The Office of the National Coordinator for Health Information Technology

Making an Impact on Interoperability: High Impact Pilots (HIP) and Standards Exploration Awards (SEA) Cooperative Agreement Program

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Caroline Coy, Senior Program Analyst, ONC

12/1/2017

HIP/SEA Program Objectives

- Focus on addressing interoperability through implementation of Technology Solutions
- Support increased use of health information technology solutions
- Incentivize use of standards from the Interoperability Standards Advisory (ISA) and newly emerging standards
- Lessons learned, and evidence generated, by these Cooperative Agreements will help advance industry understanding of health IT's potential

High Impact Pilots (HIP)

Awardee	Priority Category/ Subcategory	Impact Dimensions	Standards
The Health Collaborative	(3) Care Coordination	1) Safety 2) Privacy and Security 3) Interoperable Exchange	ADT, CCD, IHE
Lantana Consulting Group	(3) Care Coordination	1) Clinical Quality 2) Practice Efficiency 3) Interoperable Exchange	ePhCP
RxREVU Inc.	(1) Comprehensive Medication Management (i) Price Transparency at the Point of Care	1) Clinical Quality 2) Cost Efficiency 3) Interoperable Exchange	FHIR
University of Utah	(3) Care Coordination (ii) Close-Loop (surgical) Referrals	1) Clinical Quality 2) Cost Efficiency 3) Practice Efficiency	SMART on FHIR

Standards Exploration Awards (SEA)

Awardee	Priority Category/ Subcategory	Impact Dimensions	Standards
Arkansas Office of Health Information Technology	(3) Care Coordination	1) Interoperable Exchange	CCD
Cincinnati Children's Hospital Medical Center	(4) Self-Identified	1) Cost Efficiency	RFD and FHIR
Sysbiochem	(4) Self-Identified - Genomics	1) Clinical Quality 2) Interoperable Exchange	FHIR

The Office of the National Coordinator for Health Information Technology

Presenters

- Deven Atnoor, Chief Technology Officer, Sysbiochem
- Rick Geimer, Chief Innovation Officer, Lantana Consulting Group
- Keith Marsolo, Associate Professor, Division of Biomedical Informatics, Cincinnati Children's Hospital Medical Center

SEA-ONC Award
FHIR®-based Predictive Analytics: A Breast Cancer Pilot

Sysbiochem, LLC

Date: Dec 1, 2017

Agenda

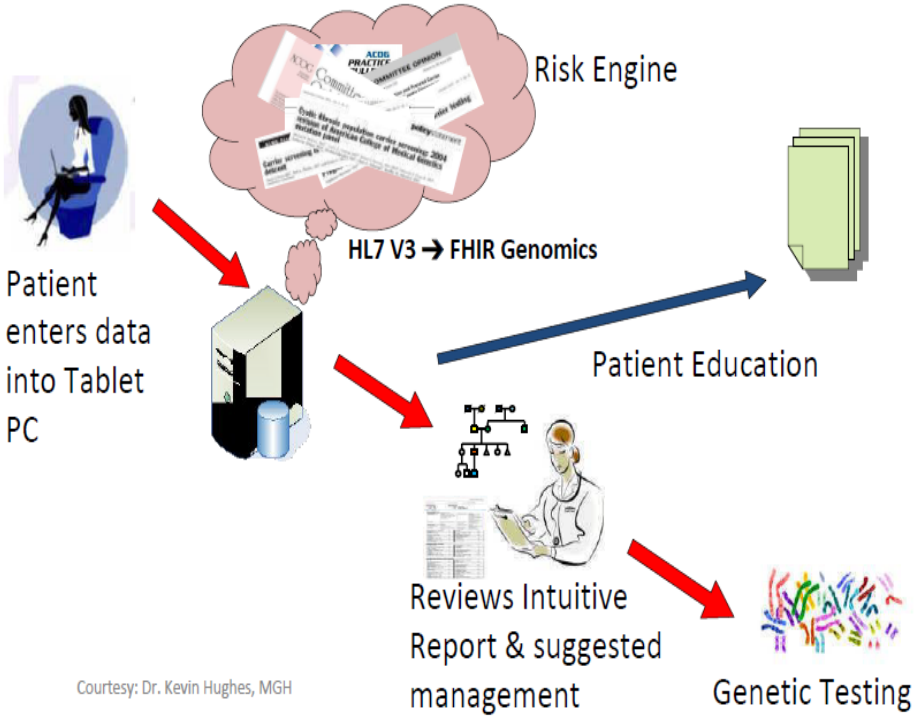
- Project Overview
  - Objectives and Goals
  - Planned tasks and Deliverables
- Product Presentation
  - Rationale
  - Status and Achievements
  - Lessons Learnt
  - Post Grant Activities
- Q&A

Value Preposition

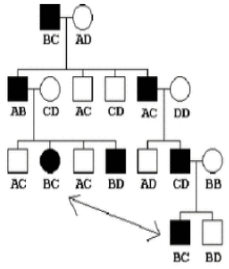
The combination of detailed family health history, medical history, clinical evaluation, and genomic sequencing, could shed more light on accurate disease risk prediction, diagnosis, with more informed treatment recommendations and better patient outcomes.

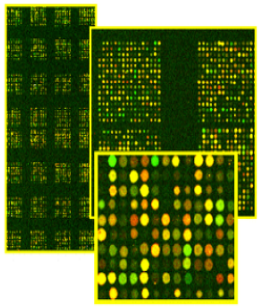
Value of Family History in Clinical Care

Current Data Flow (at best)



Courtesy: Dr. Kevin Hughes, MGH





Family history remains the best and least expensive genetic 'test' currently available for clinical use.

A major effort will entail developing tools to collect this information –

1. In a standardized format,
2. Store it in the patient's electronic health record,
3. Apply risk assessment, and
4. Develop messages to clinicians that may alter patient care based on the information obtained.

Project Objectives and Goals

- Build a minimal viable product for FamilyMemberHistory (FHx) FHIR harmonization and return of validated analytics w/ message intact.
  - To provide merged risk assessment mappings with FHIR message – standardized and unified by working with the appropriate workgroups
    - Merging genetic test data to FHx message
  - Build a module that will merge FHIR messages from various sources to create the standard FHx message
  - Create a web-service for getting risk propensities for the patient.

Project Deliverables

- Standards for CDS analytics (FHIR/HL7)
  - Interoperable Message: Provide cancer risk assessment mappings for integration into any third party system
  - Standards Harmonization: Validate Family Member History tools to support the round-trip payload for CDS. (including genomic test observations)
    - Provide beta demonstration tool for vendors and hospitals to integrate analytics for use by providers

Goals

- Build a common/Harmonized FHIR based FamilyMemberHistory profile
- Build a round-trip application
  - Submit FHIR based message to HughesRiskApp
    - By translating the message that application understands
  - Return risk profile
    - By translating the message into FHIR based message
  - Consume the message for display to clinician

FamilyMemberHistory

Minimum Data Elements - HughRiskApps

Demographic	Age
	Gender
	Alive or dead
	HL7 Fx Structure – relationship
	Identical Twins
	Race / ethnicity
Disease / Condition Hx	
	Age of onset
	Ovarian Cancer
	Breast Cancer
	Oophorectomy
	Mastectomy
Genetic Observation	
	Code
	Category
	Interpretation

FHIR resources profiles and extensions

Resource	Profile and extensions
* FamilyMemberHistory	* FamilyMemberHistory-Genetic profile * family-member-history-genetics-parent extension
* Observation	* family-member-history-genetics-observation extension

Achievements

- Harmonized FHIR based FamilyMemberHistory with RiskAssessment
- Built a web-service to consume the FHIR message
  - Return FHIR response including RiskAssessment
- Successfully transmitted message from IMH
- Building a harness to submit large datasets from IMH

Impact Measures

* Interoperable Exchange
  * Process the data through interoperable FHIR enabled pipeline, and return the results back
  * Track the number of FHIR messages being translated via the application interface

Interoperable exchange			Q1 Actual	Q2 Actual	Q2 Actual	Q4 Actual
Baseline	Original	Updated				
Q1 Target	0	0	0			
Q2 Target	1000	10		10		
Q3 Target	2000	1000			3000	
Q4 Target	0	1990				30
Total		3000	0	10	3010	3040

Family Member History Summary Status

* Extension added to FMH – Genetic parent
  * **http://hl7.org/fhir/StructureDefinition/family-member-history-genetics-parent**
* Extension Genetic Observation
  * **http://hl7.org/fhir/StructureDefinition/family-member-history-genetics-observation**
* Mapping between Risk V3 and Risk Assessment FHIR
  * **https://www.hl7.org/fhir/riskassessment.html**

* US realm based profile – Family Member History
  * Containing race and ethnicity
    * **https://www.hl7.org/fhir/extension-us-core-race.html**
    * **https://www.hl7.org/fhir/extension-us-core-ethnicity.html**

Lessons Learnt

* Resource Availability
* Infrastructure Constraints

Post grant activities

* Universal Adapter
* Wider Web service availability
* SMART app

Thank you.

Questions?

Made possible by an SEA grant from ONC (Grant Number: 90AX0011/01-00)

Lantana
CONSULTING GROUP

ONC-HIP: PHARMACIST CARE PLAN (PHCP)

ONC Annual Meeting

Rick Geimer
Lantana Consulting Group

ONC High Impact Pilot Grant

- Awarded to Lantana Consulting Group
- Collaborators:
  - Community Care of North Carolina (CCNC)
  - PioneerRx
  - QS/1

Project Objectives

1. Improve practice efficiency by

- Eliminating duplication of effort by pharmacists
- Supporting pharmacists to focus on patients at high risk for negative outcomes and developing care plans incorporating CMRs for those patients

2. Improve clinical quality by

- Enhancing free-text narratives with structured data
- Sharing structured data from patient interactions between providers, pharmacist and payers

3. Support interoperable exchange by enabling CCNC to

- Receive PhCPs from pharmacy management systems
- Validate against the specification

Phases of the Project

Phase 1: Project Launch, Standards Development, and Training

Phase 2: Initial Implementation, Refinement, and Testing

Phase 3: Full Implementation and Data Collection

Phase 4: Data Analysis and Reporting

Three key tools placed into the public domain:

- CDA (Clinical Document Architecture) and FHIR® (Fast Health Interoperable Resources) implementation guides (IGs) for PhCPs
- A library of bi-directional transformations converting PhCP FHIR to and from PhCP CDA
- PhCP FHIR and PhCP CDA training for implementers delivered in person and materials delivered to ONC

Dual CDA/FHIR IGs

- First dual CDA/FHIR IG development project
- Included CDA and FHIR examples
- Demonstrated a viable pathway for CDA/FHIR integration and transition planning

CDA <—> FHIR Transforms

- Open Source
- Targets the PhCP document type, but extendable to others
- Bi-Directional
  - **FHIR to CDA**: Comply with existing C-CDA standards while moving early to FHIR
  - **CDA to FHIR**: Load FHIR systems and servers with C-CDA data

CDA to FHIR Transformation

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  <id root="1a6
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    codeSystemN
    <translatio
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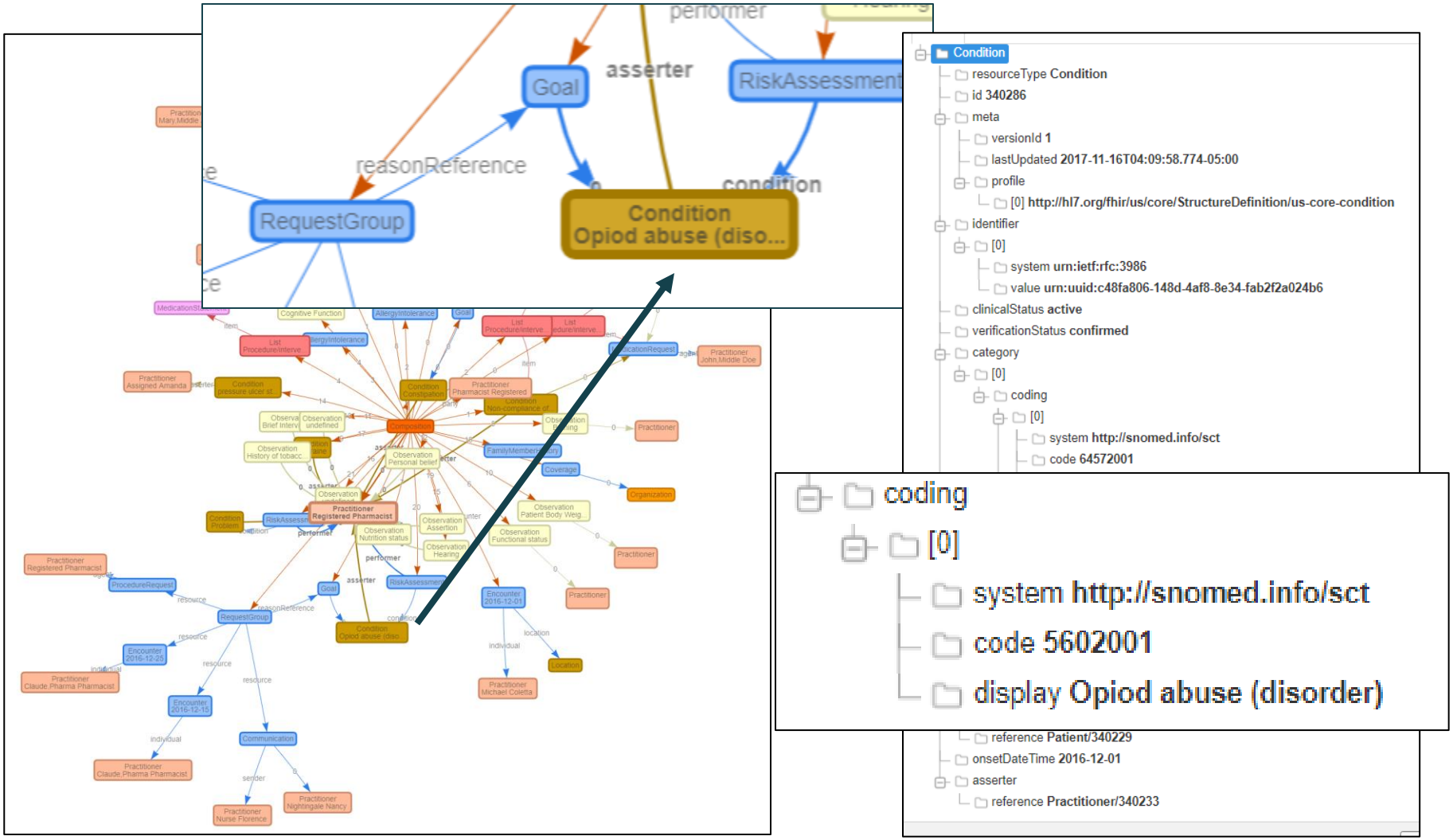
ClinFHIR Resource Graph



Pharmacy Management Vendor Training

Training plan:

- 3 days for CDA/FHIR training
- 1 week virtual Connectathon

Initial target: 2 vendors

Final trained: 22 vendors

Implementation of the standard, improved:

- **Practice efficiency** (objective #1)
  - Reducing redundant manual data entry
  - Increasing time for patient engagement with pharmacist
- **Clinical quality** (objective #2)
  - Increasing structured data capture, supporting automated clinical quality measurement
  - Speeding data sharing (pharmacies —> CCNC), supporting reporting
- **Interoperability** (objective #3)
  - Delivering standard-based structured and coded reports
  - Validation, conversion (CDA to FHIR) done by CCNC

Clinical Quality—structured data capture, supporting automated clinical quality measurement

- Assessed PhCP data for calculating three pharmacy-based measures:
  - Percent of Antihypertensive Drug Users Adherent to Antihypertensive Therapy
  - Percent of Antihyperlipidemic Therapy Users Adherent to Antihyperlipidemic Therapy
  - Percent of Patients Adherent to Multiple Chronic Medications
- Found that PhCP specifications and submitted files contained all data elements required to calculate these measures

Results—Unexpected

Interest in the standard grew substantially during the pilot.

- At start of pilot, only 2 pharmacy management vendors involved
- By the end of pilot, trained 20 more organizations

The standard will be reviewed by a larger audience as both specifications move through the HL7 ballot process, opening an opportunity for nationwide adoption.

Questions?

Cincinnati Children's Hospital Medical Center Standards Exploration Award Project Summary

ONC Annual Meeting

Keith Marsolo, PhD
Associate Professor
Division of Biomedical Informatics
Cincinnati Children's Hospital Medical Center
December 1, 2017

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Cincinnati Children's Hospital Medical Center (CCHMC) – FY16 numbers

- 629 inpatient beds
- 1.3M patient encounters
- 15K+ employees
- $200M in research grants & contracts (3rd in pediatrics)

- Informatics / Information Technology support
  - Operations – Department of Information Services (IS)
  - Research – Division of Biomedical Informatics (BMI)

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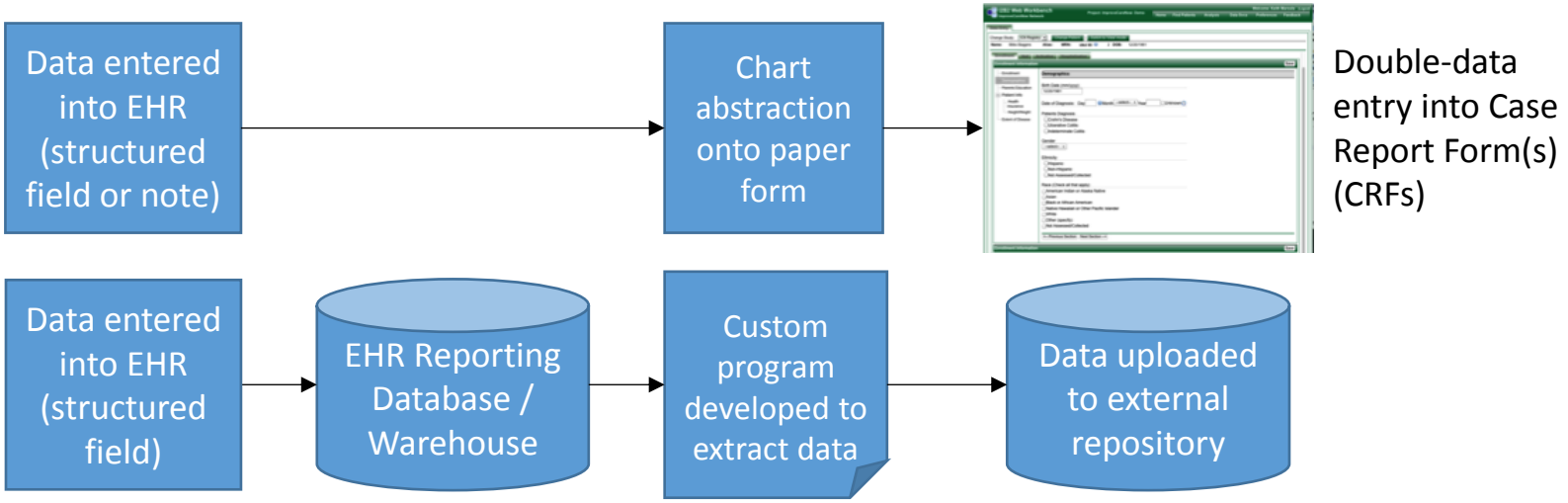
CCHMC Biomedical Informatics Data Services

- Service areas
  - Research data warehouse & Honest Broker service
  - Support for distributed research networks
  - *Infrastructure & standards to support learning health systems*
  - *Integration with the electronic health record (EHR) to support quality improvement (QI) & research*
- Structure
  - ~25 staff, mix of application & database developers, project management
  - Led by staff director & faculty advisor (Marsolo)
- Project is a collaboration between BMI & Information Services

Motivation

- Learning health system
  - Data captured in EHR supports clinical care, QI & research
  - Supports learning cycle – knowledge to practice & practice to knowledge

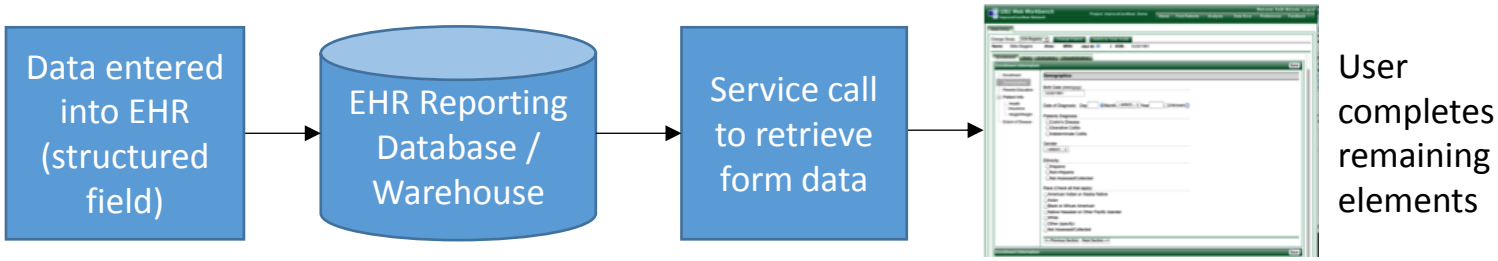
- Reusing data from the EHR – typical workflows:



- Challenge with option #2 – process to develop/deploy standardized data collection forms within the EHR at scale is cumbersome

Other alternatives

- *Capture data in EHR -> pre-populate eCRF -> coordinator completes remaining fields*



- Potential benefits
  - Save time on chart abstraction
  - No need for EHR-specific form (eventually)
- Potential drawbacks
  - Resources need to configure & maintain new interfaces are unknown

Proposed project

- Description
  - Collect data on time required to complete eCRFs using double-data entry compared to eCRFs launched from the EHR with pre-populated fields
  - Test using ongoing pragmatic clinical trial, CCHMC as testbed

- Interoperability need(s):
  - Leveraging the EHR and other health information technology (HIT) systems to integrate healthcare and clinical research
  - Pre-population of research CRFs from EHRs

- Priority category – Self-identified

- Impact Dimensions – Cost Efficiency
  - Metric – time to complete form; time spent on chart abstraction

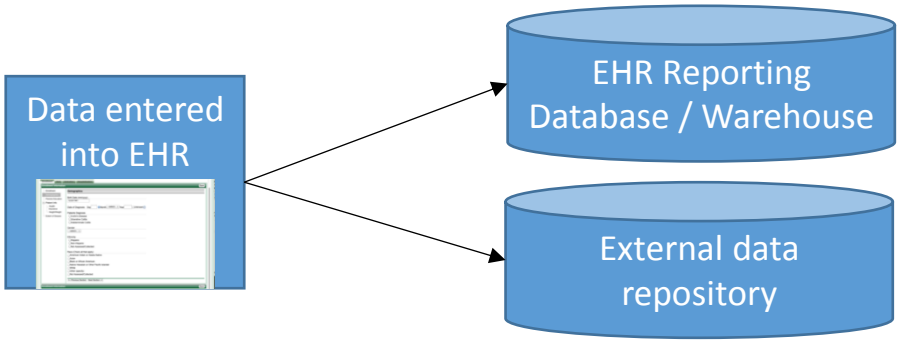
Relevant standards

- Retrieve Form for Data Capture (RFD)
  - Retrieve Form
  - Display & complete Form
  - Return data to requesting application

- Fast Healthcare Interoperability Resource (FHIR)
  - Application Programming Interface (API)-like approach to healthcare data
  - Web service-based requests for common data elements

- SMART on FHIR
  - Authentication & authorization – OpenID and OAuth2

- Structured Data Capture
  - Successor to RFD
  - May eventually allow external form to write to EHR & to external repository
  - Very early in adoption



Trial information

- Clinical Outcomes of Methotrexate Binary treatment with INfliximab or adalimumab in practicE (COMBINE)
  - Funded by the Patient-Centered Outcomes Research Institute (PCORI)
  - Compare outcomes of patients with Crohn's Disease who receive anti-tumor necrosis factor (anti-TNF) medications with those that receive anti-TNFs and low-dose methotrexate
- Patients recruited from centers in the ImproveCareNow (ICN) Network
  - 106-center quality improvement & research network focused on pediatric Inflammatory Bowel Disease
- Trial data are collected in a module of the ICN registry
  - Screening / randomization + follow-up study visits (every ~10-13 weeks)
  - Currently have 102 patients randomized across 25 sites

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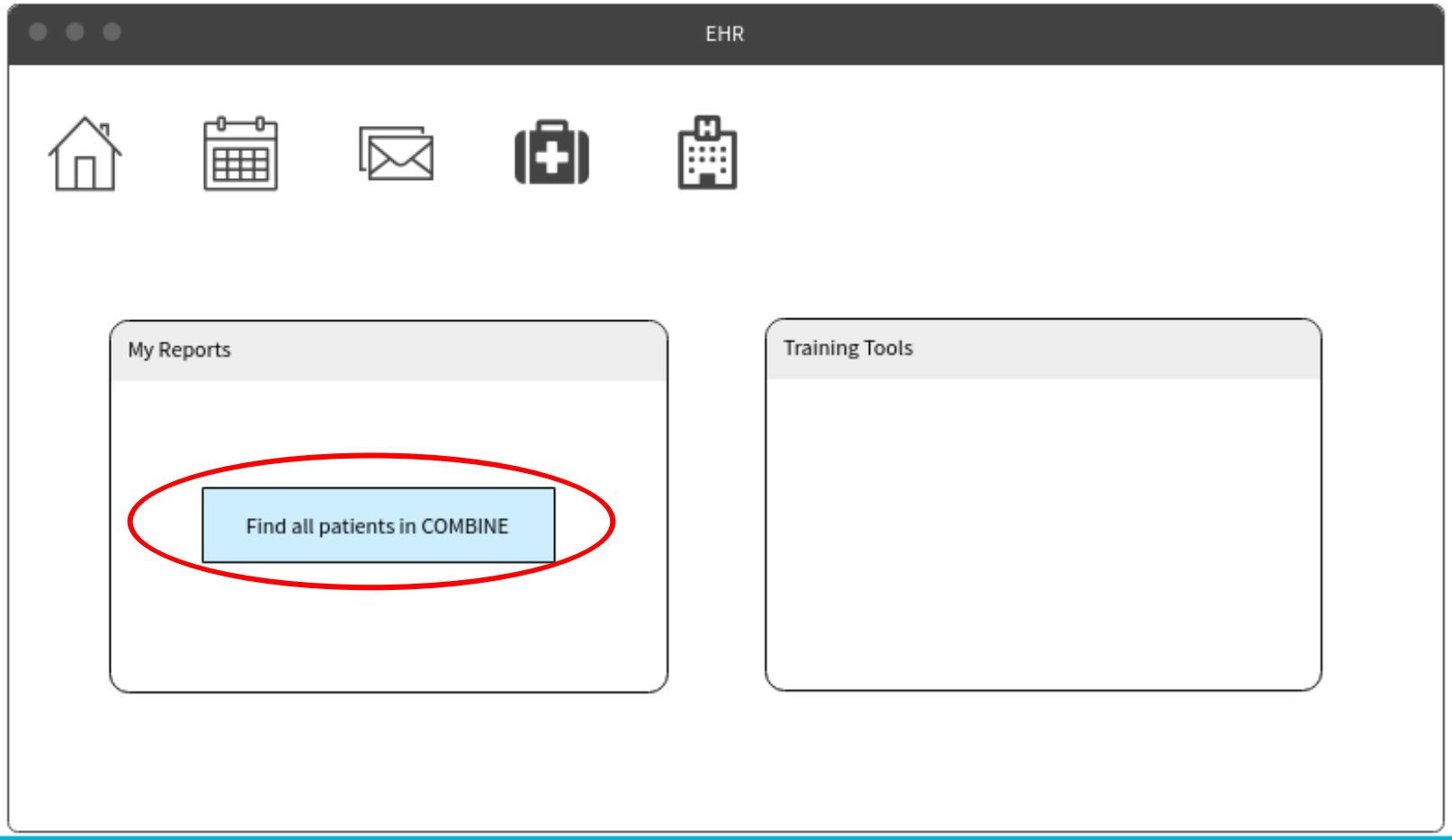
High-level project tasks

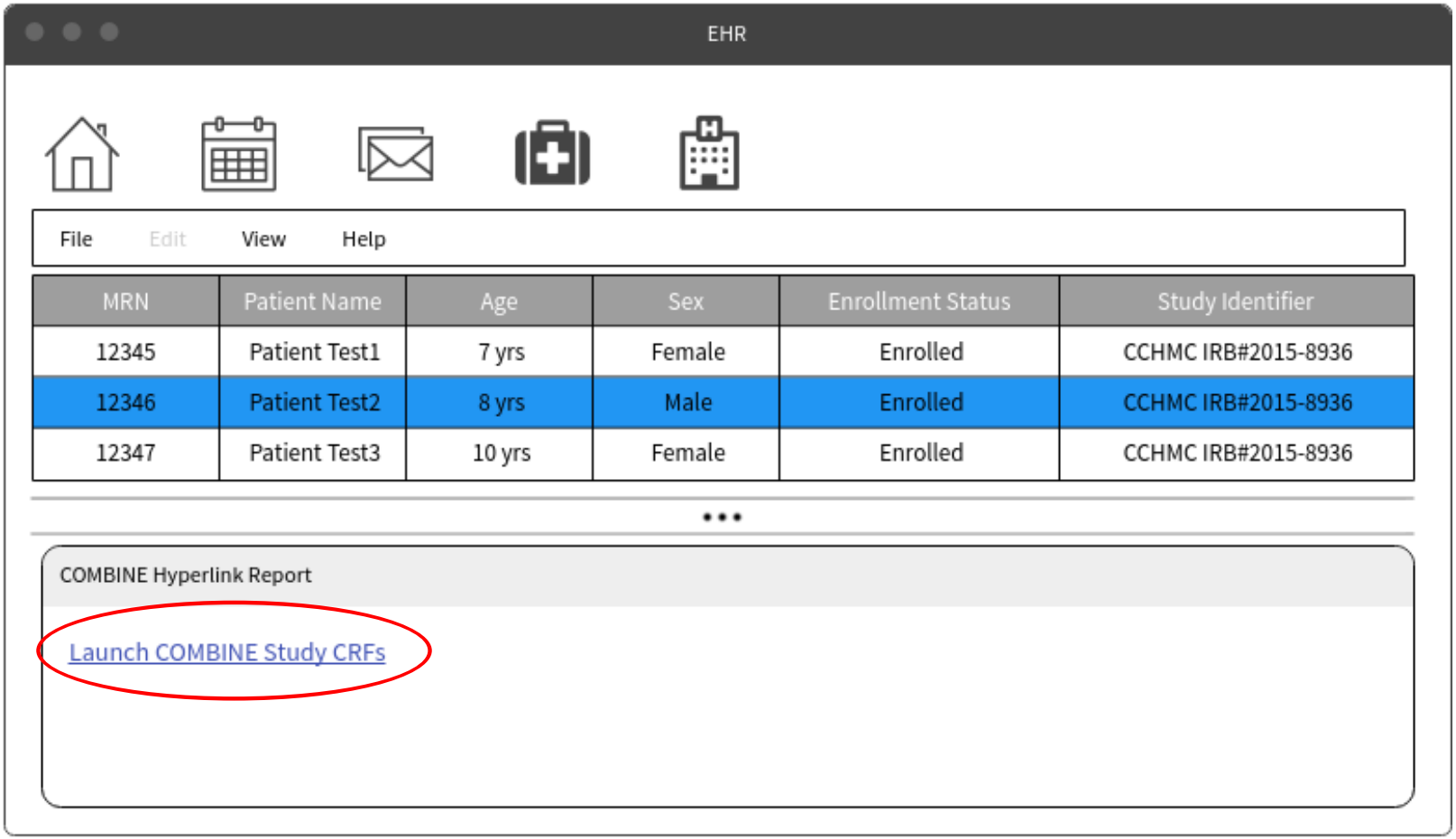
- Determine optimal placement in EHR for “button” (hyperlink) to launch registry
- Develop extensions to allow registry to be called from the hyperlink
- Reconfigure the registry to minimize extraneous display content
- Configure web services to allow EHR data to pre-populate the CRF
- Allow research coordinator to log in to the registry using EHR credentials

Project workflow



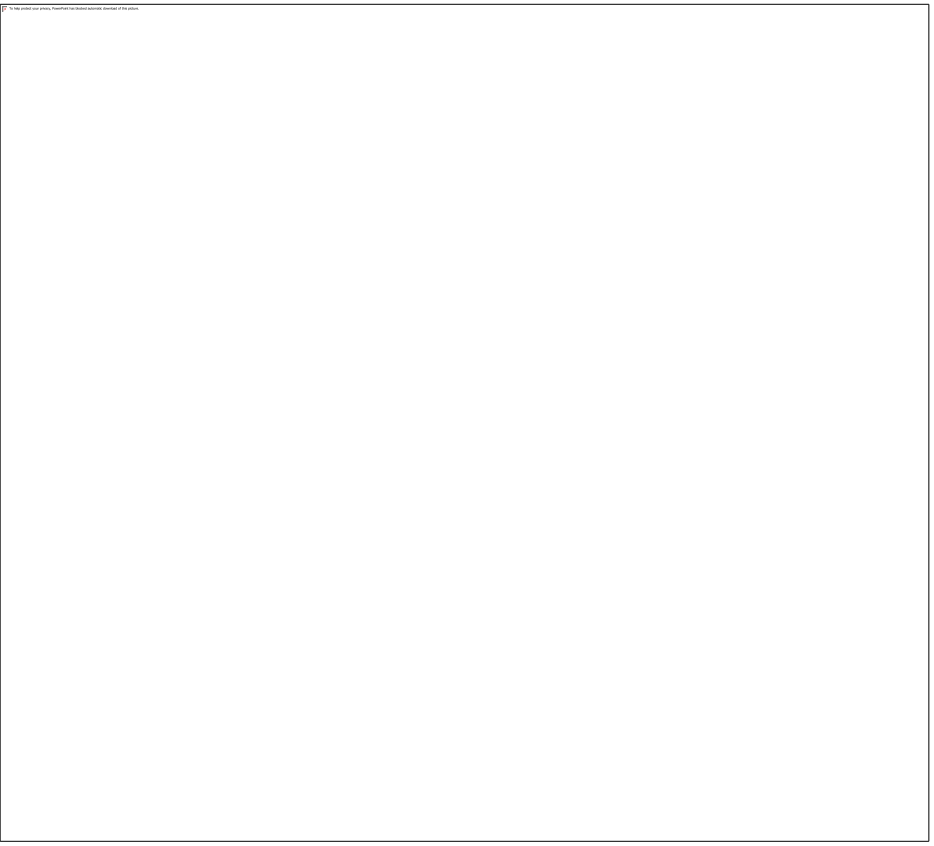
*Mockup. Unable to share full EHR screenshot publicly.

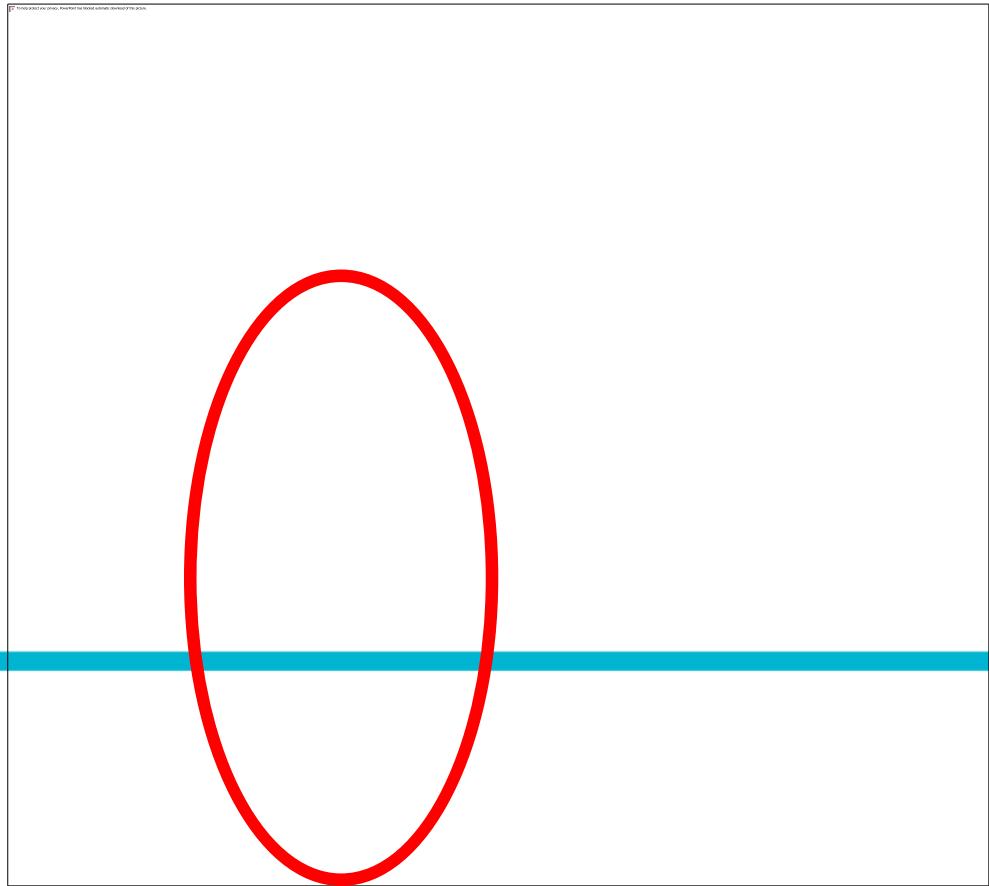
Project workflow (2)



*Mockup. Unable to share full EHR screenshot publicly.

Project workflow (3)





Results

- Deployed technology solution ~1 month ahead of schedule (early June 2017)
- Collected data on study visits pre-deployment (CCHMC & 2 other COMBINE sites) & post-deployment (CCHMC)
  - Slower-than-expected-recruitment limited # of visits
  - Initial findings: decrease in abstraction time (~10 minutes); slight increase in data entry time (~1.5 minutes) – may artifact from low number of visits or potentially for time spent validating pre-populated data

Pre-deployment

Site	Abstraction	Data entry
CCHMC	20	6
Site X		5
Site Y		28*
Site Y		38*
Site Y	30	4
Average (minutes)	**25**	**5**

* Numbers reported appear to combine abstraction & data entry into a single value; subsequently removed from analysis

Post-deployment

Site	Abstraction	Data entry
CCHMC	10	3.35
CCHMC	15	9
CCHMC	20	6
CCHMC		8
Average (minutes)	**15**	**6.6**

Key findings / Lessons learned

- Time savings limited by number of CRF elements captured discretely in EHR
  - COMBINE study visit CRF only had a handful of applicable variables (weight, labs)
- Initial sequencing of events posed a challenge (e.g., tried to request access to web service first)
  - Bring all functions together first – make sure everyone understands hand-offs and sequencing
  - Frequent huddle to ensure that progress continues
- Process for deploying & enabling access to FHIR resources is not well-defined
  - Frequent contact with vendor to understand all the steps
  - FHIR standard does not reflect the way data have been captured over time – will need to validate each variable for time range in question
- OpenID not completely supported by EHR vendor
  - Vendor-specific workaround exists, but was not well-documented
  - Suggested as area for vendor improvement in documentation & training

Acknowledgements

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  - Keith Marsolo
  - Dan Jeffers
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  - Wayne Geers
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  - Nicole Slonaker
  - Steve Metz
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  - PCS-1406-18643 (PCORI)
  - CCHMC

For more information, please contact:
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Questions?