



Children'sSM
Healthcare of Atlanta

Leveraging Epic for your Research

EHR Tools and Data Analytics for Research Efficiency

Evan Orenstein

October 27, 2021

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Children'sSM
Healthcare of Atlanta

Your Time is Valuable

Please stop doing chart reviews (except when you really have to)

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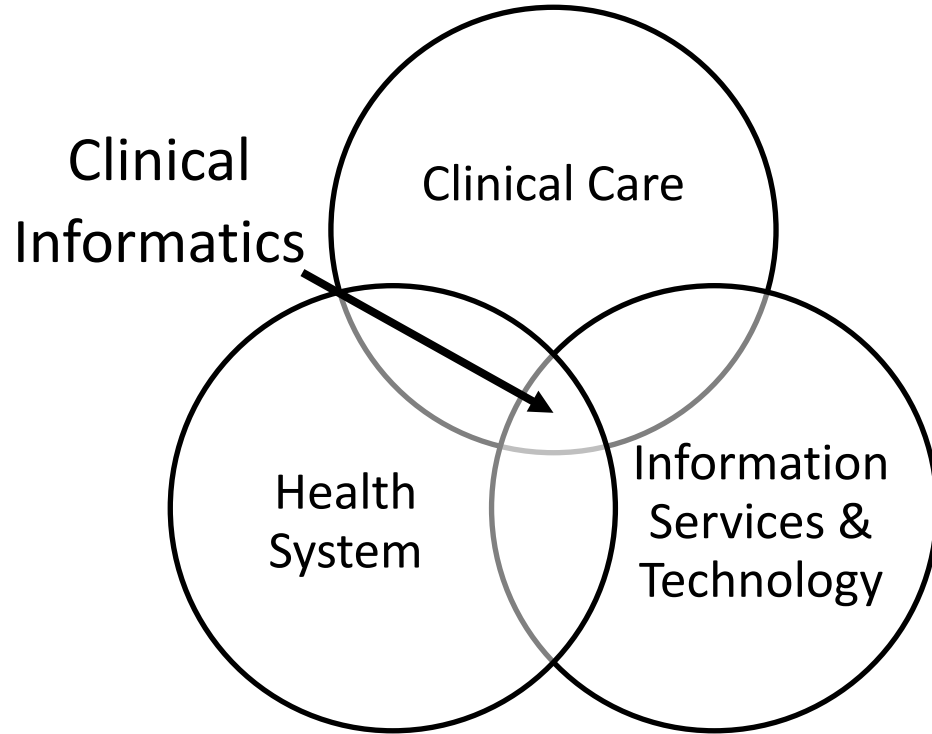


Disclosures

- I am a co-founder and have equity in Phrase Health©, a clinical decision support analytics company. I receive no direct revenue.
- I am the Principal Investigator on a Phase 1 and Phase 2 STTR grant with Phrase Health© from the National Library of Medicine (NLM) and National Center for Advancing Translational Science (NCATS). I receive salary support from the NLM.



What is Clinical Informatics?



Outline

- Learning Health System
- How Does Epic Work?
- Getting Data Out of the EHR
- Intervening in the EHR
- GEEK Squad

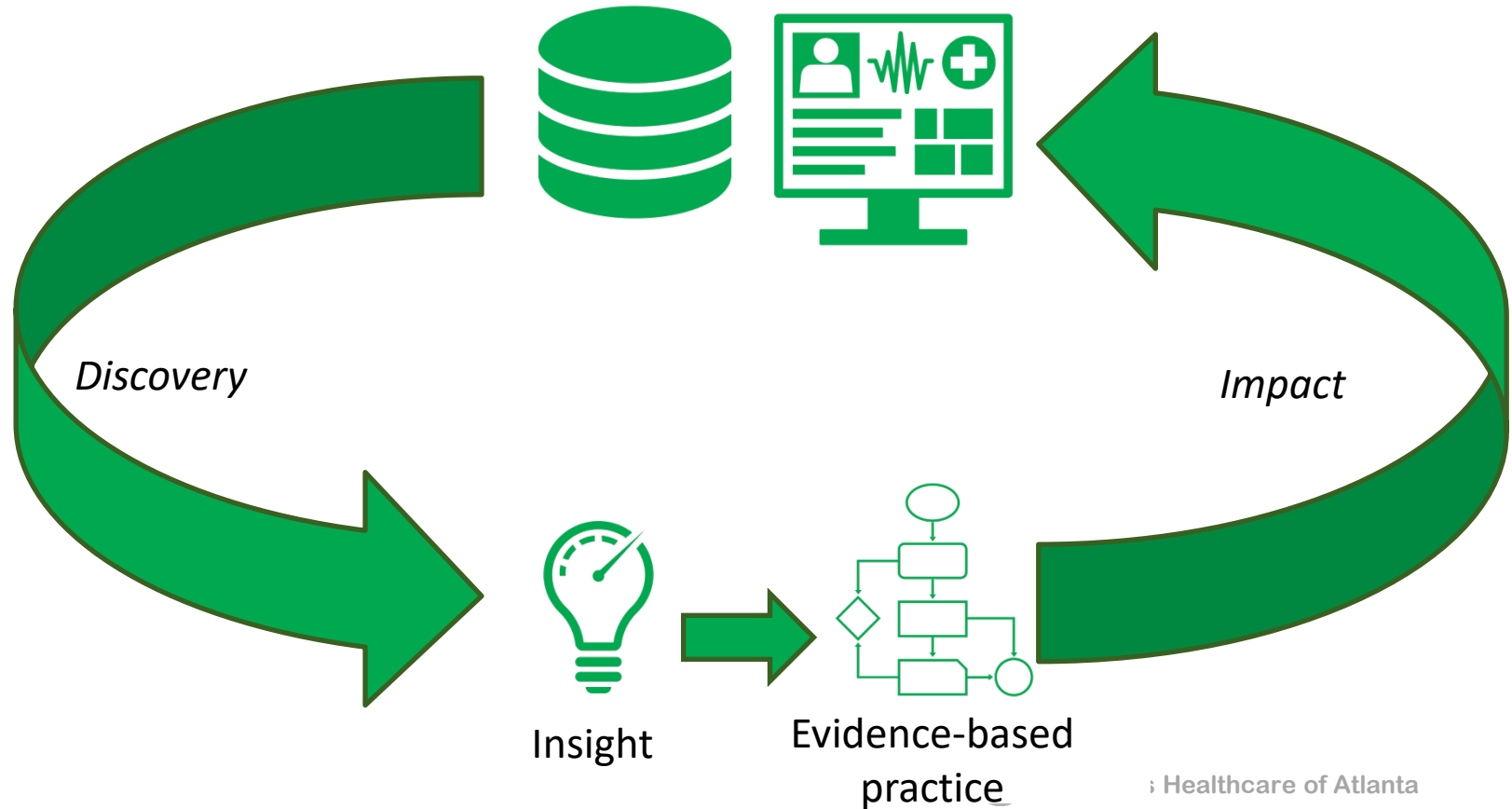




Learning Health System

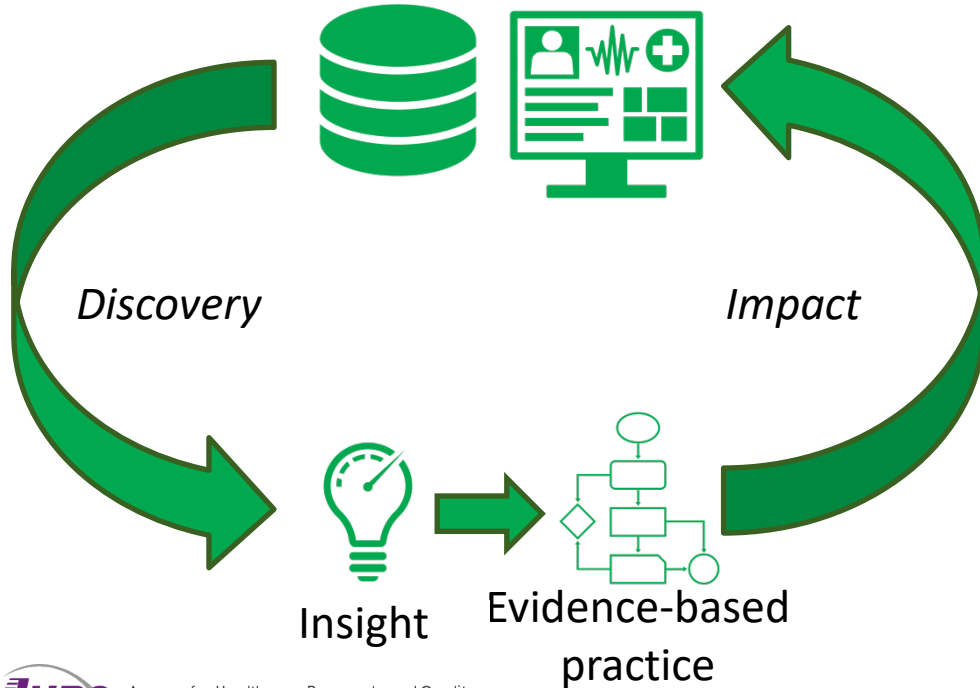


Learning Health System

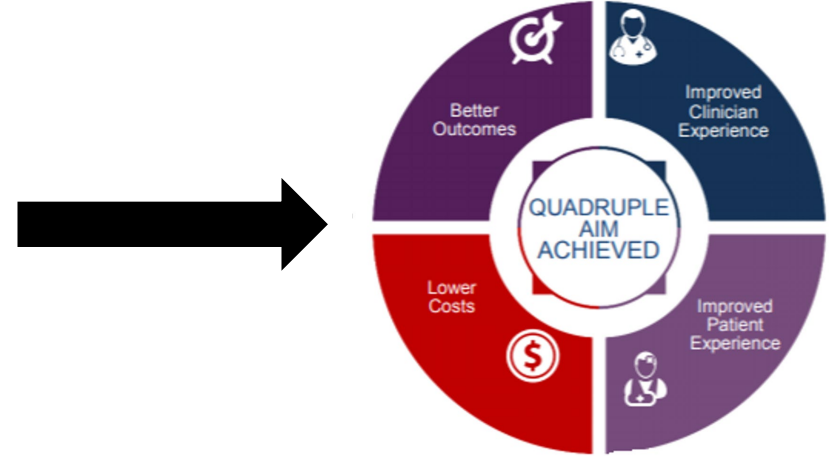


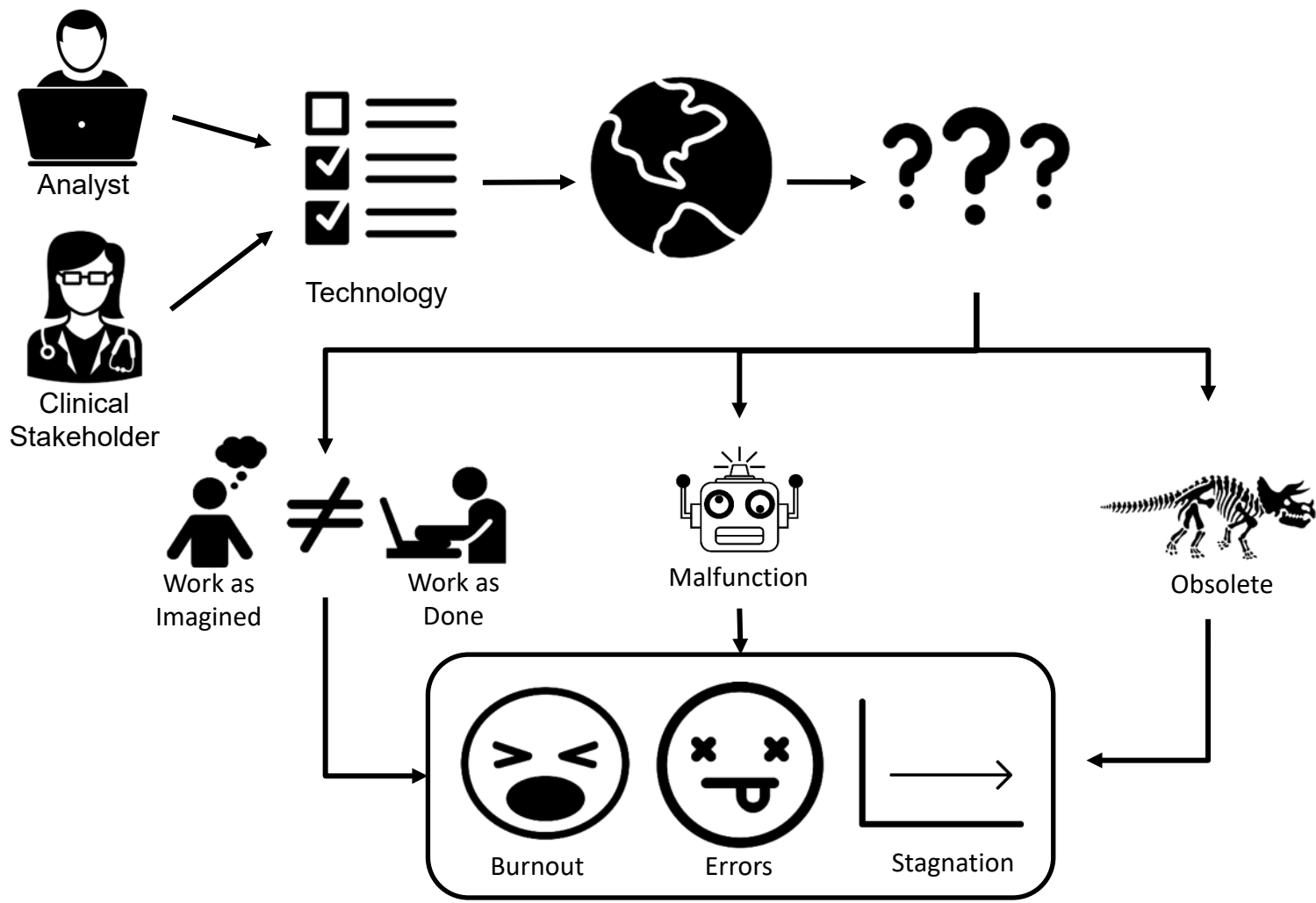
Learning Health System

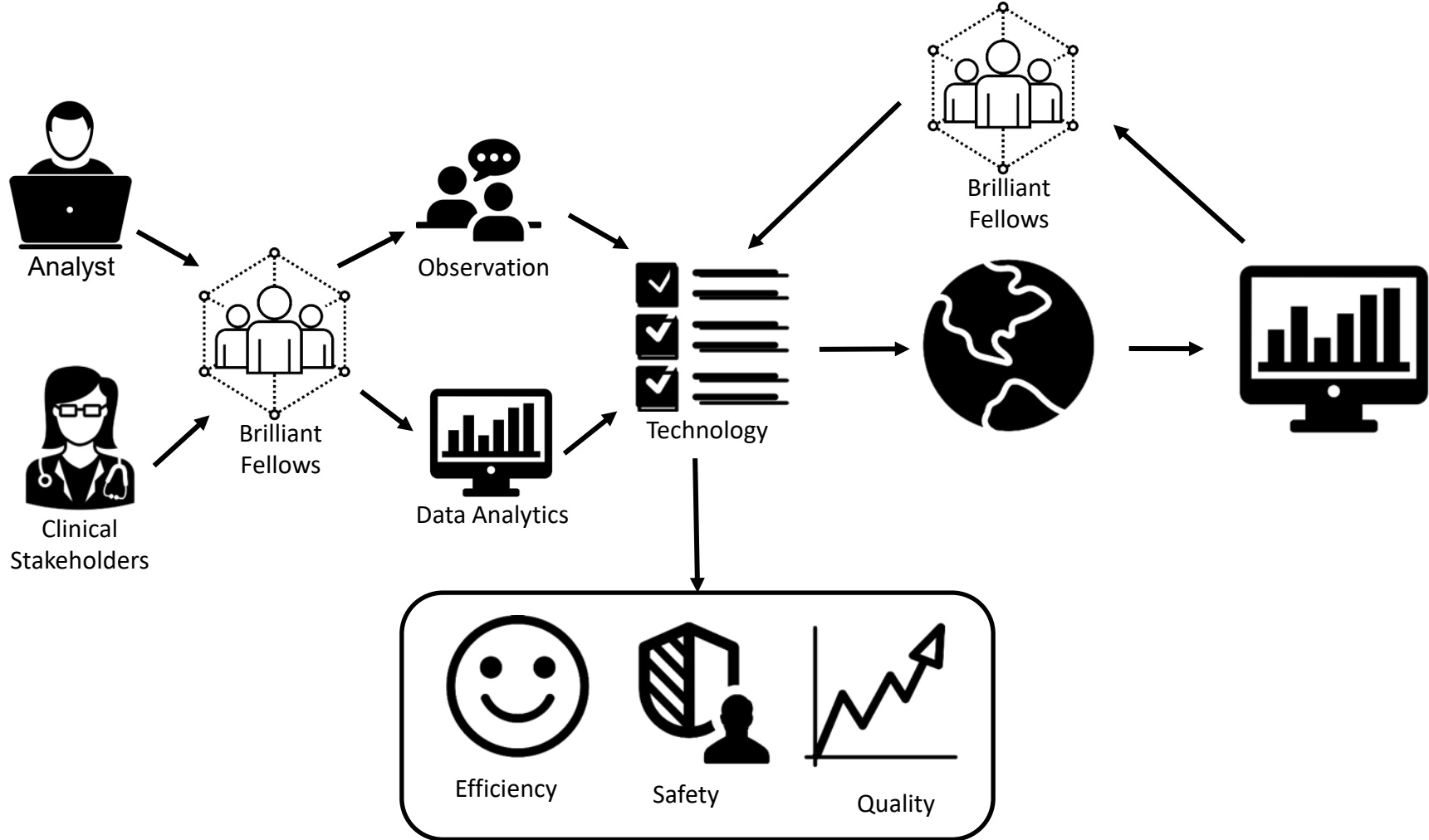
Learning Health System



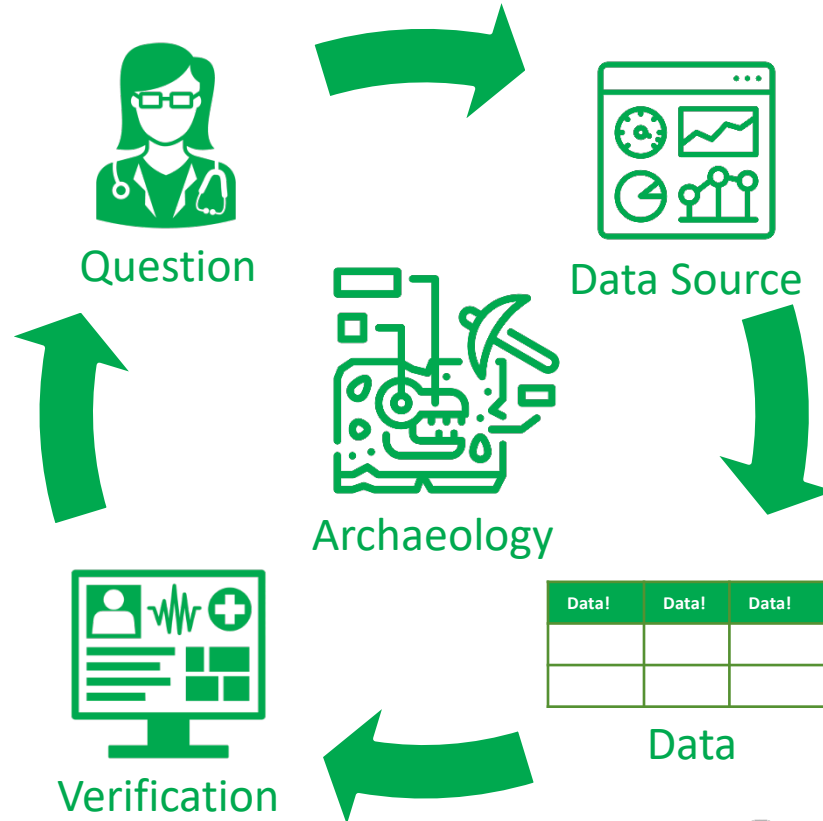
Better Outcomes







EHR Data Process

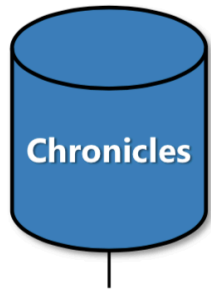




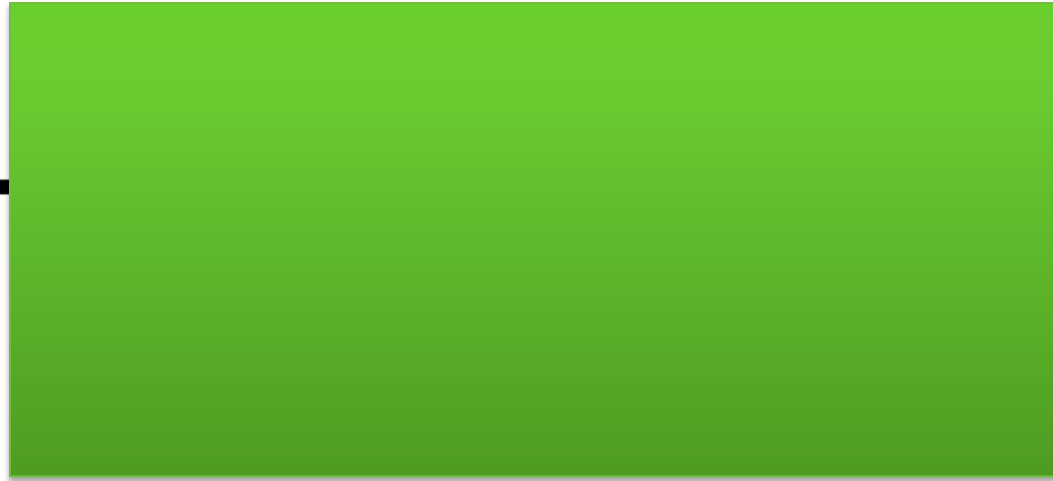
How Epic Works

Slides adapted with permission from Dr. Phil Hagedorn, Associate CMIO at Cincinnati Children's



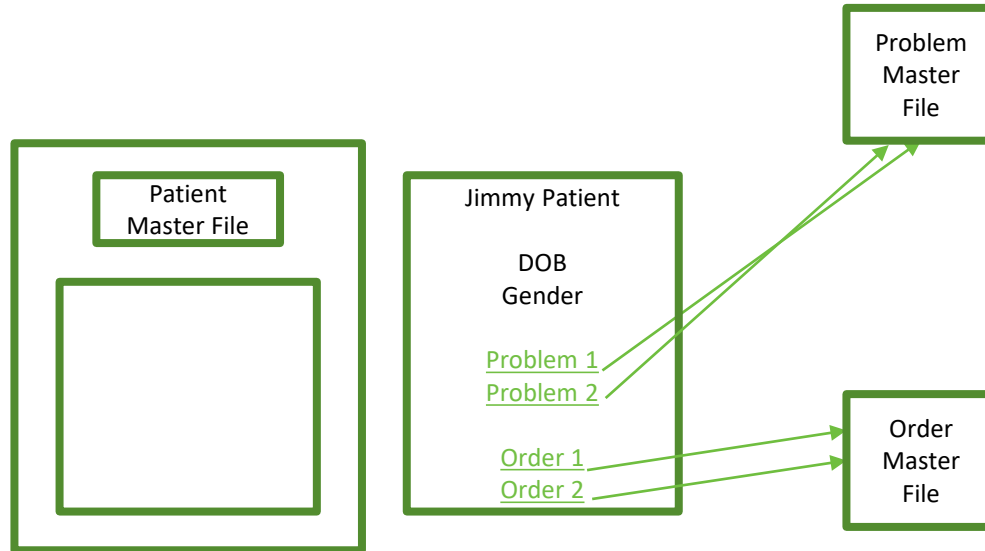


Hierarchical database
with real-time data



Visual Explanation

Chronicles



INI: EMP ID: HAGEDORN, PHILIP A [HAG] Contact: 30 - 3/23/2020 [View](#)

Item range: : Include blanks

EMP-HAGEDORN, PHILIP A [HAG2IY]

Some items have more lines to load. [Click here](#) to load all lines (blank items will not be included).

Last refreshed: 08/20/20 09:54:49 AM

1-USER NUMBER	HAG2IY [HAG2IY]
2-USERNAME	HAGEDORN, PHILIP A
8-CONTACT SERIAL NUMBER	85156
9-LOGICAL OWNER	CCHMC POC DEPLOYMENT [120]
10-CONTACT NUMBER	30
Rel 11-COMMUNITY ID	12-CID DESCRIPTOR
0 1. 1	1. 1
1 1. 40019369	1. CI189
Rel 15-UNIQUE CONTACT IDENTIFIER	16-UCI COMMUNITY DESCRIPTOR
0 1. 1	1. 1
1 1. 10044875	1. CI189
17-PHYSICAL OWNER	CCHMC POC DEPLOYMENT [120]
20-EFFECTIVE DATE	3/23/20 [65461]
21-CONTACT OWNER	CCHMC POC DEPLOYMENT [120]
23-CONTACT COMMENT	LFK - Add physician Administrator template for build environments
35-USER NAME	HAGEDORN, PHILIP A
36-USER NAME OVERTIME	HAGEDORN, PHILIP A
37-EMPLOYEE NAME RECORD	HAGEDORN, PHILIP A [58166]
43-PASSWORD CASE SENSITIVE?	Yes [1]
45-SYSTEM LOGIN	HAG2IY
46-FORCE PASSWORD CHANGE	No [0]
49-USER LOGIN DOMAIN	CHMCCORP
50-STATUS	Active [1]
75-TYPE OF EMP RECORD	User [1]
180-USER ALIAS	PROJECT TEAM
198-APPLIED LINKABLE TEMPLATE	CCHMC PHYSICIAN ADMINISTRATOR BUILD ENV ONLY [T11192]
199-DEFAULT LINKED USER TEMPLATE COPY TIMESTAMP	Aug 6, 2020 3:01 PM [5667634908[EDT]

INI: EAF ID: LIBERTY [10413] Contact: 1 - 6/25/2007 View

Item range: : Include blanks

Rel	1040-IPS MED FORM (ADS)	1041-IPS MED ROUTE (ADS)	1042-IPS CONTROLLED SUBSTANCE (ADS)	1043-IPS MATCHES ALLOWED (ADS)	1044-IPS MAXIMUM PACKAGES (ADS)	1045-IPS PARTIAL MATCH PREFERENCE (ADS)	1047-IPS LARGER PACKAGE AFTER (ADS)	1049-IPS MED GROUPER (ADS)
0	1. 1	1. 1	1. 1	1. 1	1. 1	1. 1	1. 1	
1					1. 7			

1075-DIRTY BIT 0

Rel	2855-CLIA NUMBER	2856-CLIA FROM	2857-CLIA TO
0	1. 1		
1	1. 36D1087513		

4101-NEW MODIFIER INFO CACHED? No [2]

5003-POS: IS FACILITY? Yes [1]

5005-LOCATION ABBREVIATION (FOR SCHEDULING) LBRTY

5250-SERVICE AREA CINCINNATI CHILDREN'S SA [10]

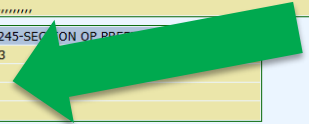
9000-INSTANT OF ENTRY Jun 25, 2007 9:33 AM [5253672824[EDT]

10199-PACKED PATIENT INFO

10299-PACKED ACCOUNT INFO

Rel	17215-SECTION PREFERENCE LIST (LPF ID)	17230-MIXTURE SECTION TYPE-LPF	17245-SECTION ON PR...
0	1. 3	1. 3	1. 3
1	1. 1. IP RX BASE IV FLUIDS [4080000005]	1. Base [1]	
4	4. 4. IP RX LARGE VOLUME IV ADDITIVES [4080000011] 4. Additives [4]		
3	3. 1. IP RX INJECTABLE MEDS [4080000004]	1. Medications [3]	

What Happens when we follow a hyperlink?



Rel	20564-BCA REPORT TYPE	20565-BCA OVERRIDE HRX REPORT	20566-BCA OVERRIDE PATIENT LIST	20567-BCA OVERRIDE CENSUS	20564-BCA OVERRIDE DETAILS REPORT	20565-BCA OVERRIDE RANGE START DATE	RANGE END DATE	OVERVERRIDE REPORT NAME	START INSTANT	OVERVERRIDE INTERVAL	PC NAMES	UNIQUE INDEX	REPORT TAGS	REPORT TAG TYPE
0	1. 9			1. 9	1. 9	1. 9	1. 9	1. 9	1. 9	1. 9	1. 9	1. 9		
1	1. Single Patient List [4]			1. All Admitted Patients [29834]	1. CCHMC BCA IP CLINICAL SUMMARY [3046000702]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
2	1. Single Patient List [4]			1. All Admitted Patients [29834]	1. CCHMC BCA IP SHORT REPORT [3046000706]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
3	1. Single Patient List [4]			1. All Admitted Patients [29834]	1. CCHMC BCA HEM CLINICAL SUMMARY [1156000701]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
4	1. Single Patient List [4]			1. LIB Emergency Medicine [30693]	1. CCHMC BCA IP CLINICAL SUMMARY [3046000702]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
5	1. Single Patient List [4]			1. LIB Emergency Medicine [30693]	1. CCHMC BCA IP SHORT REPORT [3046000706]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
6	1. Single Patient List [4]			1. LIB Emergency Medicine [30693]	1. CCHMC BCA HEM CLINICAL SUMMARY [1156000701]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
7	1. Single Patient List [4]			1. HOD Patients - Confirmed [600134]	1. CCHMC BCA IP CLINICAL SUMMARY [3046000702]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
8	1. Single Patient List [4]			1. HOD Patients - Confirmed [600134]	1. CCHMC BCA IP SHORT REPORT [3046000706]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			
9	1. Single Patient List [4]			1. HOD Patients - Confirmed [600134]	1. CCHMC BCA HEM CLINICAL SUMMARY [1156000701]				1. Mar 30, 2016 1:00 PM [5530251600]	1. 6.0	1. P17-3270			

INI: LPF ID: IP RX INJECTABLE MEDS [4] Contact: 1 - 4/29/2009 View

Item range: : Include blanks

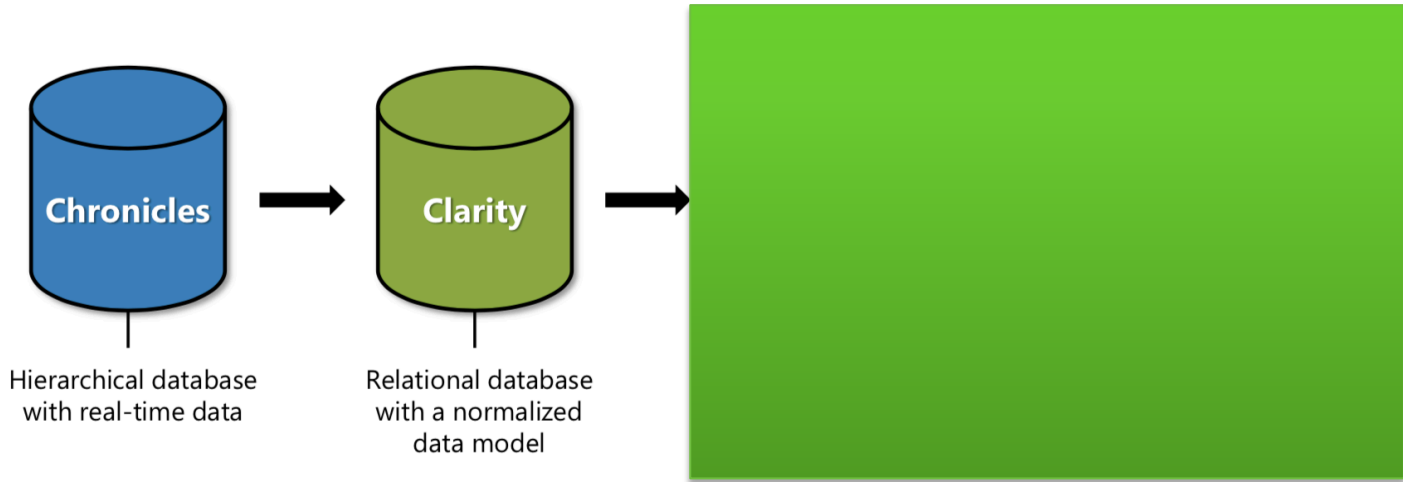
LPF-IP RX INJECTABLE MEDS [4080000004]

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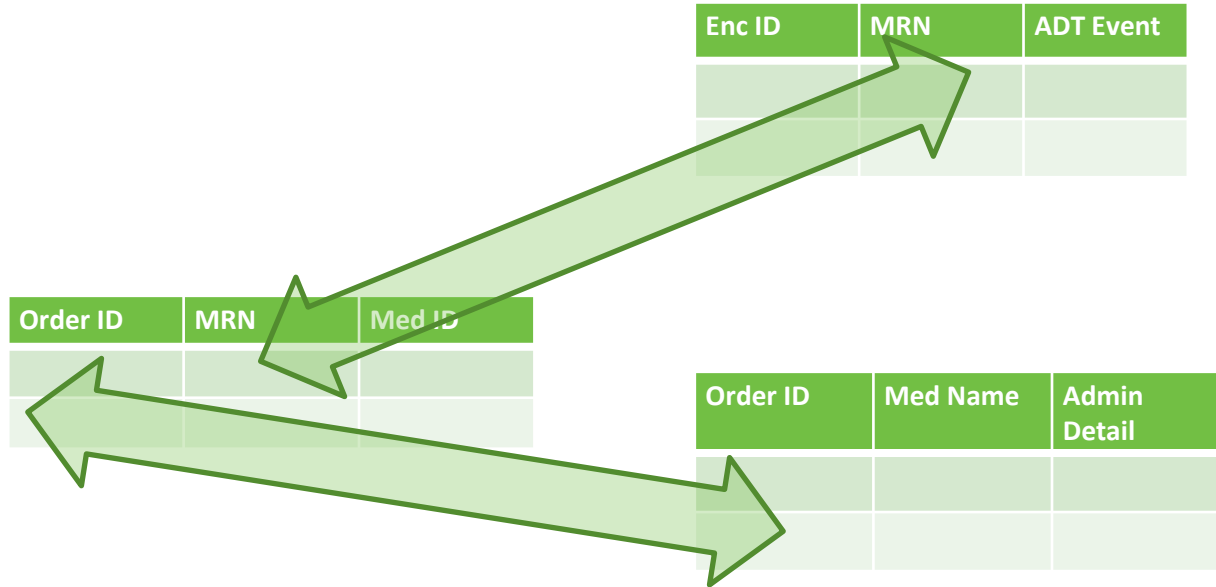
1-PREFERENCE ID	4080000004
2-PREFERENCE DESCRIPTION	IP RX INJECTABLE MEDS
9-LOGICAL OWNER	CCHMC POC DEPLOYMENT [120]
10-CONTACT DATE	4/29/09 [61480]
Rel 11-COMMUNITY ID	12-CID DESCRIPTOR
0 1. 1	1. 1
1 1. 10016341	1. CI189
17-PHYSICAL OWNER	CCHMC POC DEPLOYMENT [120]
20-CONTACT NUMBER	1
130-ORDER PREFERENCE TYPE	Medications [999]
150-EXCLUDE FROM SEARCH?	No [2]
170-SUPPRESS USER PREFERENCE LIST	No [2]
180-USER OR SYSTEM LIST	System Preference List [2]
190-LIST TYPE	Meds [2]

Rel	200-ROW TYPE	201-ORXID	202-OTLID	203-SECTION ID	204-ROWID	205-LINK INFO
0	1. 226	1. 226	1. 226	1. 226	1. 226	1. 226
1-126	1. [skipped]	1. [skipped]	1. [skipped]	1. [skipped]	1. [skipped]	1. [skipped]
127	1. Meds [2]	1. METHYLERGONOVINE MALEATE 0.2 MG/ML IJ SOLN [135381]	1. OTL [424498]	1. MEDICATIONS [107287]	1. 107287-0000138	
128	1. Meds [2]	1. METHYLPREDNISOLONE SODIUM SUCC 1000 MG IJ SOLR [135388]	1. OTL [424499]	1. MEDICATIONS [107287]	1. 107287-0000139	
129	1. Meds [2]	1. METOCLOPRAMIDE HCL 5 MG/ML IJ SOLN [130414]	1. OTL [424500]	1. MEDICATIONS [107287]	1. 107287-0000140	
130	1. Meds [2]	1. EPINEPHRINE (ANAPHYLAXIS) 1 MG/ML IJ SOLN [331122]	1. OTL [1239687]	1. MEDICATIONS [107287]	1. 107287-0000423	
131	1. Meds [2]	1. SODIUM THIOSULFATE 25 % IV SOLN [132580]	1. OTL [424560]	1. MEDICATIONS [107287]	1. 107287-0000200	
132	1. Meds [2]	1. SODIUM CHLORIDE 4 MEQ/ML IV SOLN [132542]	1. OTL [623696]	1. MEDICATIONS [107287]	1. 107287-0000295	
133	1. Meds [2]	1. AMINOCAPROIC ACID 20 MG/ML INJECTION [255890]	1. OTL [534311]	1. MEDICATIONS [107287]	1. 107287-0000281	
134	1. Meds [2]	1. FLUCONAZOLE IN SODIUM CHLORIDE 200-0.9 MG/100ML-% IV SOLN [134898]	1. OTL [637874]	1. MEDICATIONS [107287]	1. 107287-0000296	
135	1. Meds [2]	1. SODIUM LACTATE 5 MEQ/ML IV SOLN [132563]	1. OTL [424558]	1. MEDICATIONS [107287]	1. 107287-0000198	
136	1. Meds [2]	1. MYCOPHENOLATE MOFETIL HCL 500 MG IV SOLR [147642]	1. OTL [424507]	1. MEDICATIONS [107287]	1. 107287-0000147	
137	1. Meds [2]	1. NA FERRIC GLUC CPLX IN SUCROSE 12.5 MG/ML IV SOLN [148558]	1. OTL [424508]	1. MEDICATIONS [107287]	1. 107287-0000148	
138	1. Meds [2]	1. NAFACILLIN SODIUM 1 G IJ SOLR [130709]	1. OTL [424509]	1. MEDICATIONS [107287]	1. 107287-0000149	
139	1. Meds [2]	1. NALBUPHINE HCL 10 MG/ML IJ SOLN [130714]	1. OTL [424510]	1. MEDICATIONS [107287]	1. 107287-0000150	
140	1. Meds [2]	1. NALOXONE HCL 0.4 MG/ML IJ SOLN [130749]	1. OTL [424511]	1. MEDICATIONS [107287]	1. 107287-0000151	
141	1. Meds [2]	1. NESIRITIDE 1.5 MG IV SOLR [154419]	1. OTL [424512]	1. MEDICATIONS [107287]	1. 107287-0000152	
142	1. Meds [2]	1. GLUCAGON HCL (DIAGNOSTIC) 1 MG IJ SOLR [318139]	1. OTL [917981]	1. MEDICATIONS [107287]	1. 107287-0000337	
143	1. Meds [2]	1. SINCALIDE 5 MCG IJ SOLR [136080]	1. OTL [424552]	1. MEDICATIONS [107287]	1. 107287-0000192	
144	1. Meds [2]	1. ONDANSETRON HCL 4 MG/2ML IJ SOLN [252168]	1. OTL [495647]	1. MEDICATIONS [107287]	1. 107287-0000253	

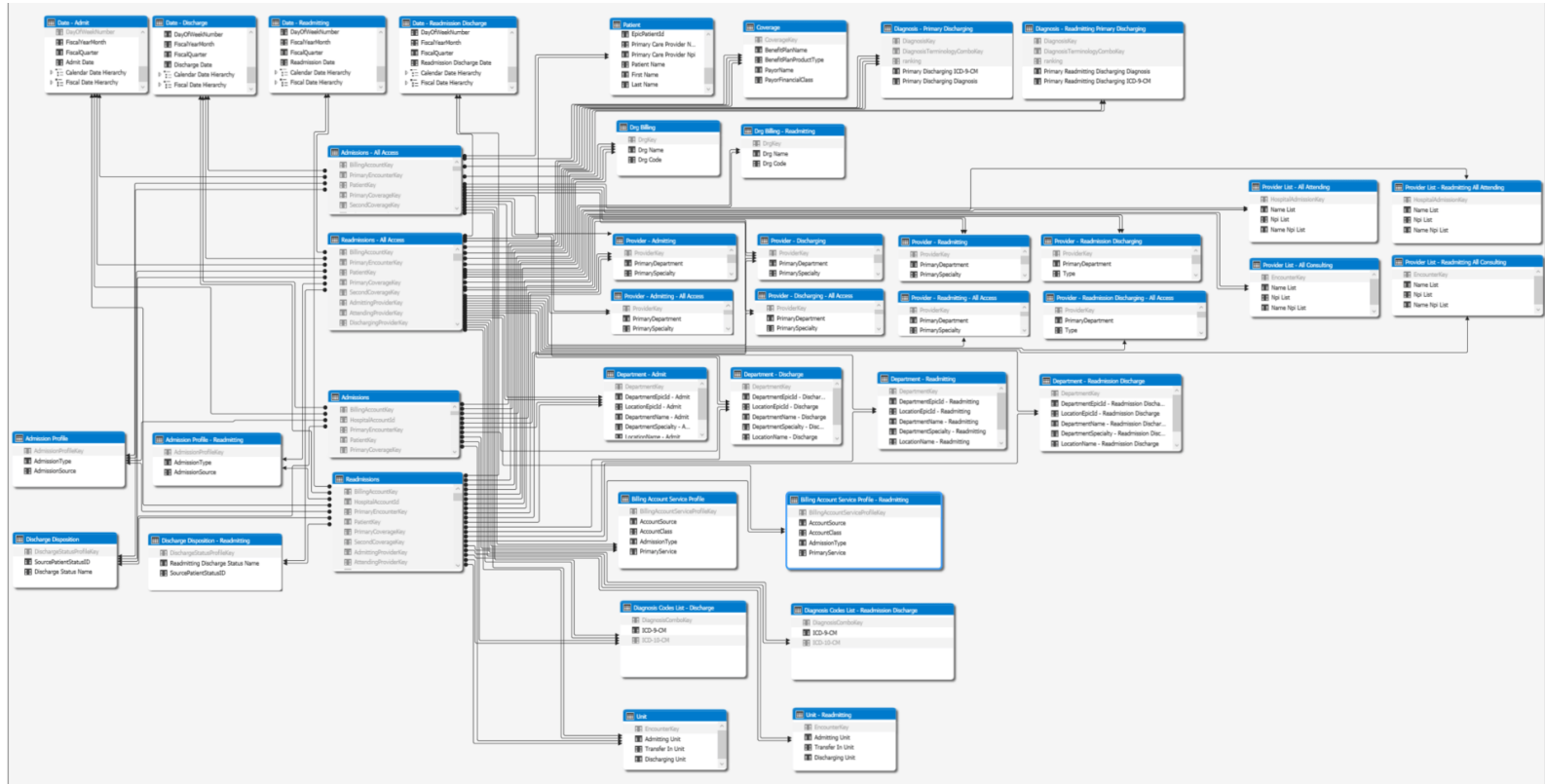


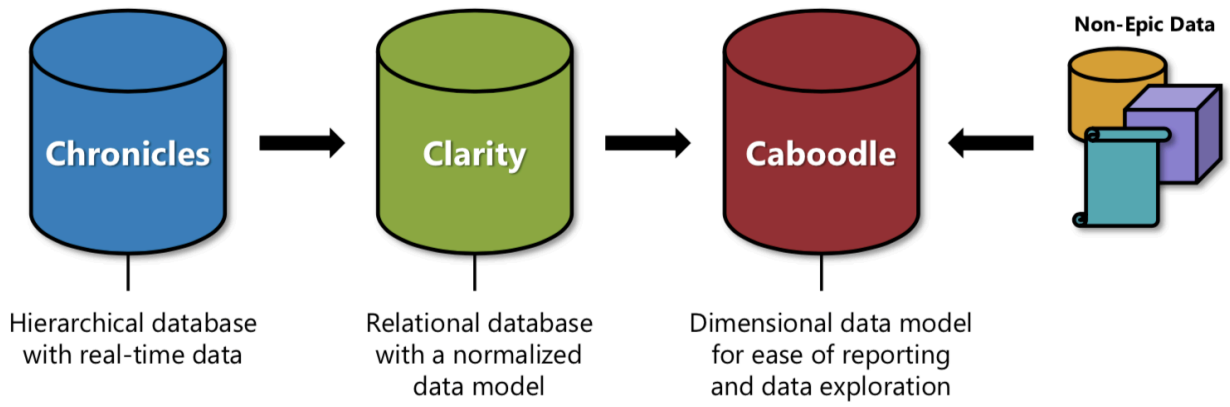
What's a relational, normalized database?

Clarity



Want to know about readmissions?

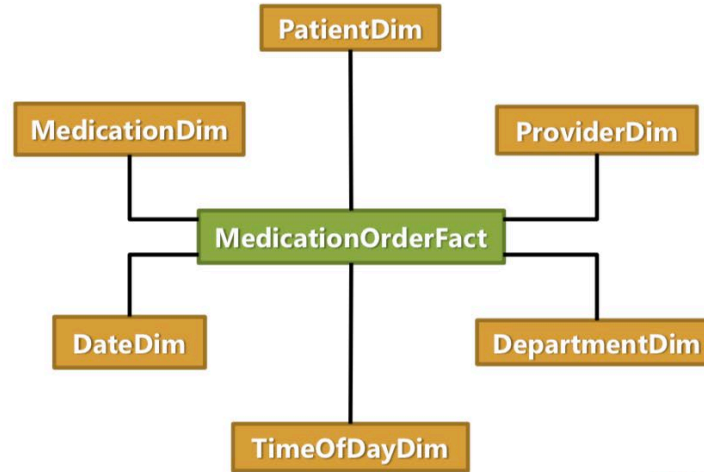




What's a Dimensional Data Model?

Facts represent the occurrence of a specific, measurable event

Dimensions are concrete entities that provide context





Getting Data Out of the EHR



Collecting Data

Easy:

- Med orders
- Med admins (IP)
- Laboratory orders
- Laboratory results
- Vital signs
- Flowsheets
- ADT events (Admission, Discharge, Transfer)
- Alert Firings
- Order Set Use Patterns

Medium:

- Diagnoses
- Time intervals
- EHR phenotypes
- SmartData

Hard:

- Notes
- Time in Notes
- Screens viewed

Relational Database

Relational Database + NLP/ML/Other

Dimensional Database



Dimensional Data Sources



Dimensional Data Sources

- Epic: SlicerDicer
- PopDisco
- Phrase Health



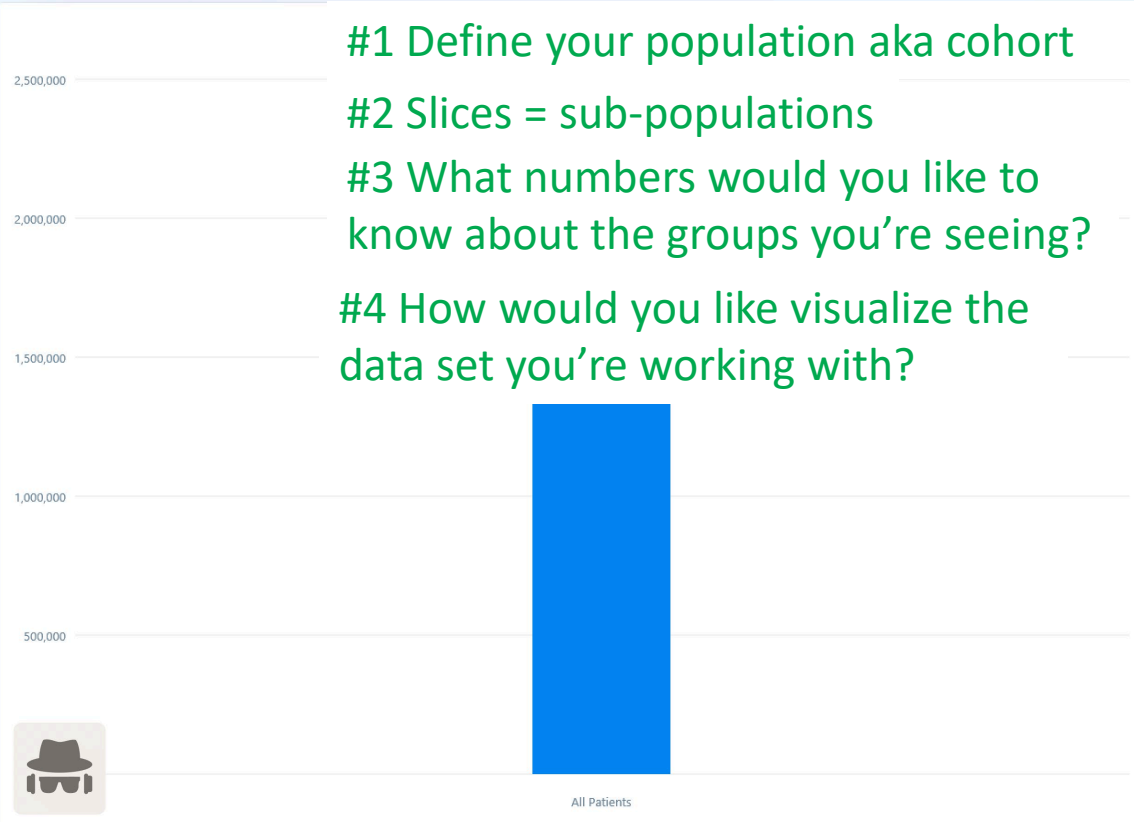
SlicerDicer



Select a Data Model

Admissions 9,765	BestPractice Advisories 9,148,161	ED Encounters 109,650
Opioid Outpatient Prescriptions 0	Outpatient Prescriptions 351,176	Patients 2,866,545
Patients with Cancer 5,981	Surgeries and Invasive Procedures 25,890	Visits 715,583

- #1 Define your population aka cohort
- #2 Slices = sub-populations
- #3 What numbers would you like to know about the groups you're seeing?
- #4 How would you like visualize the data set you're working with?



Population
Base: All Patients

Slices
No Slices

Measures
Number of Patients

Visual Options
Bar Height: Number of Patients
Bar Color: None
Y-Axis Range: Automatic

All Patients

Base: All Patients

Search for criteria

Advanced Logic



SlicerDicer

Current Dimensions

- Patients
- Visits
- Admissions
- Alerts
- ED Encounters
- Outpatient Opioid Prescriptions
- All Outpatient Prescriptions
- Cancer
- Surgeries/Invasive Procedures

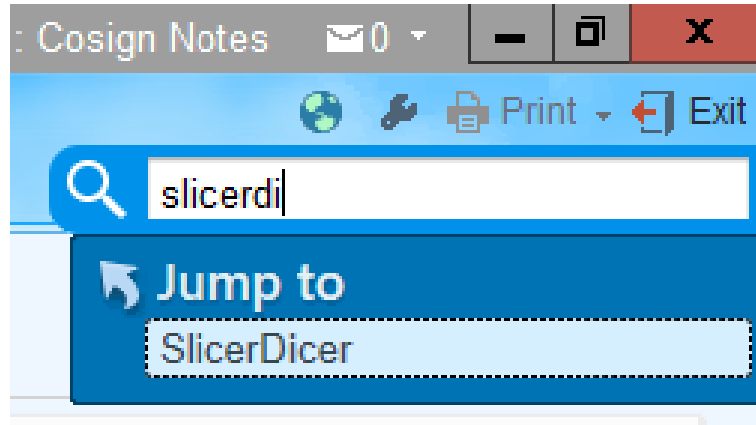
Future Dimensions

- Births
- Imaging Studies
- Labs
- Referrals
- Research Studies
- Custom Data Models



Slicer Dicer

- How to get access:
 - You already have it!



Population Discovery



2017 to Present

Population Discovery is intended to allow clinicians or data investigators to perform preliminary investigation across patient populations. This method of data access is not intended for research and no data displayed may be published or shared with external parties. Complex requests or requests with intent to be published or utilized for patient contact/outreach must be processed through the Reporting Request Portal.

Select the button below to access the Data Request Form

 [Data Request Form](#)

[Data Dictionary](#) 

 [PopDisco User Guide](#)

Reloaded on 10/27/2020 11:57:49 AM from H:\QV11\Publisher\Data\

This application contains Confidential Privileged Quality Peer Review Material Pursuant to GPR Statute Georgia Code Sections 31-7-130 to 133 and under the HCQI Act of 1986. Therefore, the information should not be disclosed or shared with others that are not involved in the quality initiative either through written or verbal communication. Unauthorized disclosure can result in a loss of protections afforded by statute. Use of Protected Health Information (PHI) in this application must adhere to Children's policy 8.15

[Uses and Disclosures for Research Purposes & Waivers \(HIPAA Research Policy\).](#)

Visit Type and Facility >>		
Inpatient	Facility	Visits
	CPG	165,137
Outpatient	EG	207,161
	HS	50,540
	SR	257,568
Inpatient	EG	12,799
	HS	841
	SR	15,685

Visit Departments		
ED YN	<input type="checkbox"/>	
CICU YN	<input type="checkbox"/>	
ICU YN	<input type="checkbox"/>	
NICU YN	<input type="checkbox"/>	
PICU YN	<input type="checkbox"/>	
Observation YN	<input type="checkbox"/>	
Neurosurgery YN	<input type="checkbox"/>	

Hospital Account		
Billing Pat Class	<input type="checkbox"/>	
Msdrg Master Service Line	<input type="checkbox"/>	
Msdrg Service Line	<input type="checkbox"/>	
Msdrg Sub Service	<input type="checkbox"/>	

Special Populations		
Sickle Cell Registry YN	<input type="checkbox"/>	
Sickle Cell Genotype	<input type="checkbox"/>	
Oncology Class	<input type="checkbox"/>	
Oncology Registry YN	<input type="checkbox"/>	
Cancer Type	<input type="checkbox"/>	
Sequence of Primary	<input type="checkbox"/>	
Date of Diagnosis	<input type="checkbox"/>	
New Onset Diabetes YN	<input type="checkbox"/>	
New Onset DKA YN	<input type="checkbox"/>	
DKA Severity	<input type="checkbox"/>	
DKA Visit Flag	<input type="checkbox"/>	
Complex Chronic Condition	<input type="checkbox"/>	
Guideline Population	<input type="checkbox"/>	
Act Score	<input type="checkbox"/>	
Ed Behavioral Health YN	<input type="checkbox"/>	
Ed Annual Screen Time	<input type="checkbox"/>	

Visit Dept(s)	First Dept	Last Dept	First IP Dept
Visit Department(s)			
SR EMERGENCY DEPT			55,967
EG EMERGENCY DEPT			42,112
HS EMERGENCY DEPT			30,172
SR RAD RADIOGRAPHY			23,096
HUDSON BRIDGE UC			18,064
EG RAD RADIOGRAPHY			17,918
CPG ORTHO MERI MARK			17,143
SATELLITE BLVD UC			17,123
TOWN CENTER UC			16,968
OP LAB COLLECTION CAP			15,642
FORSYTH UC			13,399
HS PRIMARY CARE			13,378
CPG NEUROLOGY CAP			12,998
SR AFLAC CENTER			12,143
EG AFLAC OP CENTER			12,002
ZOPT-SR PACU			10,579
CHAMBLEE-BROOKHAVEN UC			10,281
ZOPT-SR PREOP			9,839
SR RAD ULTRASOUND			9,725
CPG ENDO CAP			9,689
CPG ORTHO DULUTH			9,661
CPG PULM MT VERNON			9,591
EG LAB			9,202
ZOPT-SR INTRAOP			9,187
SR OR			8,855
CPG ORTHO HUDSON BRI			8,720
CPG ORTHO OLD MILTON			8,648
CPG ORTHO CAP			8,632
CPG ORTHO TC			8,410
-----			-----

Case Management		
Case Mgt Adm Past 12 Months YN	<input type="checkbox"/>	
Case Mgt Adm Past 30 Days YN	<input type="checkbox"/>	
Case Mgt Adm Planned YN	<input type="checkbox"/>	
Case Mgt ED Visit Past 72 Hours YN	<input type="checkbox"/>	

Prim Hsp Srvc	First Hsp Srvc	Last Hsp Srvc
Primary Hospital Service		
Emergency Medicine		128,153
Urgent Care		94,693
Surgery		24,684
Pediatrics		10,363
Hematology/Oncology		8,875
Cardiology		4,808
Critical Care		3,707
Pediatric Surgery		3,137
Orthopedic Surgery		1,672
Otolaryngology		1,451
Hematology		1,305
Endocrinology		1,300

Visit Type		
Not Available		265,345
TREATMENT		45,984
LAB		31,598
ORTH SPORTS EST		29,845
ESTABLISHED PATIENT		19,596
ORTH SPORTS NEW		18,810
EST PATIENT TELEMEDICINE		14,072
NEW PATIENT		14,054
FOLLOW UP		10,115
PHYSICAL EXAM		9,838
ORTH SPORTS NEW EST		8,660
XR EXTREMITY 1V		6,574
ESTABLISHED ENDO		6,018
ESTABLISHED DIABETIC		5,844
INFUSION		5,645

Select a button below to evaluate a specific Length of Stay statistic

PopDisco

Dimensions

- Visits
- Diagnoses
- Chief Complaints
- Demographics
- Payors
- Procedures
- Providers
- Medications
- ADT Events
- Lab values
- Microbiology
- Respiratory Pathogens
- Other Orders



PopDisco

Special Populations

- Sickle Cell
- Cancer
- DKA
- Clinical Effectiveness Guideline Populations
- Complex Chronic Conditions



PopDisco

- How to get access:
 - Talk to Quality champions in your division
 - Data Request



Phrase Health



Alerts

Firings 338,329
Alerts 235

📅 Sep 27, 2020 - Oct 26, 2020 ▾

▶ Alert Properties show more

Best Practice Advisories (BPA) ▾ ?

Visible only ▾

Firing greater than ▾ 0 per day

▶ Alert Dimensions show more

▶ Governance Metadata show more

Review	Firings ↓	PBI	Name
In Progress	40,578	0.213	COVID - HAS AN ACTIVE AEROSOL GENERATING PROCEDURE - BASE ● 🕒 2 👤 0 💬 0 👉 covid
<input type="checkbox"/>	38,526	0	AMB INFLUENZA BASE ● 🕒 0 👤 0 💬 0
<input type="checkbox"/>	22,766	0.419	IP HEIGHT DOCUMENTATION - BASE ● 🕒 1 👤 0 💬 0
<input type="checkbox"/>	22,563	0	CHOA ED - NEED A PHYSICIAN LOS CHARGE FILED ON A PATIENT - BASE ● 🕒 0 👤 0 💬 0
<input type="checkbox"/>	18,531	0.306	IP IV EXTRAVASATION BASE ● 🕒 0 👤 0 💬 0
<input type="checkbox"/>	15,359	0.194	LOOK-A-LIKE/ SOUND-A-LIKE(BASE) ● 🕒 0 👤 0 💬 0
<input type="checkbox"/>	12,290	0.098	AFLAC ADRENAL INSUFFICIENCY BASE ● 🕒 3 👤 0 💬 0



Phrase Health



COVID - HAS AN ACTIVE AEROSOL GENERATING PROCEDURE - BASE LGL Base 1348

Never Reviewed

Evan Orenstein, Edwin Ray

covid

Create

Edit

Analytics

Preview

Governance **1**

Messages **5**

Versions

Contact 1

Created 4/8/20

Please wear an N95 mask. Patient at risk for COVID-19 with order for Aerosol Generating Procedure.

Provide Feedback on this Alert

@FNAME@ @LNAME@ has an order for an aerosol generating procedure and may have COVID-19 (enhanced contact/droplet precautions or infection status of COVID-19 suspected, test pending, or confirmed).

@AEROPROC@

Please wear an N95 mask when entering @FNAME@'s room to prevent exposure.

Acknowledge

Keep alert active for me

Suppress x 12 hours

Not on aerosolizing procedure

I will not see this patient in person

Other



Phrase Health

COVID - HAS AN ACTIVE AEROSOL GENERATING PROCEDURE - BASE LGL Base 1348

🕒 Never Reviewed

👤 Evan Orenstein, Edwin Ray

📁 covid

Analytics

Preview

Governance **1**

Messages **5**

📅 Sep 27, 2020 - Oct 26, 2020 ▲

Show data for:

Action Taken

Search Search

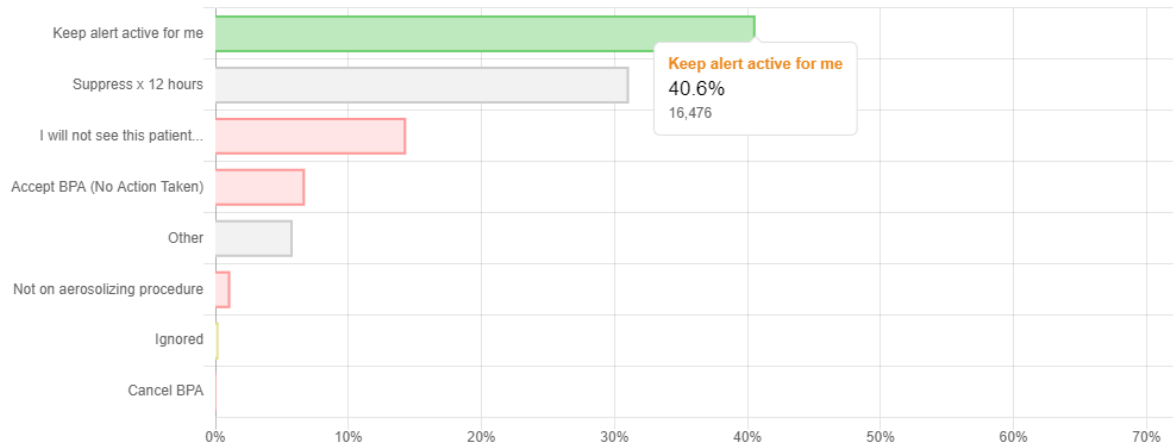
- Encounters
- Patient Department
- Provider Type
- Trigger Action
- Users

Alerts that are: ?

Characteristics

- 🕒 Interruptive Firings 100%
- 🕒 Shown Firings 100%

Actions Taken 8



Note Multiple actions may be taken on a single firing. Key

Phrase Health

Dimensions

- Alerts
 - Actions Taken
 - Triggers
 - Department
 - Providers
 - Encounters
- Order Set Use
 - Orders Used
 - Orders Within 5 Minutes
 - Order Question Responses
 - Department
 - Providers
 - Encounters
- Medication Orders
 - Order Set Source
 - Ordering Activity
 - Department
 - Providers
 - Encounters
- Procedure Orders
 - Order Set Source
 - Ordering Activity
 - Department
 - Providers
 - Encounters



Phrase Health

- How to get access:
 - You already have it! Go to app.phrasehealth.com and log in.





Relational Data Sources

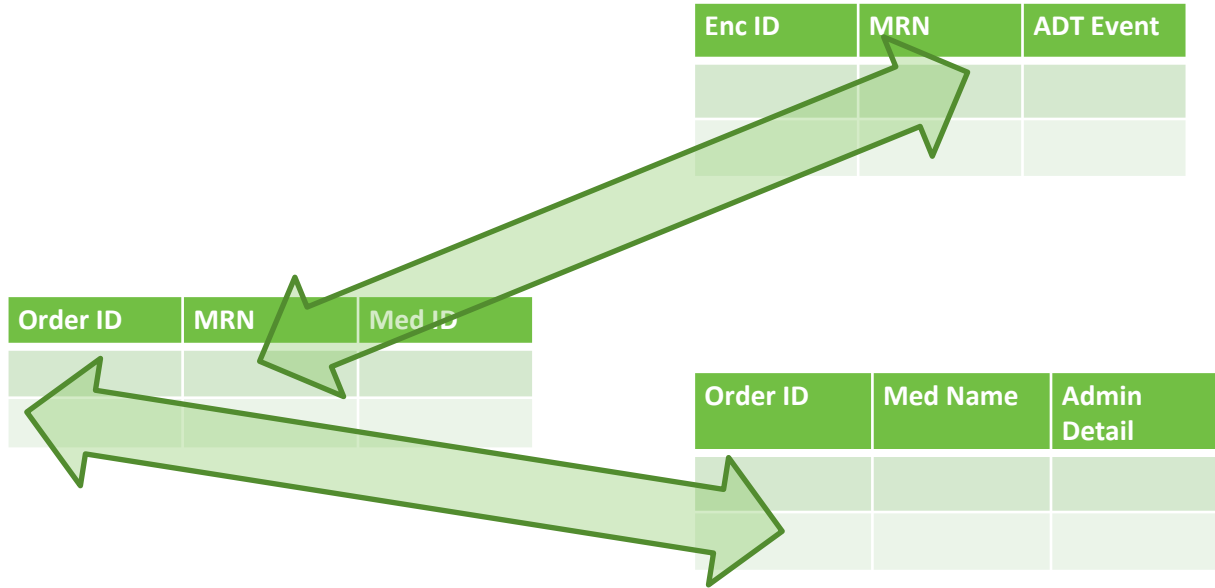


Relational Data Sources

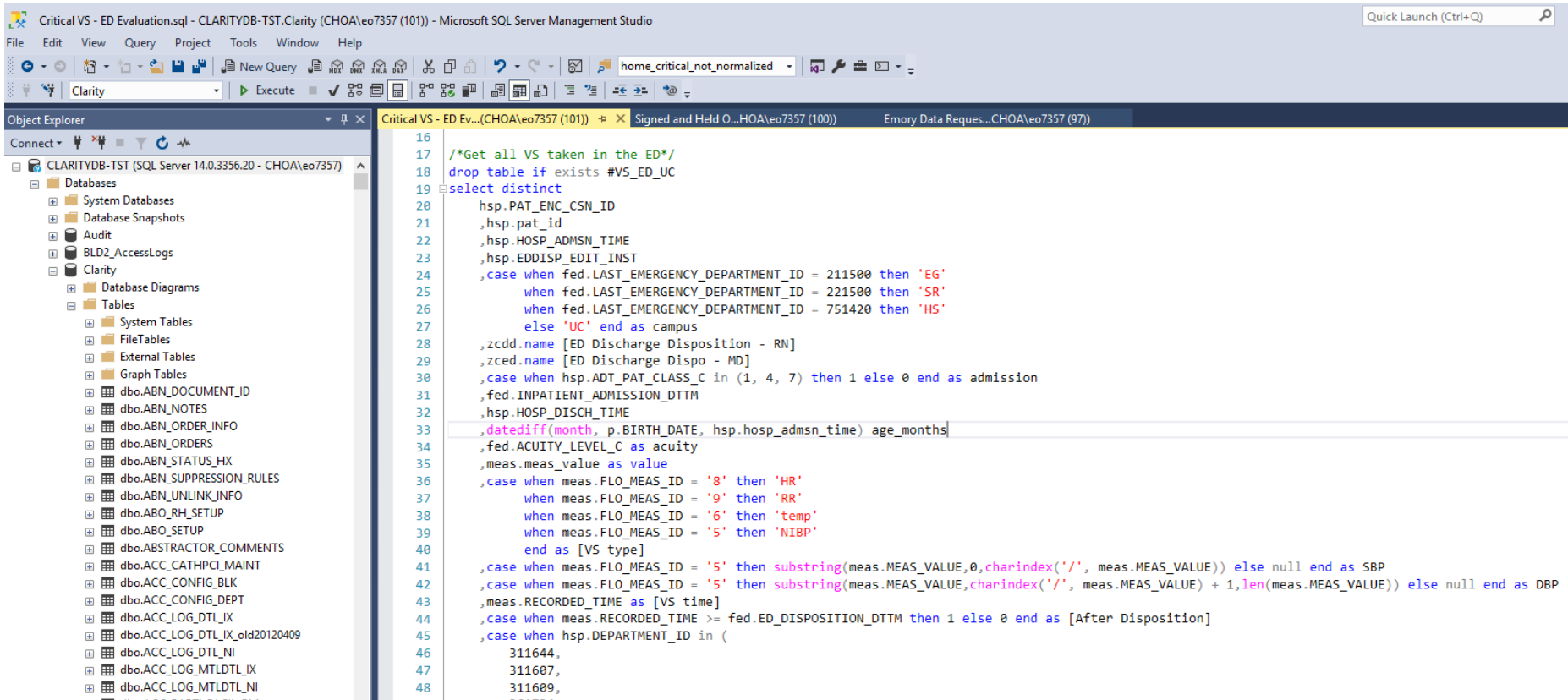
- Clarity
- KIDS
- Link to REDCap



Clarity Database Structure



Clarity Reports



The screenshot displays the Microsoft SQL Server Management Studio interface. The title bar indicates the current connection is 'Critical VS - ED Evaluation.sql - CLARITYDB-TST.Clarity (CHOA\eo7357 (101)) - Microsoft SQL Server Management Studio'. The menu bar includes File, Edit, View, Query, Project, Tools, Window, and Help. The toolbar contains various icons for file operations and query execution. The Object Explorer on the left shows the 'Clarity' database structure, including System Databases, Database Snapshots, Audit, BLD2_AccessLogs, and various tables like 'dbo.ABN_DOCUMENT_ID' and 'dbo.ABN_ORDERS'. The main query editor window shows the following SQL code:

```
16
17 /*Get all VS taken in the ED*/
18 drop table if exists #VS_ED_UC
19 select distinct
20     hsp.PAT_ENC_CSN_ID
21     ,hsp.pat_id
22     ,hsp.HOSP_ADMSN_TIME
23     ,hsp.EDDISP_EDIT_INST
24     ,case when fed.LAST_EMERGENCY_DEPARTMENT_ID = 211500 then 'EG'
25           when fed.LAST_EMERGENCY_DEPARTMENT_ID = 221500 then 'SR'
26           when fed.LAST_EMERGENCY_DEPARTMENT_ID = 751420 then 'HS'
27           else 'UC' end as campus
28     ,zcdd.name [ED Discharge Disposition - RN]
29     ,zced.name [ED Discharge Dispo - MD]
30     ,case when hsp.ADT_PAT_CLASS_C in (1, 4, 7) then 1 else 0 end as admission
31     ,fed.INPATIENT_ADMISSION_DTTM
32     ,hsp.HOSP_DISCH_TIME
33     ,datediff(month, p.BIRTH_DATE, hsp.hosp_admsn_time) age_months
34     ,fed.ACUIITY_LEVEL_C as acuity
35     ,meas.meas_value as value
36     ,case when meas.FLO_MEAS_ID = '8' then 'HR'
37           when meas.FLO_MEAS_ID = '9' then 'RR'
38           when meas.FLO_MEAS_ID = '6' then 'temp'
39           when meas.FLO_MEAS_ID = '5' then 'NIBP'
40           end as [VS type]
41     ,case when meas.FLO_MEAS_ID = '5' then substring(meas.MEAS_VALUE,0,charindex('/', meas.MEAS_VALUE)) else null end as SBP
42     ,case when meas.FLO_MEAS_ID = '5' then substring(meas.MEAS_VALUE,charindex('/', meas.MEAS_VALUE) + 1,len(meas.MEAS_VALUE)) else null end as DBP
43     ,meas.RECORDED_TIME as [VS time]
44     ,case when meas.RECORDED_TIME >= fed.ED_DISPOSITION_DTTM then 1 else 0 end as [After Disposition]
45     ,case when hsp.DEPARTMENT_ID in (
46         311644,
47         311607,
48         311609,
```



Clarity Reports



Suspected COVID-19 Patients

Campus	Department	Patient Name	Gender	Test Date	Order	Result
Scottish Rite	SR EMERGENCY DEPT		Female	05/09/2020 01:37	Coronavirus SARS-CoV-2 ORF1ab+S RT-PCR	NEGATIVE
Scottish Rite	SR EMERGENCY DEPT		Female	05/11/2020 07:56	Coronavirus SARS-CoV-2 ORF1ab+S RT-PCR	NEGATIVE
Amb Surg	SAT BLVD AMB SURG CTR		Male	05/14/2020 12:36	Coronavirus SARS-CoV-2 ORF1ab+S RT-PCR	NEGATIVE
Scottish Rite	SR OR		Female	05/04/2020 10:55	Coronavirus SARS-CoV-2 ORF1ab+S RT-PCR	NEGATIVE
Scottish Rite	LAB SR SAT BLV DR THRU		Male	05/15/2020 10:10	Coronavirus SARS-CoV-2 Qual NAAT(RefLab)	



Unit of Analysis

Examples

- Lead Screening
- Influenza Vaccines
- CLABSIs
- Blood Transfusions

Common Units of Analysis

- Patient
- Encounter
- Patient-Day
- Order
- Flowsheet Entry Timestamp



Relational Database Reports

- How to get them: <https://sp.choa.org/apps/reportrequests/Pages/Home.aspx>

SharePoint Sites

Careforce Connection
Your Link to Children's Healthcare of Atlanta

Reporting Services Report Requests

Reporting Services Requests

- Submit a Request
- My Requests
- All Requests
- Tip Sheets and Policies
- All Approvals
- My Approvals
- Search Requests
- Recent

Welcome to the Children's Data and Analysis Request Portal!

This site should be used when requesting financial, operational, clinical system, quality or research data reports

Please click on the link below to open the form:

Children's Data and Analysis Request Form

For any questions or concerns please email data@choa.org



Intervening in the EHR



Facilitating Data Collection: Order Questions

Musculoskeletal Infection Guideline-Initiate ✓ Accept ✗ Cancel

Priority:

Frequency:

For:

Starting: At:

Starting: **Today 1124** **Until Specified**

Scheduled Times

Reference Links: [1. Link to Musculoskeletal Infection Guideline](#)

🚨 Type of Host

Comments:


🚨 Next Required ✓ Accept ✗ Cancel



Facilitating Data Collection: Flowsheets

ains	I/O	POC	RespICU	RespGen	Restraints	Med (NVNSD)	Pain	HAC	WAT/c
Accordion			Expanded		View All				
				EG 5 East					
				7/20/20		10/20/20			
				1000		1100			

Unplanned Extubation Risk (UPE)

 Is the Patient Intubated?		Yes
Difficult Airway w/ Epic Order?		Yes
Anatomical Risk (Facial Deformities)		0
Agitation/Sedation Holiday		2
Multiple Procedures&/or Transport		1
Planned Extubation (Protocol in Place)		1
Patient Leaving Bed		
Excessive Secretions/Frequent Retaping		
History of UPE		
Weight <1000grams		
Unplanned Extubation Risk Calculation		4



Facilitating Data Collection: SmartForms

Copy Note Copy Antimicrobial Start Clear All Manage Macros

Antimicrobial Start Systemic/Cardiac CNS ENT/Eye/Dental Skin/Soft Tissue/Musculoskeletal Lower Respiratory Tract G

Antimicrobial Start

Patient condition:

- is previously healthy
- is immunocompromised
- is not immunocompromised but has underlying conditions
- is premature and < 3mo old

Antimicrobial treatment being used:

to treat a presumed/confirmed infection, empiric treatment
for prophylaxis
for non-infectious use



Facilitating Data Collection: SmartLists

Over the past 2 weeks, how often have you been bothered by any of the following problems?

- Little interest or pleasure in doing things: {Answers:13778}
- Feeling down, depressed, or hopeless: {Answers:13778}
- Trouble falling or staying asleep or sleeping Too Much: {Ar
- Feeling tired or having little energy: {Answers:13778}
- Poor appetite or overeating: {Answers:13778}
- Feeling bad about yourself or that you are a failure or have let yourself or your family down: {Answers:13778}
- Trouble concentrating on things such as reading the newspaper or watching television: {Answers:13778}
- Moving or speaking so slowly that other people could have noticed or the opposite - being so fidgety or restless tha
- Thoughts that you would be better off dead or of hurting yourself: {Answers:13778}

- 0 - Not at all
- 1 - Several days
- 2 - More than half the days
- 3 - Nearly every day

Score (add above): {Post-Partum Depression Screening - PHQ9 Total Score:13780}

{If PHQ-9 Score >= 5, provide resources to mom - enter a "Discharge Instruction" order in the Discharge Navigator

System SmartList – Post-Partum Depression Screening - PHQ9 Total Score [13780]

Choice	Default?	SDE	Context	Value
0 {No depression:999}		PHQ-9 SCORE ...	Encounter	0
1 {Minimal depression:999}		PHQ-9 SCORE ...	Encounter	1
2 {Minimal depression:999}		PHQ-9 SCORE ...	Encounter	2
3 {Minimal depression:999}		PHQ-9 SCORE ...	Encounter	3

Facilitating Data Collection: Alerts

Influenza Vaccine


@FNAME@ is eligible for influenza vaccine (no flu vaccine given this season in our system or [GRITS](#)).

Inactivated Influenza Vaccine is **safe** and **recommended** for patients ≥ 6 mo including those on [steroids](#), with [asthma exacerbation](#), with [egg allergy of any severity](#), and for [cancer and other immunocompromised patients](#).

The **only** absolute contraindication is a history of anaphylaxis to influenza vaccine.

Order

Do Not Order

 influenza virus vaccine 2020-21 (FLUZONE) IM injection

 [CDC Flu Guidelines](#)

Acknowledge Reason _____

To be admitted

Hx of reaction to fl

Not Ready to Decide

Other (enter

Criteria

1. FLU VACCINE - CRITERIA [93]
2. FLU BPA - SURGERY INCLUSION RULE [12100216]
3. PATIENT HAS NOT RECEIVED FLU VACC SINCE THIS SEASON (CHECKS CURRENT YEAR IF CURRENTLY FALL) [265]
4. PATIENT HAS NOT RECEIVED FLU VACC SINCE THIS SEASON (CHECKS PRIOR YEAR IF CURRENTLY SPRING) [267]
5. FLU VACCINE DATE RANGE CRITERIA [501]
6. FLU VACCINE CUI EXCLUSION CRITERIA [94]
7. IP FLU VACCINE - ANAPHYLAXIS [801000]
8. IP FLU VACCINE - NURSE DOCUMENTED OPT OUT [801002]
9. IP FLU VACCINE - HAS ACTIVE, PENDING, OR COMPLETED FLU VACCINE ORDER [801003]
10. ED FLU VACCINE - FLU VACCINE ORDER ENTERED [1624]
11. ASAP FLU VACCINE - BPA FIRED WITHIN 1 HOUR - CRITERIA [1625]
12. ASAP ED - REGISTRATION COMPLETE [1652]

Logic:

1 AND 2 AND 3 AND 4 AND 5 AND NOT 6 AND NOT 7 AND NOT 8 AND NOT 9 AND NOT 10 AND NOT 11 AND 12

Facilitating Data Collection: Alerts

Record Summary for BestPractice Advisory: ASAP ED FLU VACCINE - BACKGROUND TOTAL DENOMINATOR [70186]

General Information

Contact released?: Yes

Contact date: 8/21/19

Contact: 1

Type: Base

Display

Display to user?: No

Importance level: Very Important [4]

Display text: Influenza Vaccine

SmartLink: FLU VACCINE - BPA TEXT
SMARTLINK [100428]

Criteria

1. FLU VACCINE - CRITERIA [93]
2. FLU BPA - SURGERY INCLUSION RULE [12100216]
3. PATIENT HAS NOT RECEIVED FLU VACC SINCE THIS SEASON (CHECKS CURRENT YEAR IF CURRENTLY FALL) [265]
4. PATIENT HAS NOT RECEIVED FLU VACC SINCE THIS SEASON (CHECKS PRIOR YEAR IF CURRENTLY SPRING) [267]
5. FLU VACCINE DATE RANGE CRITERIA [501]
6. FLU VACCINE CUI EXCLUSION CRITERIA [94]
7. IP FLU VACCINE - ANAPHYLAXIS [801000]
8. IP FLU VACCINE - HAS ACTIVE, PENDING, OR COMPLETED FLU VACCINE ORDER [801003]
9. ASAP ED TRIAGE ACUITY 4 OR 5 [70184]

Logic:

1 AND 2 AND 3 AND 4 AND 5 AND NOT 6 AND NOT 7 AND NOT 8 AND 9

Facilitating Data Collection: Registries

Context: Registry Inclusion Criteria [17004] - Rule: CHOA DM Inclusion COVID-19 Confirmed [1051448]

Search

CHOA DM Inclusion COVID-19 Confirmed

1051448

Allow Override?

Properties

Metric Value
Properties
Criteria

This rule evaluates criteria to determine if a patient should be included in the COVID-19 Confirmed registry. If your organization uses infections functionality, the Infection active? and Has Resolved Infection? properties MUST be populated in order for this inclusion criteria to work appropriately.
4/21/20 JDZ: Removed parameter 4 which looked to grouper to define confirmed cases by Problem List dx.

Evaluation logic:

And

Or

Custom

1 or (2 and 3) and not 4 and not 5

Show Parameter Values

#	Property	Operator	Value
1	General Properties > Infection active? Infection Code 27 Check Admission?	=	1
2	General Properties > Has Resolved Infection? Infection COVID-19 Confirmed	=	No [0]
3	General Properties > Evaluate Rule Rule DM Lab Last Positive SARS-C... Data Source Use Default from External D...	<>	

Tree help

Property to see more information about that property or rule.
Double click the name to add the property or rule to the

Facilitating Data Collection: Principles

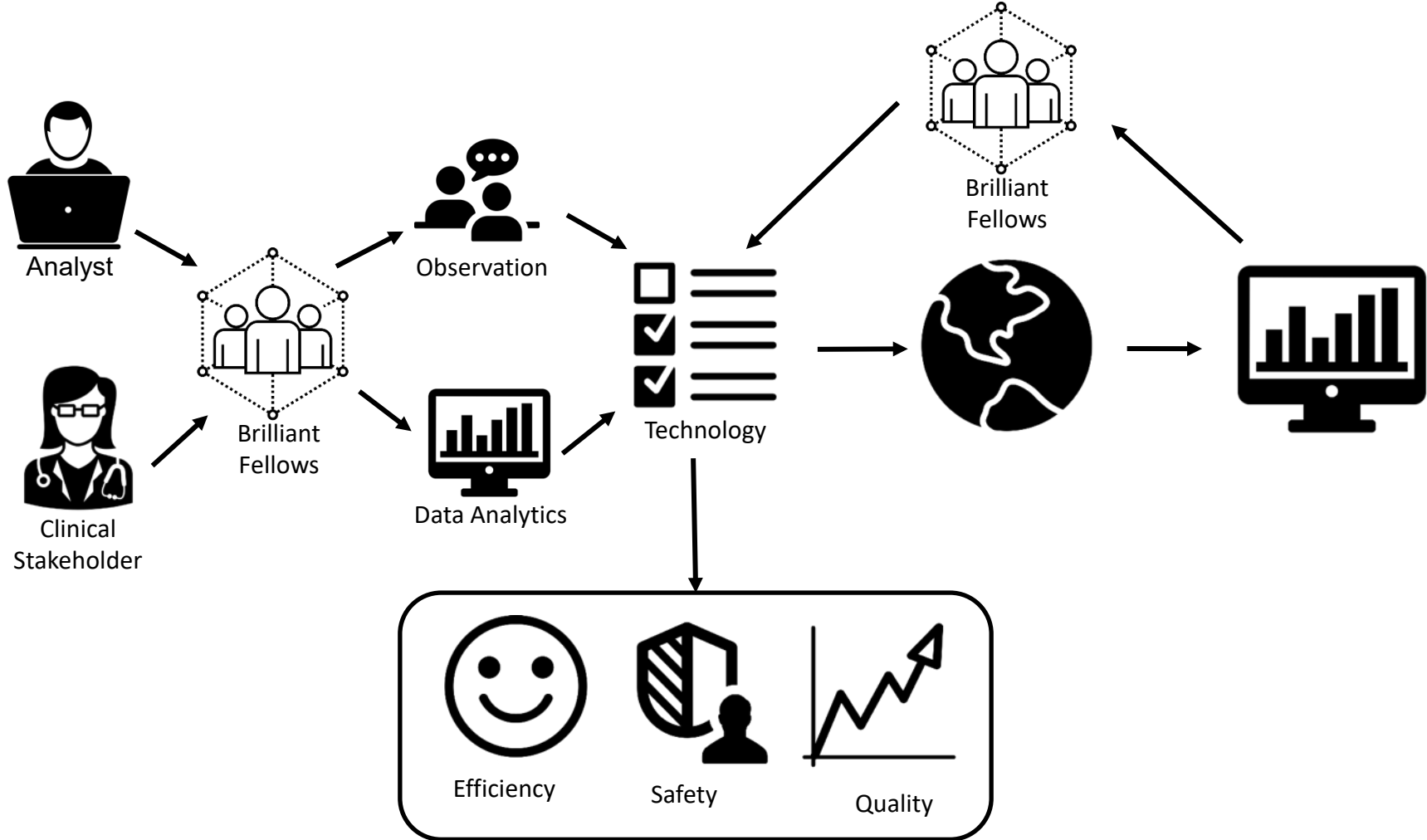
Principles

- Workflow > Research

Consequences

- Poor Design → Garbage
- Poor Design → Enemies





Clinical Decision Support (CDS)

Five “Rights” of CDS

- The right *information*
- To the right *person*
- In the right intervention *format*
- Through the right *channel*
- At the right *time* in workflow

Improving Outcomes with Clinical Decision Support An Implementer's Guide

Second Edition

Jerome A. Osheroff, MD, FACP, FACMI
Jonathan M. Teich, MD, PhD, FACMI, FHIMSS
Donald Levick, MD, MBA, FHIMSS
Luis Saldana, MD, MBA, FACEP
Ferdinand T. Velasco, MD
Dean F. Sittig, PhD, FACMI, FHIMSS
Kendall M. Rogers, MD, CPE, FACP, SFHM
Robert A. Jenders, MD, MS, FACP, FACMI

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Device Informatics
Specialists

shm
Society of Hospital Medicine





Example: Ketogenic Diet Medication Errors

Credit: Ben Siegel, MD



What is Ketogenic Diet

How the diet works

- High fat, low-carbohydrate diet → “Ketosis”
- Brain uses ketones instead of glucose for fuel
- ↓ seizure frequency in refractory cases

Risk:

- Sugary medications → out of ketosis → ↑ seizures



Prior State: Alert on Chart Open



Critical (1) ⌵

⚠ Ketogenic Diet FYI

The ketogenic diet is a medically prescribed diet to help control seizures.

- **Labs:** If checking routine lab work, please include Beta Hydroxybutyric (BHB) and appropriate anticonvulsant drug levels.
- **Formula:** Do not start formula overnight; run dextrose-free IV fluids instead. Consult with nutrition prior to placing formula orders.
- **Fluids:** For maintenance IV fluids, please use saline (0.45% or 0.9%) or lactated ringers. Dextrose should only be used as directed for extended periods NPO or for hypoglycemia treatment.
- **Medications:** All medications must be in the lowest carbohydrate form. No syrups, suspensions, elixirs, or chewable tablets may be used without keto team approval. Check with pharmacy if you have questions.

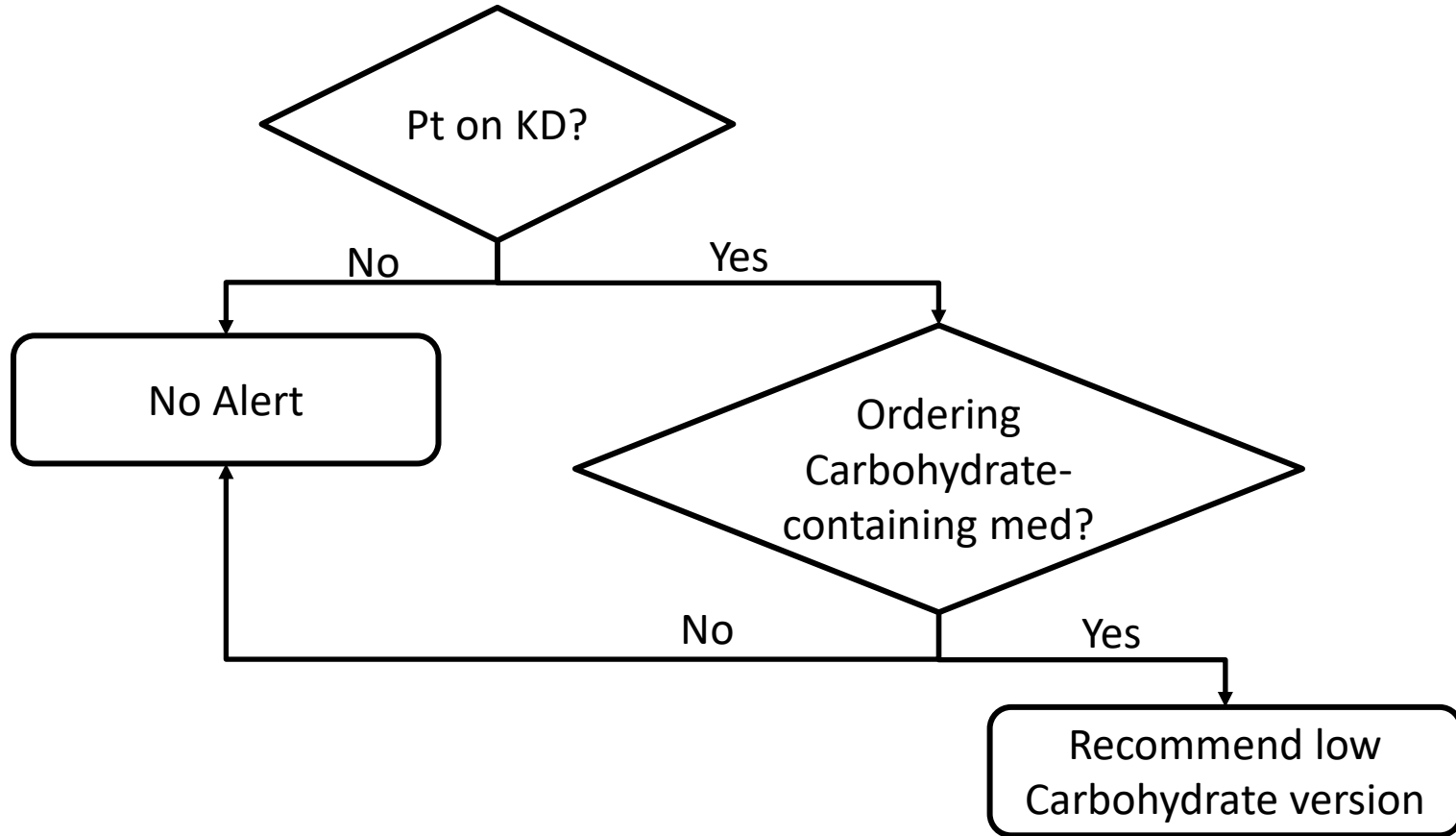
Click here for the provider reference guide on ketogenic diets including side effect management.

[Provider Reference Guide - Ketogenic Diets for Epilepsy](#)

Contact the On-Call Neurologist with questions.

⚠ Acknowledge Reason _____

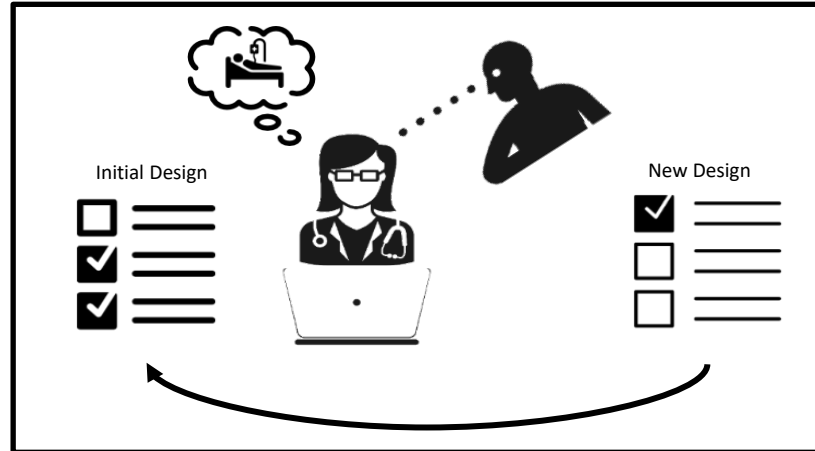
Alert Logic: Ketogenic Diet (KD)



Formative Usability Testing

Scenarios:

- 21 mo M with Dravet syndrome admitted for dehydration secondary to viral AGE. You are cross-covering overnight and get a call from his nurse that he has a temperature of 38.4. There are no anti-pyretics ordered.
- 3 yo F with Lennox-Gastaut Syndrome admitted for increased seizure frequency in the setting of a viral URI. On rounds this morning, mom notice that she was picking at her ears. On otoscopic exam, both TMs are red and bulging.



Candidate Designs

Manage Orders Order Sets Options

Research Edit Multiple Phase of Care

Place new orders or order sets + New ! Next

This patient has active treatment/therapy plans.

New Orders

! amoxicillin (AMOXIL) suspension

Allergy/Contraindication: Carbohydrate-containing medication in patient on ketogenic diet

Incompatible Medication Warning

acetaminophen Details

This medication contains **carbohydrates** which are **incompatible with ketogenic diet**. Please consider an alternative medication.

Cancel Order

Override

Remove All Pend/Save Work Sign

BestPractice Advisory -

Important (1)

This is a carbohydrate-containing medication. The patient is on a ketogenic diet. Consider an alternative medication.

Remove unsigned order: Acetaminophen (TYLENOL) 650 mg oral suspension

Accept Dismiss

Critical (1)



⚠ Carbohydrate-containing medication in patient on ketogenic diet. Consider alternative formulation.

[Provide Feedback on this Alert](#)

For patients on Ketogenic diet, all medications must be in the lowest carbohydrate form.

No syrups, suspensions, elixirs, or chewable tablets may be used without keto team approval.

Consider ordering regular tablets that can be crushed.


Check with pharmacy if you have questions.

[Provider Reference Guide - Ketogenic Diets for Epilepsy.](#)

Remove the following orders? _____

Remove

Keep


 amoxicillin (AMOXIL) suspension

Oral • starting today at 1710

Acknowledge Reason _____

Not on keto diet (please fix FYI)

Ok per keto team, neuro, or pharmacy

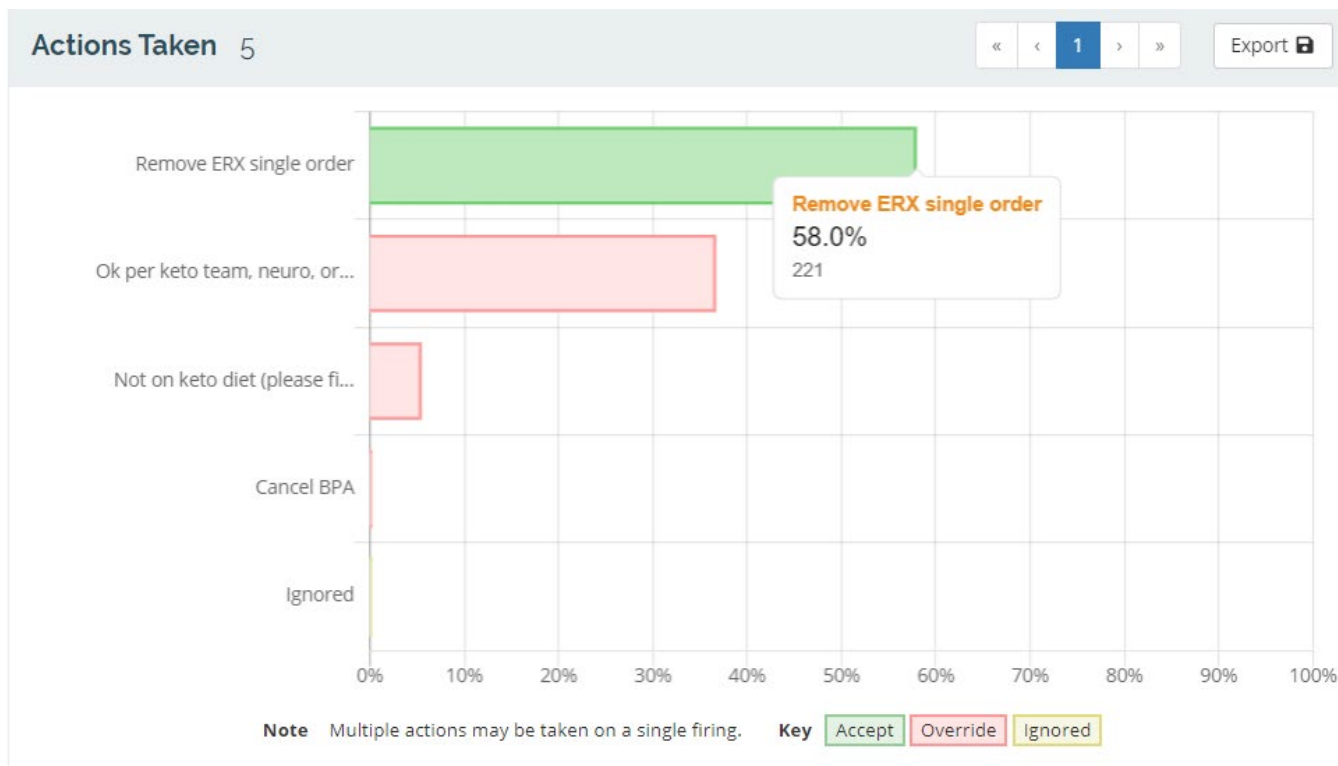
 **Accept**

Evaluation

- How does Epic facilitate research/evaluation?
 - Alert on Chart Open → Cohort Definition
 - Alert-based Intervention → Dimensional Database
 - Data Sources:
 - Alert Firings → Phrase Health
 - Taboo medications per patient day → Clarity Report

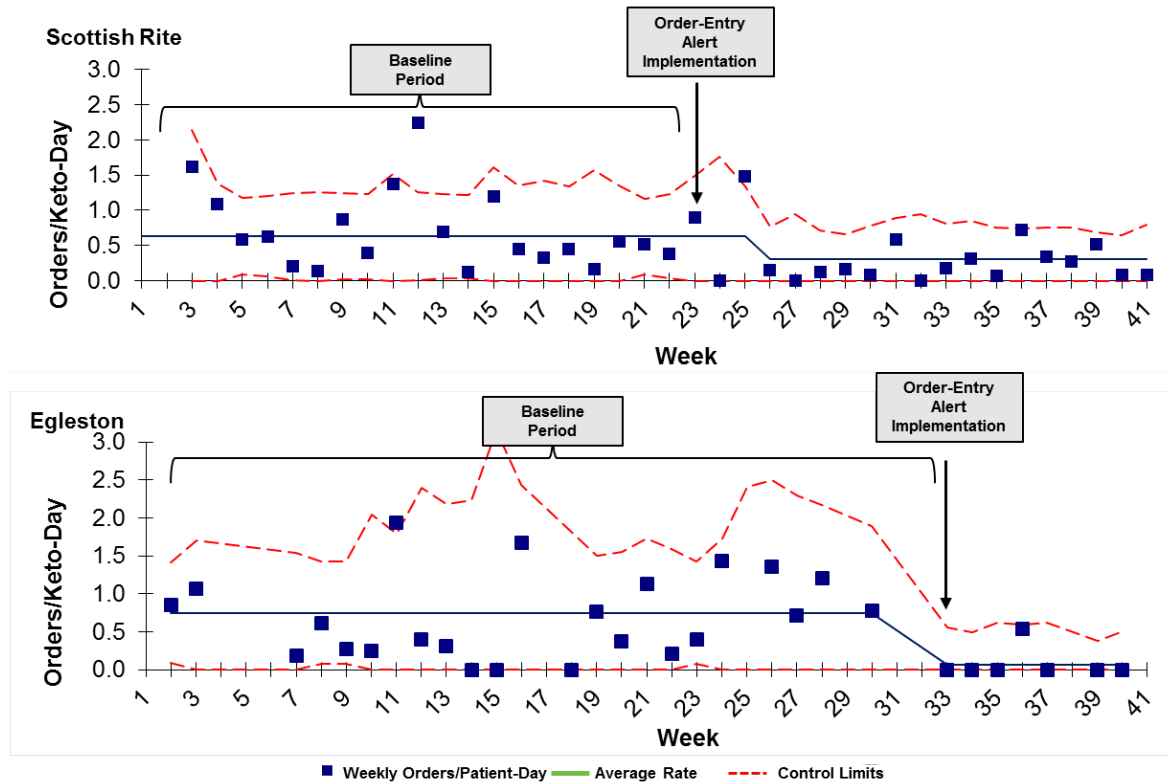


Outcomes: Actions Taken



Outcomes: Implementation

- Medication errors: ↓ by 53%





GEEK Squad

Graduate medical Education in EHR Koding



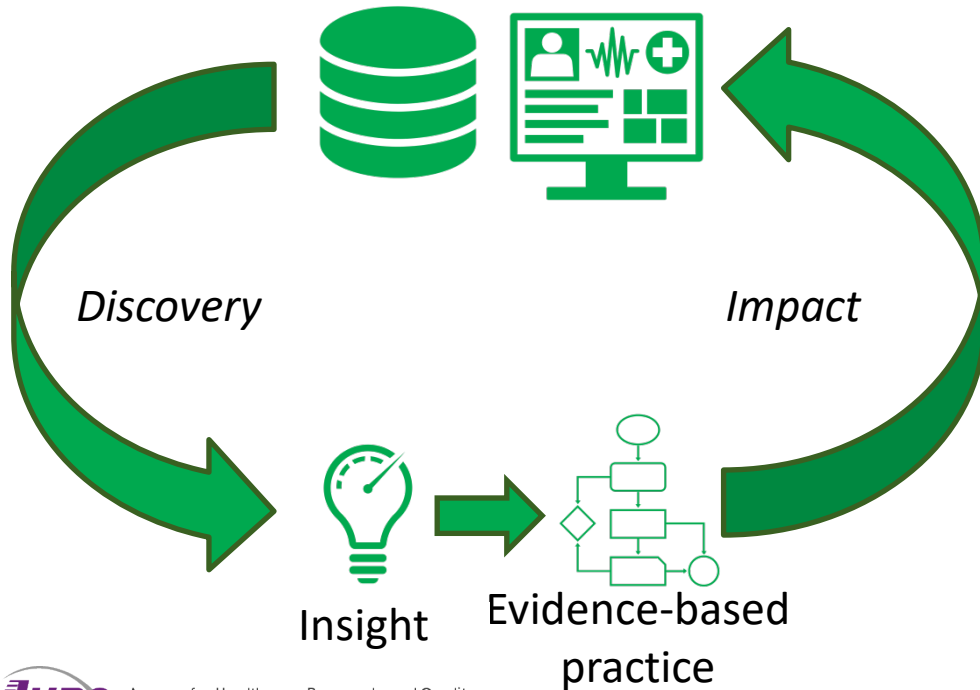
GEEK Squad

- Epic Certifications:
 - <https://training.epic.com/CourseCatalog#/?LocationID=1&VersionID=1236&ViewID=train-tracks&RoleID=14&TrackID=57>
 - Physician Builder (minimum)
 - Physician Builder Analytics
 - Clarity Data Model for Physician Builders
- Access to Epic Development Environments
- Mentorship from a board-certified clinical informaticist
- Monthly GEEK Squad Meetings (starting **November 17, 5-6:30pm**)
 - Clinical Informatics/Epic Build Education
 - CHOA IS&T Logistics
 - Works in Progress



Vision

Learning Health System



Better Outcomes



How to leverage Epic for your research

- **Understand your Data Sources**
 - Dimensional Data is easy to get
 - Relational Data is (relatively) easy (for discrete EHR phenotypes)
 - Chart Review is for data validation
- **Data Collection in Epic Should Enhance Workflow**
 - Make useful tools with discrete data capture
- **Iterative Design**
 - Data strategy
 - Intervention strategy