, liability, regulation)
  - Innovation is *hard* work – network problem

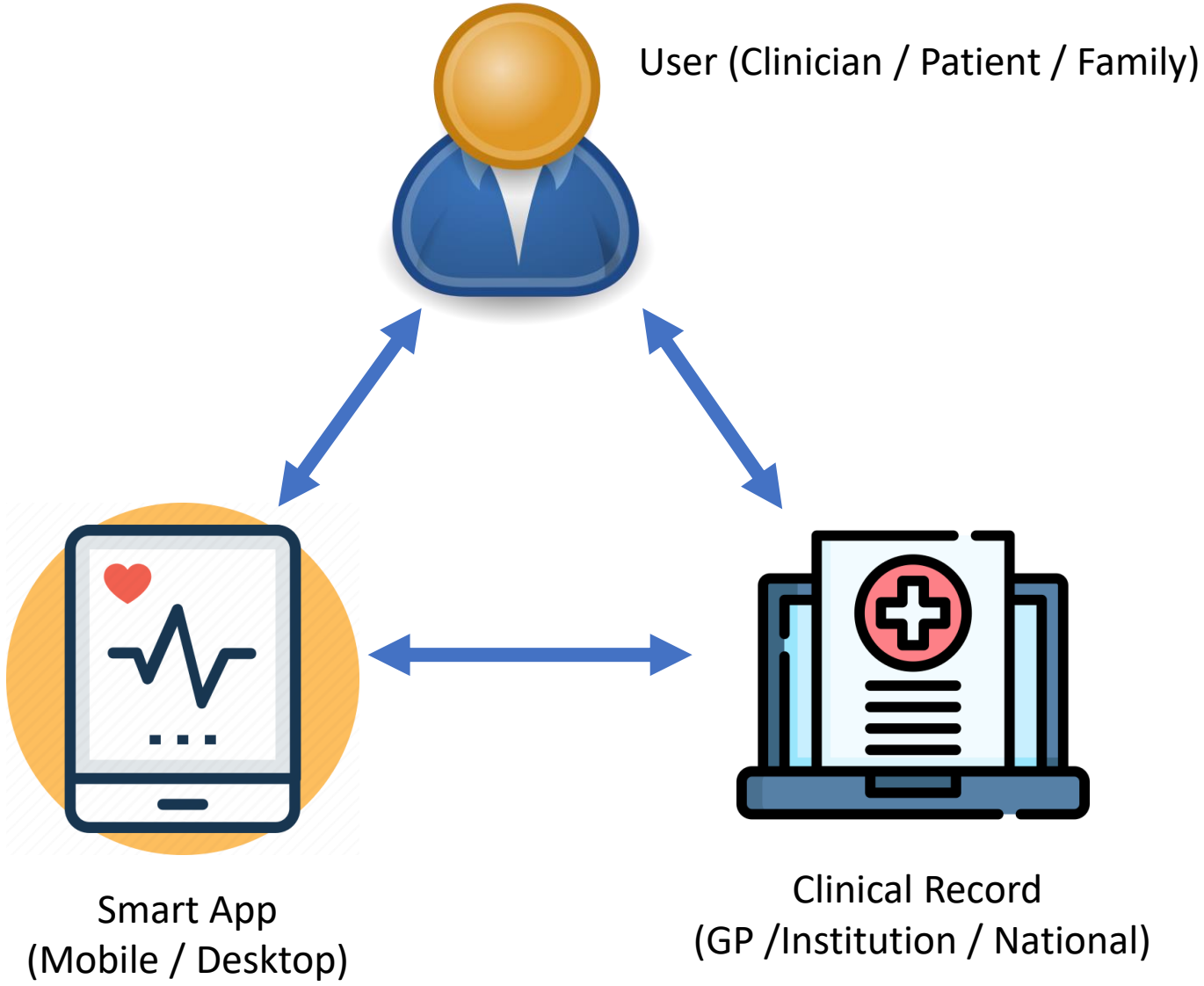


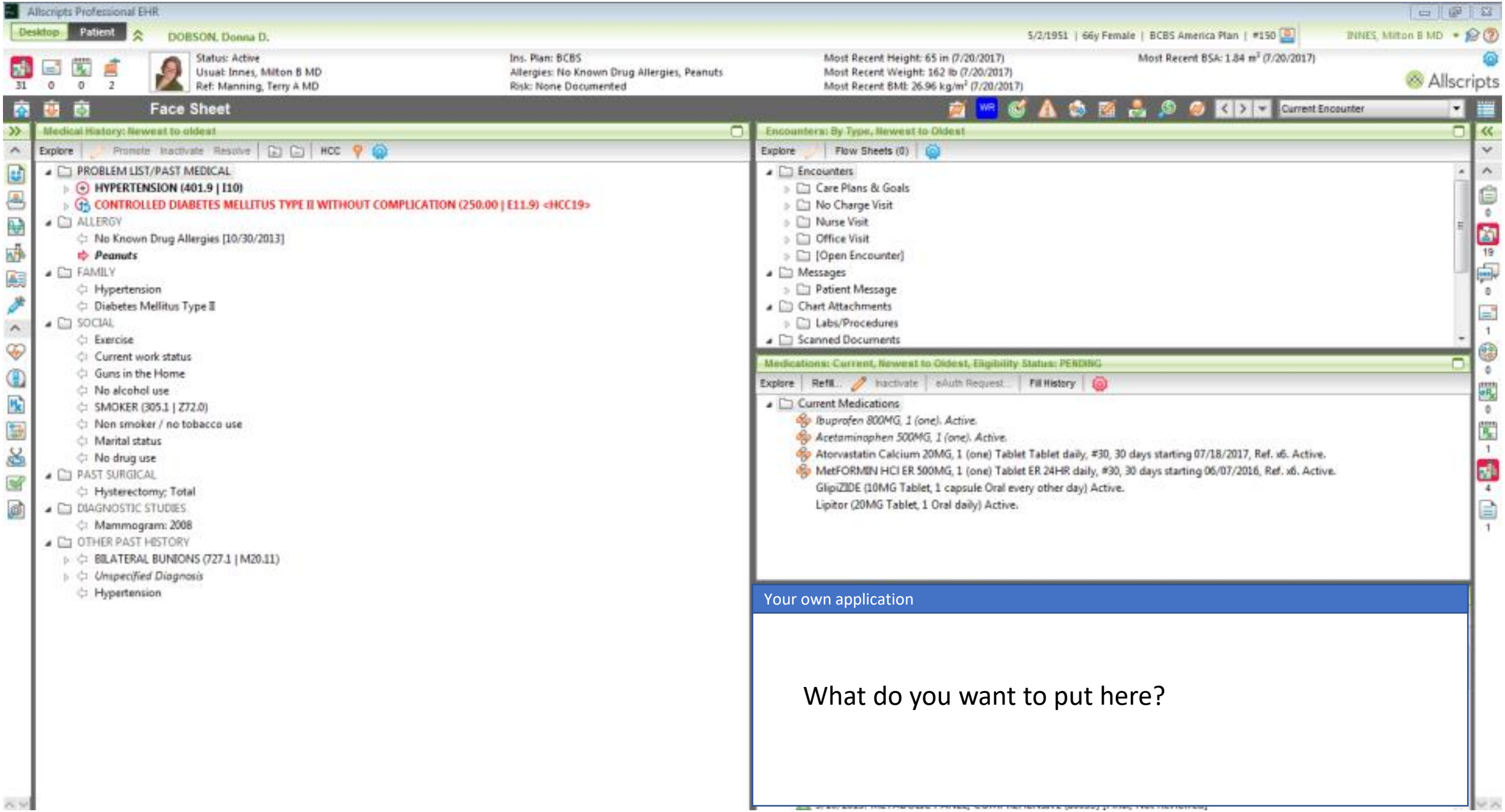
Why SMART?

- Major Problem: Clinical record systems (LIS / EHR) have massive amounts of data
- All sorts of interesting clinical / business rules could help
- Vendors can’t do everything
- So:
  - Provide a General Purpose API that allows access to EHR data and services
  - With Integrated security
  - And a way to launch application in a child window

SMART: Substitutable Medical Apps, Reusable Technology

- FHIR – Access Clinical Data & services (IPS/CDI)
- OAuth – Identify User & Get permission
- Clinical Context – Integrate workflow and presentation




Allscripts Professional EHR
Desktop
Patient
DOBSON, Donna D.
5/2/1951 | 66y Female | BCBS America Plan | #150
INNES, Milton B MD
Status: Active
Usual: Innes, Milton B MD
Ref: Manning, Terry A MD
Ins. Plan: BCBS
Allergies: No Known Drug Allergies, Peanuts
Risk: None Documented
Most Recent Height: 65 in (7/20/2017)
Most Recent Weight: 162 lb (7/20/2017)
Most Recent BMI: 26.96 kg/m² (7/20/2017)
Most Recent BSA: 1.84 m² (7/20/2017)
Allscripts
Face Sheet
Current Encounter
Medical History: Newest to oldest
Explore
Prompts
Inactivate
Resolve
HCC
PROBLEM LIST/PAST MEDICAL
HYPERTENSION (401.9 | I10)
CONTROLLED DIABETES MELLITUS TYPE II WITHOUT COMPLICATION (250.00 | E11.9) <HCC19>
ALLERGY
No Known Drug Allergies [10/30/2013]
Peanuts
FAMILY
Hypertension
Diabetes Mellitus Type II
SOCIAL
Exercise
Current work status
Guns in the Home
No alcohol use
SMOKER (305.1 | Z72.0)
Non smoker / no tobacco use
Marital status
No drug use
PAST SURGICAL
Hysterectomy: Total
DIAGNOSTIC STUDIES
Mammogram: 2008
OTHER PAST HISTORY
BILATERAL BUNIONS (727.1 | M20.11)
Unspecified Diagnosis
Hypertension
Encounters: By Type, Newest to Oldest
Explore
Flow Sheets (0)
Encounters
Care Plans & Goals
No Charge Visit
Nurse Visit
Office Visit
[Open Encounter]
Messages
Patient Message
Chart Attachments
Labs/Procedures
Scanned Documents
Medications: Current, Newest to Oldest, Eligibility Status: PENDING
Explore
Refill...
Inactivate
eAuth Request...
Fill History
Current Medications
Ibuprofen 800MG, 1 (one). Active.
Acetaminophen 500MG, 1 (one). Active.
Atorvastatin Calcium 20MG, 1 (one) Tablet Tablet daily, #30, 30 days starting 07/18/2017, Ref. x6. Active.
MetFORMIN HCl ER 500MG, 1 (one) Tablet ER 24HR daily, #30, 30 days starting 06/07/2016, Ref. x6. Active.
GlipiZIDE (10MG Tablet, 1 capsule Oral every other day) Active.
Lipitor (20MG Tablet, 1 Oral daily) Active.
Your own application
What do you want to put here?

Extensible Clinical Record Systems

- Launch apps that can access patient record
- Add a way to inject ‘suggestions’ into the application
  - E.g. what things could/should you do for this patient?
- Write your own surveillance/management tools
- Examples in production:
  - Custom advanced dosing regimes (‘DoseMe’)
  - Risk calculators (by many clinical risk ratings)
  - Case Registration applications
  - Apple Health (/Personal Health access)

Smart, Joe
Allergies: Allergies Not Recorded
Care Team: View Details

DOB:05/21/1988 | Age:33 years | Sex:Male | MRN:00490082237
Dose Wt:85.000 kg (08/04/2020) | Advance Directive:Yes | Code Status:<No Data Available> | Isolation:<No Data Available>
HealtheLife:No | Clinical Trial:<No Data Available> | Loc:NU05 | Inpatient FIN: 00098353786[Admit Dt:8/3/2020 1:26:00 AM CDT Di...

Individualized Dose

2000 mg over 3.5 hours every 12 hours for 2 days

Target: AUC24: 450 mg.h/L
Predicted: AUC24: 437 mg.h/L

Peak	27.18 mg/l
Trough	10.7 mg/l
AUC24	437 mg.h/L

Plot Select

Guideline Dose*

1500 mg over 2.5 hours every 12 hours for 3 doses

** Non-severe Infection*

Peak	21.49 mg/l
Trough	7.58 mg/l
AUC24	328 mg.h/L

Plot Select

Label Dose

1000 mg over 2 hours every 12 hours for one day

Peak	15.24 mg/l
Trough	5.09 mg/l
AUC24	227 mg.h/L

Plot Select

Customize

Target | Dose

Target AUC24

AUC24 450 mg.h/L

Infusion Length 3.5 hours

Dosing Interval 12 hours

Number of Doses 4

Calculate

Individualized Dose Profile

Case Study: Argonaut

- Government instigated project involving US EHR vendors
  - Vendors ran their own project
- Goal: define a public API for patients to get their own data
  - Secondary goal: use the same API for application extensibility
- Outcome: an industry specification for letting the patient get their healthcare summary –
  - Medications, Allergies
  - Labs, Vital Signs
  - Documents (/ Clinical Notes)
  - All done securely via SMART on FHIR

Case Study: Apple Healthkit

- Apple Healthkit uses Argonaut specification (US Only)
- Hospitals can register with Apple for free
- Hospitals get software with the capability for free
- Register with Apple for free
- Have to pass the Apple testing process (some weeks work)
- Have to maintain patient portal accounts

- Reduction in cost for PHR: >90% - it’s a commodity

Why use SMART on FHIR?

- All the advantages of FHIR, e.g.:
  - Free Open Source Specification
  - Leverage Web technology / security / community
  - Active & helpful FHIR community
- Can use other standards
  - V2 – designed for back-office exchange
  - CDA / XDS – designed for historical record collection
- Can do it your own way (down with standards)

Standards Cost More!

- Standards increase up front costs
  - Encountering requirements you don't (*yet*) have
  - More development than a custom agreement
- Standards decrease follow up costs
  - More re-use of work in the future
  - Less re-work (safer! Lower Risk!)
  - Easier (cheaper) to find staff & maintain institutional memory
  - More likely to be compliant with regulation
- Can't achieve data lock-in by dead-end-thinking

Hacking FHIR: Is it secure?

- Alissa Knight is a professional hacker who was paid to hack production APIs and publish her results
- EHRs were very secure. Other Apps: very insecure
- This is scary! Why use FHIR?
- Because you will be hacked – so why not be part of the solution?

Coordinated Care

- Common Frustration of Patients:
  - Scheduling/Communication problems
  - Conflicting care plans / payment options
  - Conflicting system definitions of success
  - Must be resolved by the patient
- FHIR enables Services for
  - distributed care plan
  - virtual clinical review
- Virtual Institutions (internet hospitals, institutional boundaries)
- Integrated Home Care (medication management)

FHIR & Disruption

FHIR disrupts healthcare (& healthcare IT):

- Significantly reducing the cost of data exchange
- Making it easy and natural to use the web
- Encouraging the development of open community
- Building a solid base to scale computation about healthcare

At the same time as wider web / open community transforms are happening.

Join a community….