



**ECHO**  
Environmental Influences  
on Child Health Outcomes  
A program supported by the NIH

IDeA States  
Pediatric Network



**SCTR**  
Oklahoma Shared Clinical  
& Translational Resources

# Leveraging OUHSC Clinical Data Warehouse to Inform Research & Practice

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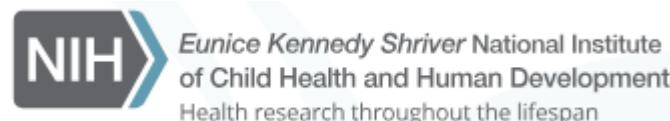
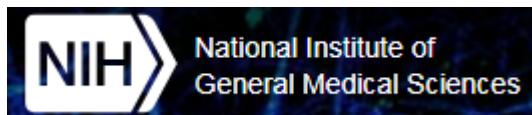
University of Oklahoma HSC

Biomedical & Behavioral Methodology Core (BBMC)

June 2020



Award Numbers:  
UG1OD024950  
U54GM104938



## *Terms*

- **EMR** (or EHR): Electronic Medical/Health Records

A huge database with patient records used by providers

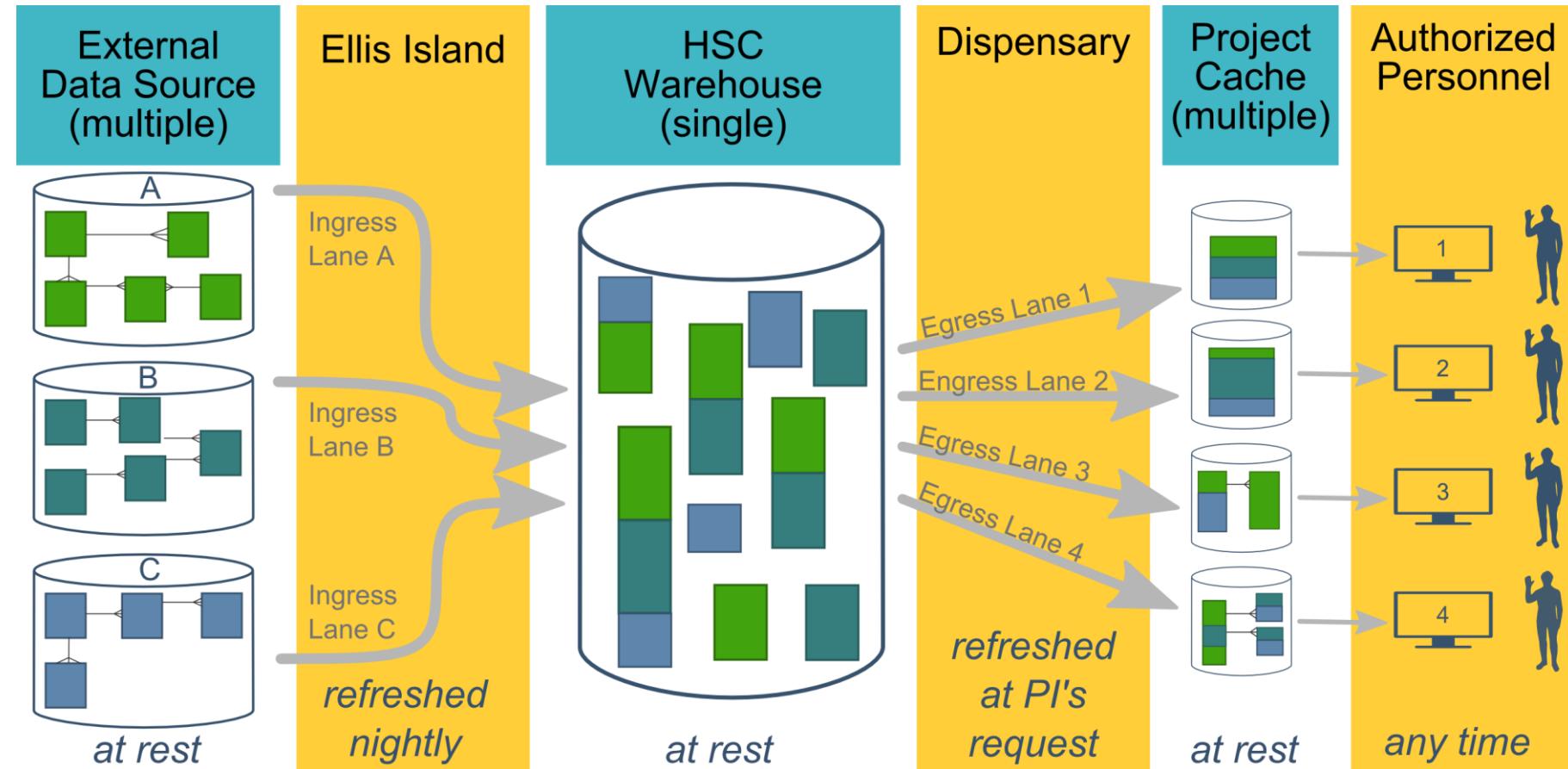
- **CDW**: Clinical Data Warehouse

A collection of databases (such as EMRs and project-specific datasets) that has been transformed to make research more efficient and complete

# Prairie Outpost – CDW (Clinical Data Warehouse)

<https://github.com/OuhscBbmc/prairie-outpost-public>

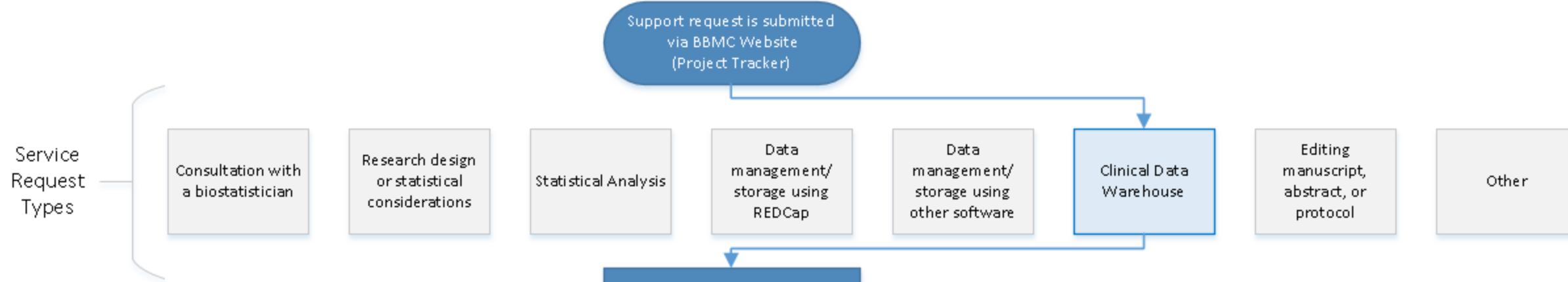
## Ecosystem Architecture



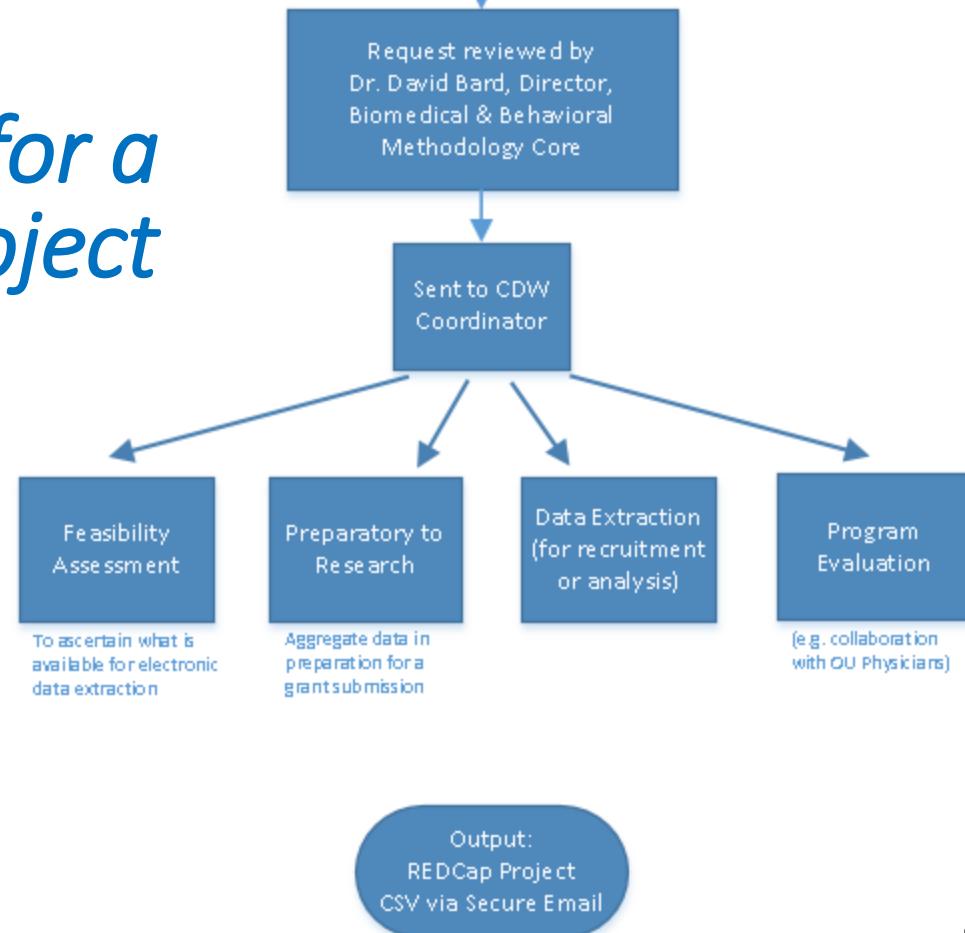
- **Data Source** (column 1): contains unique info
- **Warehouse** (column 3): contains copy after manipulation
- **Project Cache** (column 5): contains copy of copy after a lot of manipulation

# *HSC Data Sources*

- Patient
  - Outpatient (Centricity)
  - Billing and Claims Data
  - Inpatient (Meditech)
  - Dozens of departmental sources
  - Biomedical Research Data
  - Epic (in ~1 year)
- Provider
- External Agencies
  - Service Provided (by the Health Dept of Oklahoma)
  - Child Protective Services (Oklahoma Dept of Human Services)
  - Immunization (Health Dept of Oklahoma)
  - Vital Records (Health Dept of Oklahoma)
  - ...
  - Multi-state collaborations (in the future)
- Administrative Cost
- Employee & Student



## Typical Workflow for a CDW Research project by the BBMC



Submit a request at:  
[ouhsc.edu/bbmc/](http://ouhsc.edu/bbmc/)  
then 'Request Support'

# Clinical Trials & Other Research Studies Supported by the CDW

## since 2017; page 1

Short Name	PI	Department
Asthma Outcomes	M. Naifeh	Pediatrics
Pediatric Diabetic Ketoacidosis	M. Marin	Pediatrics
Anxiety & Depression Education	A. Bax	Pediatrics
Obesity in Foster Care	N. Torres-Garcia	Pediatrics
Posterior Cruciate Ligament Avulsions	S. Algan	Orthopedics
Avulsion Fractures (Tibia & Fibula)	S. Algan	Orthopedics
Avulsion Fractures (Femur)	S. Algan	Orthopedics
STI Screening	R. Leasure	Infectious Disease
Interstitial Cystitis Pain	L. Quiroz	Women's Health
Pharmacist-Led Care	T. Truong	Pharmacy
POPS	C. Allen	Pediatrics
NAMCS	S. Gillaspy	Pediatrics
Preschool Behavior	A. Bax	Pediatrics
Psychology Consults	S. Gillaspy	Pediatrics
Chronic Hypertension in Pregnancy	R. Edwards	Women's Health
High Blood Pressure in Children	N. Connolley	Pediatrics
Sickle Cell Disease Transition Program	A. Sinha	Pediatrics
Molecular Alterations in Brain Tumors	J. Battiste	Cancer Center
Pelvic Floor Disorders	L. Quiroz	Women's Health
Cancer Patient Navigation Program	J. Vidrine	Cancer Center
Medical Homes for Youth in Foster Care	S. Gillaspy	Pediatrics

Short Name	PI	Department
Subtalar Arthrodesis	A. Haleem	Orthopedics
Pulmonary Hypertension	H. Bhardwaj	Cardiovasular
Pelvis & Acetabulum Fractures	D. Teague	Orthopedics
Spica Casting	W. Puffinbarger	Orthopedics
Fragile X Syndrome	L. Ethridge	Pediatrics
Splinting with Side Struts	T. Lewis	Orthopedics
Humeral Fractures	D. Chong	Orthopedics
Child Trauma Services	E. Risch	Pediatrics
Humeral Fractures	D. Teague	Orthopedics
Asthma Population Management	D. Hahn	Pediatrics
Tobacco Exposure in Pediatrics	S. Gillaspy	Pediatrics
Utility of Chest X-Rays for Asthma in the ED	A. Bogie	Pediatrics
OxyContin Study	D. Hahn	Pediatrics
Transition of Care Clinic	T. Truong	Pharmacy
Lipid Screening	S. Gillaspy	Pediatrics
Sickle Cell Port Placement	A. Sinha	Pediatrics
Tranexamic Acid in Ankle Replacement	A. Haleem	Orthopedics
Newborn Metabolic Screenings	J. Lees	Pediatrics
Scapula Fractures	C. Pasque	Orthopedics
Adrenal Insufficiency	J. Lim	Endocrinology
Brain Metastases with Ovarian Cancer	J. Gillen	Cancer Center
Sever's Disease	S. Algan	Pediatrics

# Clinical Trials & Other Research Studies Supported by the CDW

## since 2017; page 2

Short Name	PI	Department
Brain Tumor Database	S. Sung	Cancer Center
Immunization Data Restructure	D. Bratzler	OUP
Off-Label Drug Use in Children	C. Allen	Pediatrics
Continuity of Care	P. Darden	Pediatrics
Prescribing Practices for Psychotropic Medications	S. Gillaspy	Pediatrics
Lactation Services for Diabetic Mothers	B. Mannel	Women's Health
Supplementation of LPI	J. Dilley	Women's Health
PCOS in Psoriasis	P. Allen	Dermatology
Assessment of Medication Problems	T. Truong	Pharmacy
Cancer Genetic Syndrome	J. Walker	Cancer Center
Maternal Depression Screening	M. Dunlap	Pediatrics
PROSpect Study	E. Henry	Pediatrics
Behavioral Health in the ED	R. Johnson	Pediatrics
Stem Cell Transplant Study	R. Shah	Pediatrics
Outcomes of Adalimumab in Colitis	J. Tung	Pediatrics
Mohs Surgery for High Risk cSCC	L. Collins	Dermatology
Electronic Cigarettes in Youth with Asthma	T. Wagener	Pediatrics
Vasoplegic Syndrome	C. Allen	Pediatrics
Patterns of Care Among Children with Cancer	A. Janitz	Epidemiology
Preoperative Airway Evaluation	D. Mann	ORL
Osteoporosis Prevention in Cancer Patients	J. Walker	Cancer Center

Short Name	PI	Department
Radial Neck Fractures	TR Lewis	Orthopedics
High Grade VAIN	K. Smith	Women's Health
E-Cigarette and Tobacco Use During Pregnancy	A. Cohn	Cancer Center
Analysis of C. Diff Toxins	P. Lang	Immunology
Inpatient Transition of Care Pharmacist	T. Truong	Pharmacy
Children with Medical Complexity	M. Akande	Pediatrics
Outcomes of Patients with Merkel Cell Carcinoma	C. Henson	Cancer Center
Glucocorticoid Receptor Antagonism in the Treatment of Cushing Syndrome	J. Lim	Endocrinology
Influenza A and Sialadenitis	R. Johnson	Pediatrics
Surgical Complications in Patients with Spinal Muscular Atrophy	Chong	Orthopedics
Tissue Eosinophil Count in IBD Patients	J. Tung	Pediatrics
Bone Health Study	S. Krishnan	Pediatrics
Association between Urinary Parameters and Urological Issues	A. Pal	Pediatrics
Synthetic Cartilage Implant vs Osteochondral Autologous Transfer for Advanced Hallux Rigidus	A. Haleem	Orthopedics
Outcomes of External Fixation with the Ilizarov Frame in Complex Ankle and Hindfoot Fusions	A. Haleem	Orthopedics
Effect of Surgical Treatment of Vesicoureteral Reflux on Stone Passage Rates	A. Rensing	Urology
Tobacco and Marijuana Exposure Among Youth	M. Naifeh	Pediatrics

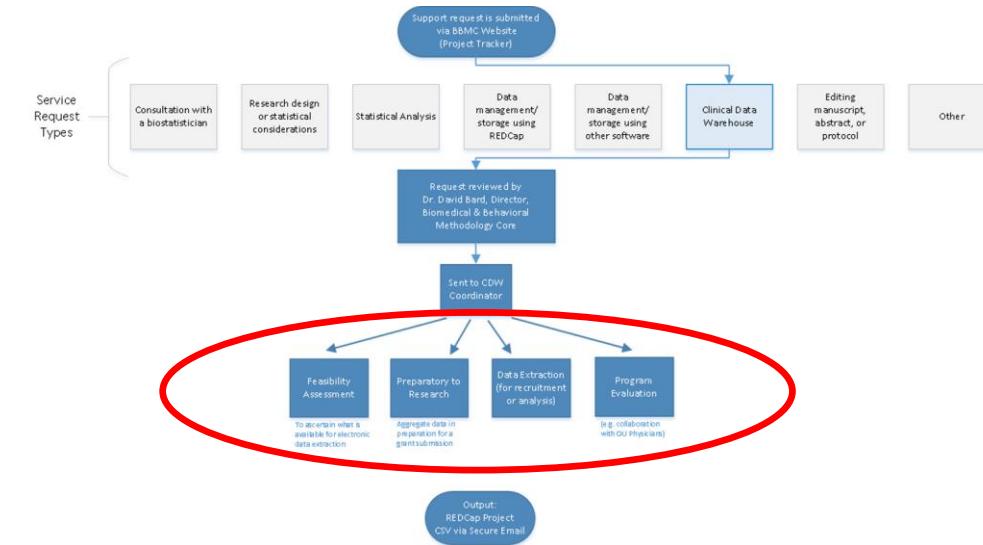
# *Clinical Trials & Other Research Studies Supported by the CDW*

## since 2017; page 3

Short Name	PI	Department
Hereditary thrombotic thrombocytopenic purpura (HTTP)	J. Journeycake	Pediatrics
Neonatal Venous Thromboembolism	J. Journeycake	Pediatrics
Evaluation of Hematologic Parameters in Patients on PARPi Therapy	K. Moore	Gyn Onc
Hip Fracture Repair	D. Teague	Orthopedics
Anterior Cruciate Ligament Reconstruction	S. Algan	Orthopedics
Bone-Grafting for Glenoid Deficiency	C. White	Orthopedics
Hospital Admission Rates for Children Living with Asthma	M. Akande	Pediatrics
Hearing Screens	J. Butcher	Pediatrics
Cesarean Scar Ectopic Pregnancy	H. Burks	Reproductive Medicine
Urologic Trauma Study	J. Furr	Urology
Oral Cavity Cancer	C. Henson	Cancer Center
Moberg Advancement Flap for Soft-Tissue Loss of the Thumb	T. Lehman	Orthopedics
Reduce Postoperative Hemorrhage	J. Sanclement	ORL
Anti-Incontinence Procedures	J. Furr	Urology
Acute Anosmia in Patients with COVID-19	G. Kremlpl	ORL
Cervical Spondylotic Myelopathy (CSM)	Z. Smith	Neurosurgery
Sellar and Parasellar Tumors	I. Dunn	Neurosurgery

# Commonly Requested CDW Support Services

- Feasibility assessment in preparation for research  
(20% of projects; 10% of CDW staff time)
- Static eligibility  
(70% of projects; 20% of CDW staff time)
  - Virtually all projects require identification of a patient pool
- Rolling eligibility  
(30% of projects; 30% of CDW staff time)
  - Remember study team's assessment of eligibility as well as the participant's response
  - Daily automation requires stability & good logging;  
e.g., a 3 hour delay might mean zero subjects are enrolled
- Clinical outcomes for retrospective investigations  
(50% of projects; 30% of CDW staff time)
- Administrative outcomes for quality improvement  
(10% of projects; 2% of CDW staff time)
- Program evaluation  
(20% of projects; 8% of CDW staff time)



# *IRB and Privacy Review Guidance*

- Requests that are preparatory to research must be submitted to the IRB/University Privacy Board for review and approval.
- Program Evaluation, CQI, & Feasibility Assessments:
  - If PHI is NOT included, it is generally not considered human subjects research.
  - A determination of human subjects research (DHSR) may be submitted to the IRB.
  - Aggregate data may be provided without an IRB submission.
- The following activities are NOT human subjects research:
  - Classroom evaluation activities when assessment involves regular classroom activities and the results of the evaluation process are intended to be used for the sole purpose of enhancing teaching practices of the instructor
  - Quality improvement activities designed to enhance functionality of a department or campus program provided that results are not intended to be shared outside of the University
  - Program evaluations
  - Public health practice surveillance activities

# *POPS Study*

Pharmacokinetics of Understudied Drugs Administered to Children per Standard of Care

# POPS Overview

- Primary Aim: Evaluate PK of understudied drugs administered to children
- Part of Oklahoma Pediatric Clinical Trial Network (OPCTN), a site for the NIH-funded ECHO IDeA States Pediatric Clinical Trials Network (ISPCTN)
- Enrollment Criteria:
  - Child receiving understudied drug of interest (DOIs) per standard of care
  - meet age range or condition (pre-term, obese, ECMO) open for enrollment.

C	D	E	F	Target Ages								N ≤ 20 years <sup>3</sup>	O
				Pre-term	<1 mo	1-5 mos	6-11 mos	1 Yr	2-4 Yrs	5-8 Yrs	2-12 Yrs	13-16 Yrs	17-20 Yrs
1	Drug of Interest (DOI)												
2													
3													
4	alfentanil (IV) <sup>16</sup>				X	X	X	X	X	Closed	Closed		X X
5	amikacin <sup>5</sup>	X			X	X	X	X	X	X	X	X	X
6	atropine (IV) <sup>14</sup>				X	X	X	X	X	X	X	X	X
7	cefepime <sup>5</sup>	X			X	X	X	X	X	X	X	X	X
8	ceftazidime												X X
9	cidofovir												X
10	ciprofloxacin												X
11	clozapine <sup>4</sup>				X	X	X	X	X	X	X	X	X
12	dexmedetomidine <sup>13</sup>				Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	X X X
13	diazepam												X
14	etomidate <sup>2,14</sup>				X	X	X	X	X	X			X X
15	fosphenytoin												X
16	haloperidol <sup>4</sup>				X	X	X	X	X	X	X	X	X X
17	heparin (low molecular weight) <sup>8</sup>				X	Closed	Closed	Closed	Closed	Closed	Closed	Closed	X X
18	hydromorphone <sup>15,16</sup>				Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	X X
19	lidocaine (IV)				X	X	X	X	X	X	X	X	X X
20	lorazepam <sup>4</sup>				X	X	X	X	X	X	X	X	X X
21	meropenem (IV) <sup>2,5</sup>	X			X	X	X	X	X				
	methylprednisolone <sup>11</sup> (See special)												
	1. Age ≤ 30 days on the day of surgery												

# *Resource Efficiency:* fewer patients, quicker review, less redundancy

## Old System

### **2019-01-12 Inpatient Extract**

- Finds patients who received a drug of interest
- 109 unique patients
- Record review: ~15 min/pt
- ~1,635 minutes

### **2019-01-13 Inpatient Extract**

- 112 unique patients @15 min/pt  
*(forgets yesterday)*

## New System

### **2019-01-12 Inpatient Screening Report**

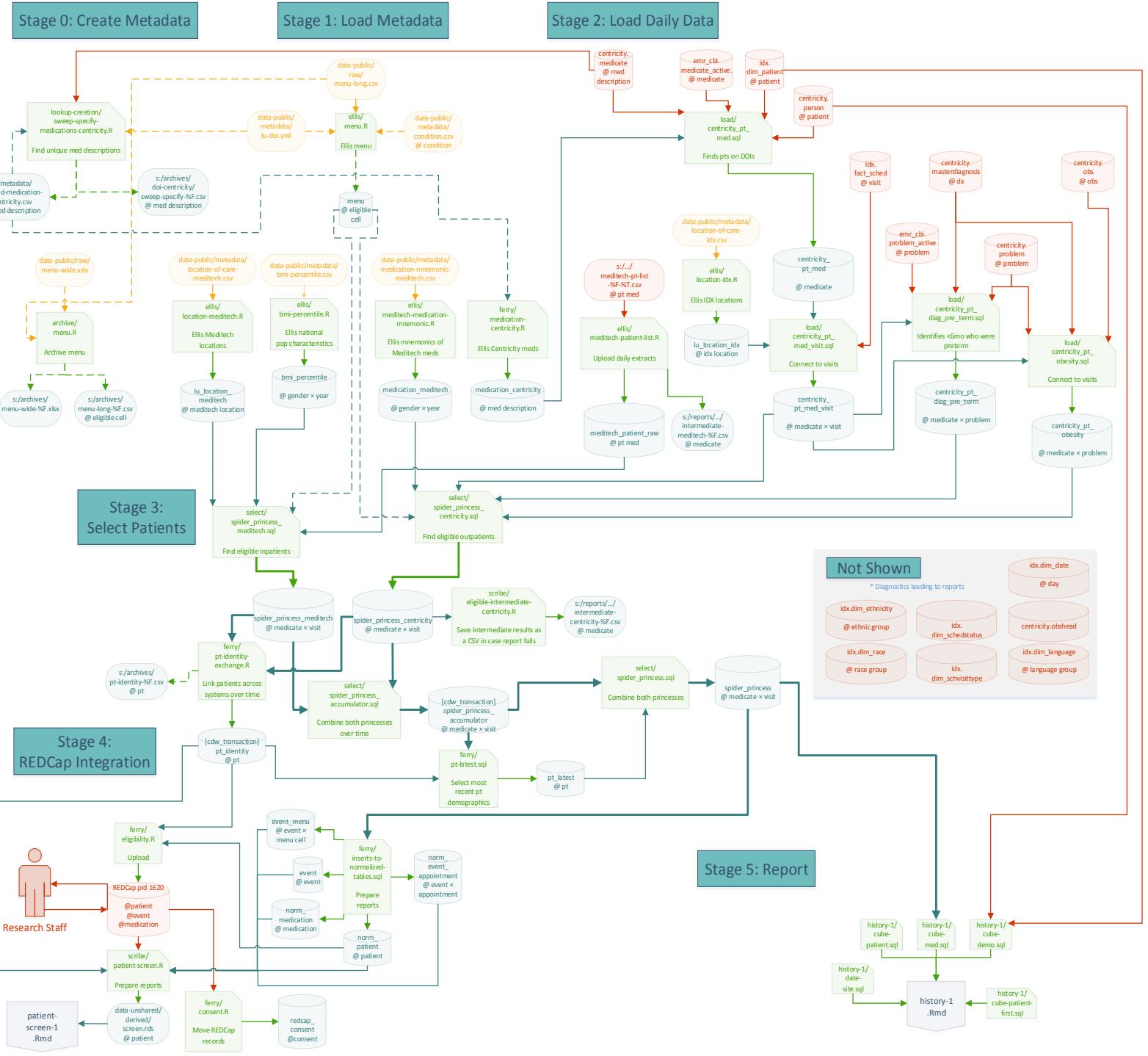
- Finds patients who received a drug of interest *and meet an age range or condition currently open for enrollment*
- 31 unique patients
- Record review: ~5 min/pt
- ~155 minutes

### **2019-01-13 Inpatient Screening Report**

- 6 new patients @5 min/pt  
*(remembers yesterday)*

# Enrollment Rate by Institution

ISPCTN Sites	Total # enrolled since activation	Months since activation	Average enrollment per month
Alaska Native Medical Center	2	13	0.15
Children's Mercy Hospitals and Clinics	19	11	1.73
Dartmouth-Hitchcock Medical Center	8	6	1.33
Kapiolani Women's and Children's Medical Center	9	8	1.13
Oklahoma University Medical Center	59	7	8.43
Rhode Island Hospital	46	11	4.18
Tulane University Health Science Center	4	14	0.29
University of Kansas Medical Center	2	2	1.00
University of Mississippi Medical Center	16	9	1.78
University of Montana	12	10	1.20
University of Nebraska Medical Center	14	12	1.17
University of New Mexico, Health Sciences Center	15	15	1.00
University of South Carolina - Palmetto Health	19	14	1.36
University of Vermont Medical Center	2	9	0.22
West Virginia University Hospital	9	13	0.69
Alfred I. duPont Hospital for Children	150	68	2.21
Arkansas Children's Hospital Research Institute	69	91	0.76
Medical University of South Carolina Children's Hospital	90	82	1.10
University of Louisville Norton Children's Hospital	138	89	1.55



# *Collapsing/Standardizing Med Instructions*

- Use regular expressions to match free-text, and replaces with a ‘better’ value.
    - Correct misspellings
    - Remove junk
    - Standardize format  
(eg, space between `5mg`)
    - Standardize term  
(eg, `cap`, `caps`, & `capsule` to capsules`)
    - Remove info irrelevant to eligibility below the red line  
(eg, `1mg` and `2mg` becomes `X mg`)
  - Reduces 130k entries to 46k

pattern	replace
[ ]{2,}	
(\b \d)(mins?)(\.\. \b)	minute
(\b \d)(hr hrs hours)(\.\. \b)	hour
\bdays\b	day
(\b \d)(wks wk)(\.\. \b)	week
(\b \d)(amt amout)(\.\. \b)	amount
(\d+)\bs*(\d)	\1 \2
(\d+)\bs*(grams? gm gr g ml mls ...)	\1 \2
(.*\bx)\bs*(\d)(.*)	\1 \2\3
\b(a p)\.m\.	\1m
\bpm\.\.	po
\bmg\.	mg
\b(1 1/2 1 and 1/2)\b	1.5
\b2 1/2\b	2.5
\b(tabs? tablet)(\.\. \b)	tablets
\b(caps? capsule)(\.\. \b)	capsules
\b[Oo]ne\b	1
\btwo\b	2
\bthree\b	3
\bfourth\b	4

pattern	replace
\b(scan test mri)\b	procedure
\b(prior to prior)\b	before
\b(remove)\b	removal
\b(catheter)\b	cath
@	at
^(takes? apply use instill give pu...)	
^(+ \s*)	
(takes? please her his the affect...)	
[^\wedge\&\~\.\*\`\\(\)]+	
\b(small large excess generous ...)	
\b(into about above across after ...)	
\b(swish and swallow swish in m...)	swish
\b(per )?(as needed if needed twi...)	
\b(per )?(q?am q?pm morning nig...)	
\b\d+\b	X
X?\.\.X	X
\b((X ?)+X (X ? & ?)+X (X ?- ?)+X (...)	X
\b((X ?)+X (X ? & ?)+X (X ?- ?)+X (...)	X
\b(monday mon tuesday tues tue...)	D
\b((D ?)+D (D ? & ?)+D (D ?- ?)+D ...)	D
\b((D ?)+D (D ? & ?)+D (D ?- ?)+D ...)	D
X? per [Dd]	
per\$	
(.+\\w{3,})(. \\.{1,2})\$	\\1
\\s{2,}	
(^\\s+ \\s+\$)	

# *Screening Reports (for outpatients)*

- Shows upcoming appointments of potentially eligible patients
  - Location of care
  - Appt Date & time
  - Qualifying medication (e.g., Diazepam)
  - Qualifying condition (e.g., obese, 24 months old)
  - Similar inpatient process was developed
- Eligible Patients for POPS

2 Eligible Patients

2.1 NICU    2.2 PICU    2.3 Inpatient    2.4 Unknown/Unclassified    2.5 Outpatient

mrn centricity	name	dob	age	gender	appointments upcoming	med 01	med 02	med 03
1 9007729	Glenna, Tillman Hunt	1999- 05-20	19y 0m	male	1. 2019-01-16 09:15 BLUE CLINIC	DIAZEPAM TABLET, --; --		

2 9003686	Faith, Clifton Lewis	2002- 04-28	16y 0m	male	1. 2019-01-16 09:30 RESIDENT CLINIC WP MENTAL HEALTH	GEODON 20 MG ORAL CAPSULE; take one capsule by mouth in am; -- q hs; --	GEODON 80 MG ORAL CAPSULE; One cap po q hs; --
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(Simulated patients)

# Screening Report (for inpatients)

Hyperlinks to REDCap

## 2 Eligible Patients

2.1 NICU

2.2 PICU

2.3 Inpatient

2.4 Unknown/Unclassified

2.5 Outpatient

	mrn meditech	days since consent	name	dob	age	gender	bed	med 01	med 02	med 03
1	F10000077259	-	Fletcher, Oswald Victoria	2018- 10-28	3y 10m	male	NICUE: 7156-A	VANCOMYCIN HCL 5 MG/ML ML; Q6H; intravenous		
(Simulated patients)										
2	F10000035896	-	Volney, Charlotta Davie	2018- 09-05	4y 2m	male	NICUE: 7156-B	VANCOMYCIN HCL 5 MG/ML ML; Q6H; intravenous		
3	F10000012921	-	Johannah, Orrie Romeo	2019- 01-26	3y 1m	male	NICUW: 7124-D	AMIKACIN SULFATE 10 MG/ML ML; Q36H; intravenous		
4	F10000002145	-	Lula, Jessica Tone	2019- 03-12	3y 6m	female	NICUW: 7126-A	AMIKACIN SULFATE 10 MG/ML ML; Q48H		

Consent stop watch

Filter, search, & sort

# REDCap Project

Days since consent  View equation

Days since the previous consent  View equation

This repeated consent is not necessary. A consent is valid for a period of 90 days.

Has the patient been approached to participate in this study?

Yes  
 No

Time Constraint  
 Incorrect Location  
 Unable to Collect Required Specimen  
 Ineligible per Manual Chart Review  
 Other

Why has the patient not been approached?

If 'other', please explain.

Consent result

Accepted  
 Declined  
 Deferred (patient is willing to discuss participation in the future, but has not accepted yet)

Warning: Documenting 'declination' of consent will permanently remove this patient from the daily eligibility reports.

Reason for Declination of Consent

Date of Consent  Today Y-M-D

Age at date of consent  View equation

Assent Result

Accepted  
 Declined  
 Unable to Assent

Warning: Documenting 'declination' of assent will permanently remove this patient from the daily eligibility reports.

Reason Assent Not Given

Date of Assent  Today Y-M-D

Approached?

Consented?

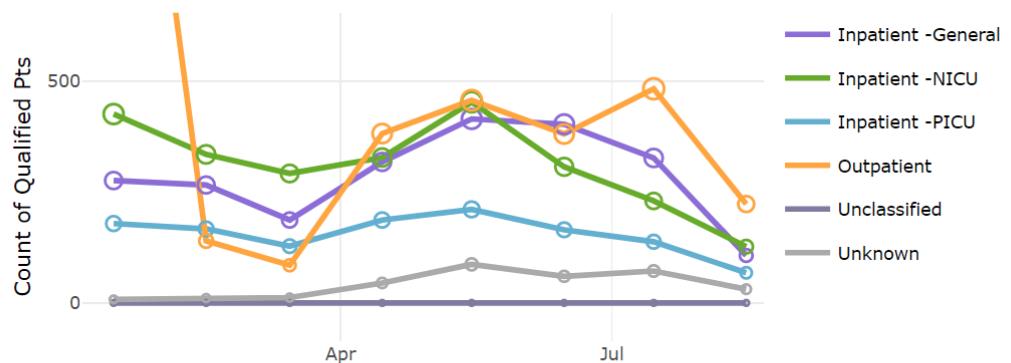
Assented?

# Progress Reports

## 2 Activity By Stage

2.1 Patients Qualified    2.2 Patients Approached    2.3 Patient Consents    2.4 Patient Assents

Daily count of patients qualified by the POPS team by their site.



# *Progress Reports*

## 3 Activity By Site

#### Summary of screening and recruitment activities by site.

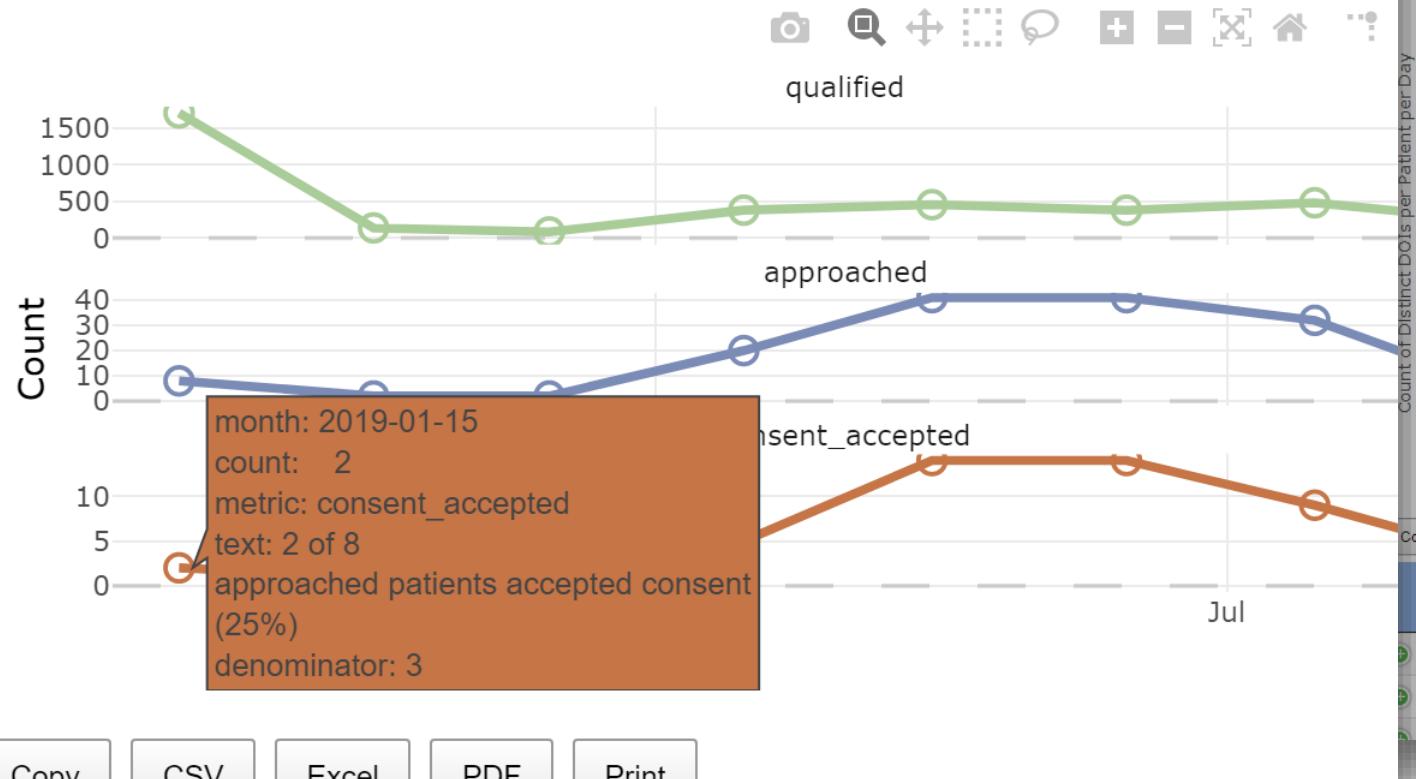
### 3.1 General

## 3.2 NICU

### 3.3 PICU

### 3.4 Outpatient

Daily count of patients qualified by the POPS team by their site.



6 DOI

6.1 Overall

The DOI per day is calculated by (a) counting the orders of a DOI and then (b) dividing by the daily count of unique patients. Since a patient may receive more than one DOI order on a single day, the DOI percentages will exceed 100%.

The histogram represents 'Sum of Daily Medication Counts': (out of 34,867 total medication-days across 237 days). Sum of Daily Medication Counts'. The uniqueness of the DOI is considered; a patient eligible for three variations of the same DOI will lengthen the bar by only 1.

The spaghetti represents the count of each DOI during a given day.



# CDW Strategy: don't overbuild

- Some studies don't require a full reporting solution
  - Scenario 1: big study already has an established tracking pipeline
  - Scenario 2: small study has a tight focus;  
2 part-time nurses can review the ~3 patients each morning
- If only a CSV of daily patients is required, we can deliver within 2-10 man-hours.
- This includes:
  - Pulling fresh info from inpatient & outpatient EMRs
  - Saving a CSV each morning to a file server
  - Logging of pipeline steps to a protected text files to facilitate quick diagnoses & fixes

# CDW Strategy: a good framework

- Permits fewer SQL & R files per study
- Permits re-use of metaphors & patterns across studies
  - Easier for us to develop & maintain
  - Easier for investigators in subsequent projects
  - Lessons from one project benefits subsequent projects

## 1 Summary

- 2 Spaghetti of Row Counts
- 3 Spaghetti of Delay
- 4 Recent
- 5 Complete
- 6 Stream
- 7 Code
- 8 Session Information

# CDW Monitor

Date: 2019-08-18

The row counts (of relevant tables) are displayed longitudinally.

## 1 Summary

1.1 Notes

1.2 Explanation of Report

1.3 Table Specification Check

1. The current report covers 68 distinct tables between 2019-06-19 and 2019-08-18.

## 2 Spaghetti of Row Counts

Row counts over time are plotted separately for each location, source, & table. Sundays are marked by gray vertical lines.

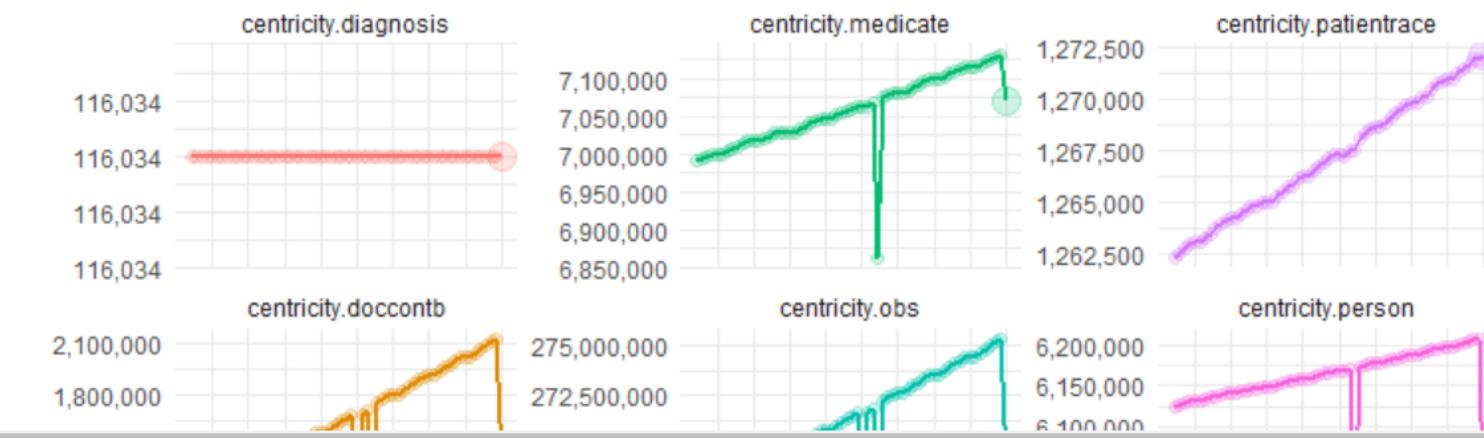
2.1 Warehouse

2.2 Waystation - Centricity

2.3 Waystation - IDX

2.4 Source - Centricity

2.5 Source - IDX



4 Recent

These location-specific tables display one row per source and table, and compares the current row count against the previous row count. The timezone is CDT (*i.e.*, UTC -0500).

4.1 Warehouse		4.2 Waystation - Centricity		4.3 Waystation - IDX		4.4 Source - Centricity		4.5 Source - IDX	
source	table name	gain percent	gain raw	row count current	row count previous	date max	date delay		
centricity	document	-1.89%	-843,851	43,871,137	44,714,988	2019-06-30	49		
centricity	insuranc	-2.63%	-649,727	24,100,884	24,750,611	2019-08-13	5		
centricity	medicate	-2.61%	-138,093	5,162,157	5,300,250	2019-08-01	17		
centricity	obs	-2.20%	-6,024,862	268,431,443	274,456,305	2019-08-09	9		
centricity	obshead	0.00%	0	113,264	113,264	NA	NA		
centricity	orders	-2.68%	-288,656	10,496,883	10,785,539	2019-08-18	0		
centricity	patientethnicity	0.01%	60	1,084,565	1,084,505	NA	NA		
centricity	patienttrace	0.02%	261	1,272,129	1,271,868	NA	NA		
centricity	person	-3.28%	-203,341	6,004,047	6,207,388	2019-06-26	53		
centricity	problem	-2.50%	-106,297	4,138,468	4,244,765	2019-08-13			

# VDORA Study

Vitamin D Supplementation in Children With Obesity-Related Asthma

# Success Story of Rapid Deployment

- An ECHO-funded study team was unsuccessfully recruiting subjects.
  - Manually previewing patient charts (3-4 hours to do properly)
  - Relying on MDs to confirm eligibility prior to appt
- OSCTR suggested leveraging the CDW.
- Daily pt list was being delivered within three days (and 10 man hours).
- This would not be possible without the lessons & framework built for POPS

# appt.csv

mrn	name	dob	age_years	city	zip	distance_in_miles	date_last_office_visit	date_last_bmi	bmi_percentile	appt_duration	provider_name	visit_type	appt_date_time	
1234567	a, Amelia	1/1/2010	7	OKLAHOMA CITY	73104	52.91793823	11/11/2011	11/11/2011	98	30	KATZ MD,ROBERT W	RETURN VISIT	Jun 10 2019 2:30PM	
2345678	B, Milo	1/2/2010	8	TULSA	74105	112.3245316	6/6/2018	12/12/2018	87	30	DORRIS PA,JANISLYNN	RETURN VISIT	Jun 28 2019 9:15AM	
3456789	C, Isla	1/3/2010	9	OKLAHOMA CITY	73104	8.626083374	1/1/2019	1/22/2019	87	30	DORRIS PA,JANISLYNN	RETURN VISIT	Jun 6 2019 12:45PM	
4567890	D, Jasper	1/4/2010	10	TULSA	74105	20.26898193	11/11/2018	11/11/2018	99	30	MEHDI MD,NIGHAT	RETURN VISIT	Jun 17 2019 1:45PM	
5678901	E, Cora	1/5/2010	11	OKLAHOMA CITY	73104	NA		4/24/2019	4/24/2019	86	30	DORRIS PA,JANISLYNN	RETURN VISIT	Jun 22 2019 10:15AM
6789012	F, Asher	1/6/2010	12	TULSA	74105	19.1277132		4/19/2019	4/19/2019	91	30	MCCRABB APRN CNP, TIFFANY J	RETURN VISIT	Jun 24 2019 2:45PM
7890123	G, Charlotte	1/7/2010	13	OKLAHOMA CITY	73104	3.259526253		2/7/2019	2/7/2019	94	30	DORRIS PA,JANISLYNN	RETURN VISIT	Jun 8 2019 10:15AM
8901234	H, Henry	1/8/2010	14	TULSA	74105	8.123344421		12/12/2018	6/26/2016	87	30	DORRIS PA,JANISLYNN	RETURN VISIT	Jun 27 2019 12:45PM
9012345	I, Iris	1/9/2010	15	OKLAHOMA CITY	73104	89.85191917		5/7/2019	4/27/2019	100	30	BUTLER RD,DANIELLE J	NEW VISIT	Jun 14 2019 3:00PM

(Simulated patients)

# VDORA: Vitamin D Supplementation in Children With Obesity-Related Asthma

- Objective: Determine PK of Vitamin D supplementation in children who have asthma and are overweight or obese.
- Part of the Oklahoma Pediatric Clinical Trial Network (OPCTN), a site for the NIH-funded ECHO IDeA States Pediatric Clinical Trials Network (ISPCTN).
- Enrollment Criteria:
  - child ages 6 – 17; diagnosis of asthma; documentation of obesity; meet additional inclusion criteria such as ‘an ability to swallow pills’.
- Precalculated “distance from residence to clinic” is displayed
  - Subjects have to comply with frequent trips to the clinic

# Resource Efficiency: fewer patients, quicker review, less redundancy

## Manual Screening Process

- Obtain a list of appointments scheduled the following week
- Review **each** medical record using the inclusion/exclusion checklist:
  - Other criteria
  - Age
  - Diagnosis of asthma
  - Documentation of obesity
- Email providers for review/input
- Volume: 130 charts
- Time: 240 minutes

## Automated Screening Process

- Review **select** medical records for:
  - Other criteria
- Email providers for review/input
- Volume: 24 charts (screened out 106)
- Time: 45 minutes

# *Akande-medically-complex-1*

Access to Primary Care and its Impact on Hospital and ICU Admission for Children with Medical Complexity

# Complex and/or Chronic

- Review combinations of dx seen with a patient to determine
  - Complex? (*ie*, multiple systems)
  - Chronic? (*eg*, long- vs short-term)
- Use classification systems to simplify the 100k distinct dx codes
- Profile of patients inform how clinics can be structured
- Complex patients can be identified in the EMR  
(but this is outside the CDW mission)

dx_id	pt_index	dx	dx_vocabulary	icd_description
1	101	H54.51	icd-10	Low vision, right eye, norma...
3	101	Z00.129	icd-10	Encounter for routine child ...
7	102	L20.9	icd-10	Atopic dermatitis, unspecifi...
9	102	Z00.129	icd-10	Encounter for routine child ...
13	103	R01.0	icd-10	Benign and innocent cardiac ...
23	104	G40.209	icd-10	Localization-related (focal)...
27	105	H69.80	icd-10	Other specified disorders of...
28	105	H72.00	icd-10	Central perforation of tympa...
29	105	H90.2	icd-10	Conductive hearing loss, uns...
31	106	J06.9	icd-10	Acute upper respiratory infec...
32	106	S42.402	icd-10	Unspecified fracture of lower...
56	107	B97.89	icd-10	Other viral agents as the ca...
57	107	H60.399	icd-10	Other infective otitis exter...
58	107	H66.90	icd-10	Otitis media, unspecified, u...
59	107	H92.09	icd-10	Otalgia, unspecified ear
60	107	J01.90	icd-10	Acute sinusitis, unspecified
61	107	J02.9	icd-10	Acute pharyngitis, unspecific...
62	107	J06.9	icd-10	Acute upper respiratory infec...
63	107	J30.9	icd-10	Allergic rhinitis, unspecified
64	107	J45.901	icd-10	Unspecified asthma with (acute)
65	107	J45.909	icd-10	Unspecified asthma, uncompli...
66	107	K59.00	icd-10	Constipation, unspecified

akande-medically-complex-1

pt_index	condition	cardiac	cranio	derm	endo	gastro	genetic	genito	hemato	immuno	malign	metab	musculo	neuro
1	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Non-complex Chronic	0	0	0	0	0	0	0	0	0	0	0	1	0
6	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Non-complex Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Non-complex Chronic	0	0	0	0	0	0	0	0	0	0	0	0	1
9	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Non-Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Non-complex Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Complex Chronic	0	0	0	0	0	0	0	0	0	0	0	0	1
13	Non-complex Chronic	0	0	0	1	0	0	0	0	0	0	0	0	0

# Automated Scripts

- project-specific tasks that run repeatedly

(Aside from the formal CDW pipeline that occurs on the database server).

- The output is directed to locations accessible only to the study team

Name	Status	Triggers	Next Run Time
beasley-covi...	Ready	At 9:15 AM every day	6/24/2020 9:15:41 AM
butcher-hea...	Ready	At 9:07 AM every day	6/24/2020 9:07:22 AM
cdw-file-dist...	Ready	At 11:55 PM every day - After triggered, repeat every 15 minutes for a duration of 1 day.	6/23/2020 3:10:19 PM
cdw-health	Ready	At 8:50 AM every day - After triggered, repeat every 1 hour for a duration of 12 hours.	6/23/2020 3:50:00 PM
clawson-ast...	Ready	At 9:07 AM every day	6/24/2020 9:07:00 AM
cohn-tobac...	Ready	At 9:08 AM every day	6/24/2020 9:08:22 AM
darden-cont...	Ready	At 9:20 AM every day	6/24/2020 9:20:00 AM
darden-phar...	Ready	Multiple triggers defined	6/24/2020 1:03:00 AM
darden-sche...	Ready	At 10:01 AM every day - After triggered, repeat every 30 minutes for a duration of 12 ...	6/23/2020 3:31:30 PM
henry-intub...	Ready	At 12:45 AM every day	6/24/2020 12:45:03 AM
krishnan-bo...	Ready	At 9:08 AM every day	6/24/2020 9:08:00 AM
mehdi-vdor...	Ready	At 9:06 AM every day	6/24/2020 9:06:00 AM
sinha-sickle-...	Ready	At 9:17 AM every day	6/24/2020 9:17:00 AM
start-outlook	Disabled	At 12:30 AM every day	6/24/2020 12:30:10 AM
tfcbt-shiny	Ready	At 11:00 PM every day - After triggered, repeat every 10 minutes for a duration of 1 day.	6/23/2020 3:10:00 PM
tzkun-server	Ready	At 1:47 PM every day - After triggered, repeat every 15 minutes for a duration of 1 day.	6/23/2020 2:17:54 PM

# A variety of categorization systems are available

- In theory, most concepts in an EMR can be categorized.
  - dxs are the cleanest
  - procedures & meds are feasible
  - pt histories are tricky
  - labs are the worst
- 10+ dx categorization schemes are published. Choose the one(s) best suited for your population and hypothesis

ICD-10-CM	ICD-10-CM Code Description	CCSR Category	CCSR Category Description
A000	Cholera due to Vibrio cholerae O1	DIG001	Intestinal infection
A000	Cholera due to Vibrio cholerae O139	INF003	Bacterial infections
A001	Cholera due to Vibrio cholerae O1	DIG001	Intestinal infection
A001	Cholera due to Vibrio cholerae O139	INF003	Bacterial infections
A009	Cholera, unspecified	DIG001	Intestinal infection
A009	Cholera, unspecified	INF003	Bacterial infections
A0100	Typhoid fever, unspecified	DIG001	Intestinal infection
A0100	Typhoid fever, unspecified	INF003	Bacterial infections
A0101	Typhoid meningitis	INF003	Bacterial infections
A0101	Typhoid meningitis	NVS001	Meningitis
A0102	Typhoid fever with heart involvement	INF003	Bacterial infections
A0103	Typhoid pneumonia	INF003	Bacterial infections
A0103	Typhoid pneumonia	RSP002	Pneumonia (except those due to typhoid)
A0104	Typhoid arthritis	INF003	Bacterial infections
A0104	Typhoid arthritis	MUS001	Infective arthritis

# *Tung-ibd-1*

Tissue Eosinophil Count in IBD patients

# Steps to Leverage EMR “documents”

## CDW-level tasks

- (Notes are stored as multiple rows --2k characters per “document”)
- Concatenate the 2-4,000 rows per document
- Strip the RTF.  
(RTF is a markup language that specifies cosmetics like font size and color.)
- Include a search index (similar to a book index) that makes searches & parsing more efficient

## Project-specific tasks

- Identify keywords that might indicate the document contains a relevant lab.
- Extract the **stem** and **result**
  - eg, “**normal fecal flora** (moderate growth)”
  - eg, “**negative** for **salmonella**, **shigella**, and **campylobacter**”

*National Registry Example:  
COVID-19 CDW Registry  
Based on OMOP*

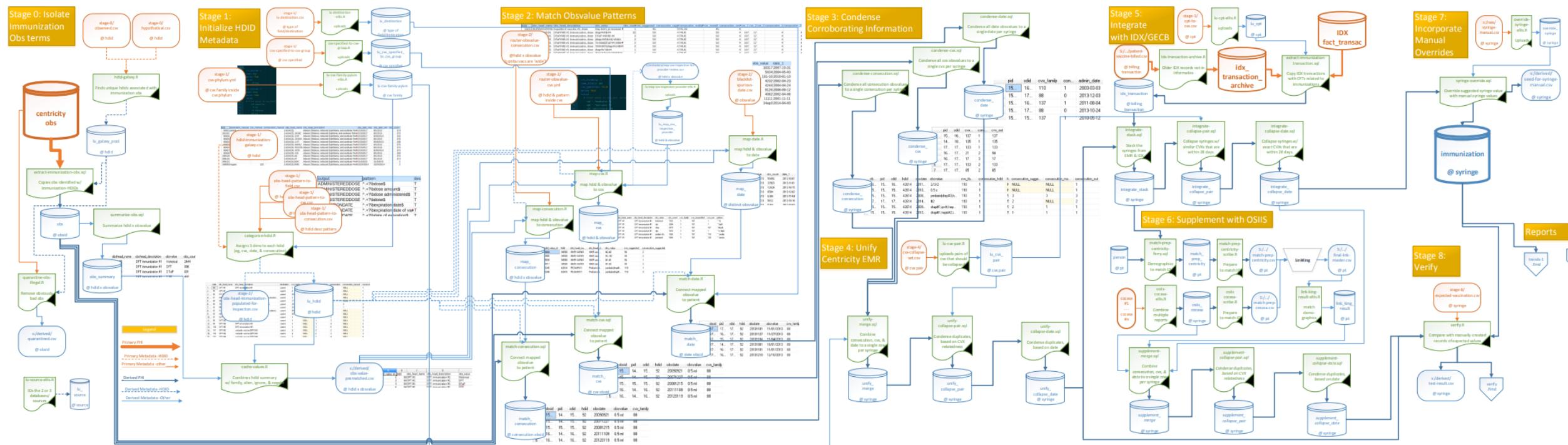
# *National Registry*

- Institutions from 11 states combine covid data from their EMRs
- There's a national movement for investigations to be informed by multiple sites/institutions. Every research study and institution collects their data differently.
- A CDM (common data model) is a standardized convention to store & describe data. Institutions extract and transform their EMR data

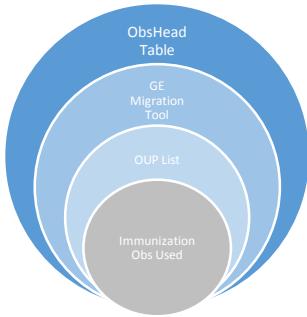
# *Immunization Project*

The goal of this project is to reorganize roughly 1 million vaccinations currently recorded in the GE Centricity EMR OBS table so those records may be transitioned to the new Immunization table.

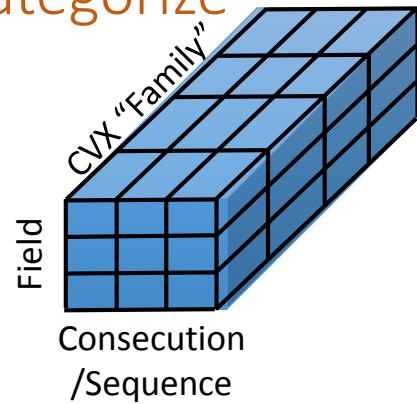
## *Flow Diagram*



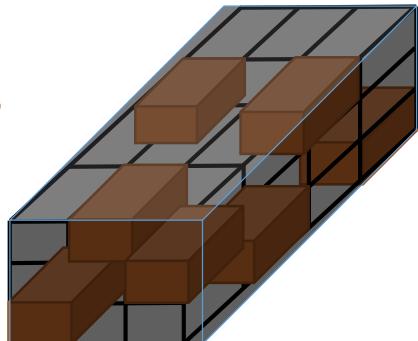
Stage 0: Isolate immunization hdids/obs terms



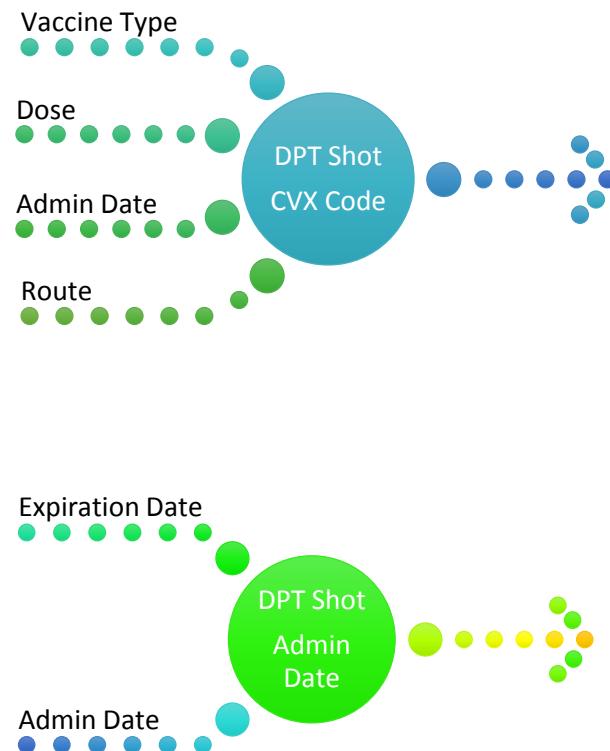
Stage 1: Categorize HDID/Obs



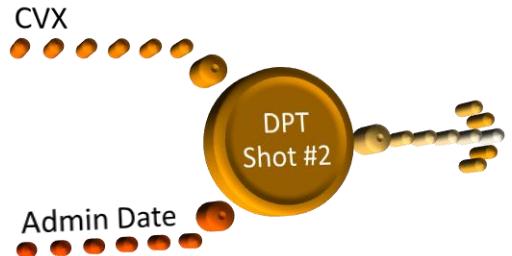
Stage 2: Categorize value *within* hdid/obs



Stage 3:  
Condense to one row per administration



Stage 4: Unify



Stage 5: Incorporate Billing

Stage 6: Incorporate Health Dept

Stage 7: Incorporate manual overrides

Stage 8: Verify against expectations



# *Immunization Scope*

- 1,000,000 syringes
- ~100 vaccine types
- 10+ years
- 70+ clinics

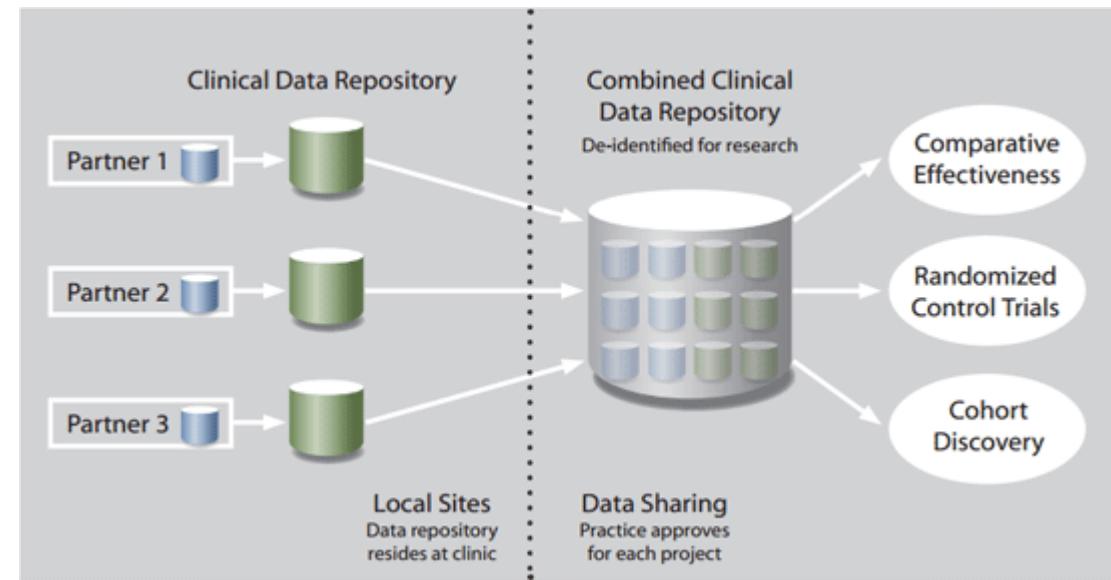
# *Brief Summary of CDW Value*

# *Brief Summary of CDW Value*

- POPS: dynamic recruitment
- OxyContin: electronic sorting and merging/patient matching
- ADHD studies: Apply standard clinical vocabulary to support interoperability to help information exchange; isolated retrieval of text documents for mining
- Diabetes Management/Transition of Care: Sharing of data across various sources improves quality of care and efficiency; maximizes utility of data
- Immunization: Harmonization of records for quality reporting and improved accuracy of record history

# Where Other Universities are Headed

- University of Washington:
  - Data Quest (<https://dataquest.iths.org/>)
  - Leaf- Integrates of Regulatory Oversight with Data Accession
    - De-identified prep to research
    - PHI access
- TriNetX
  - Attract Industry-Sponsored Trials
  - Peer-institution Collaborations
- University of Michigan
  - EMERSE (Electronic Medical Records Search Engine; <http://project-emerse.org/>)
    - Google for your free text EMR documents and notes
    - Similar to natural language processing (NLP)





## About LEAF

- Self-service web application for querying and extracting clinical data
- Flexible biomedical concept system to define hierarchical items and ontologies
- Drag & drop user interface
- Designed to seamlessly integrate with existing enterprise user authentication systems and clinical databases
- Produces results which are identifiable (with IRB approval) or de-identified

## Potential Uses

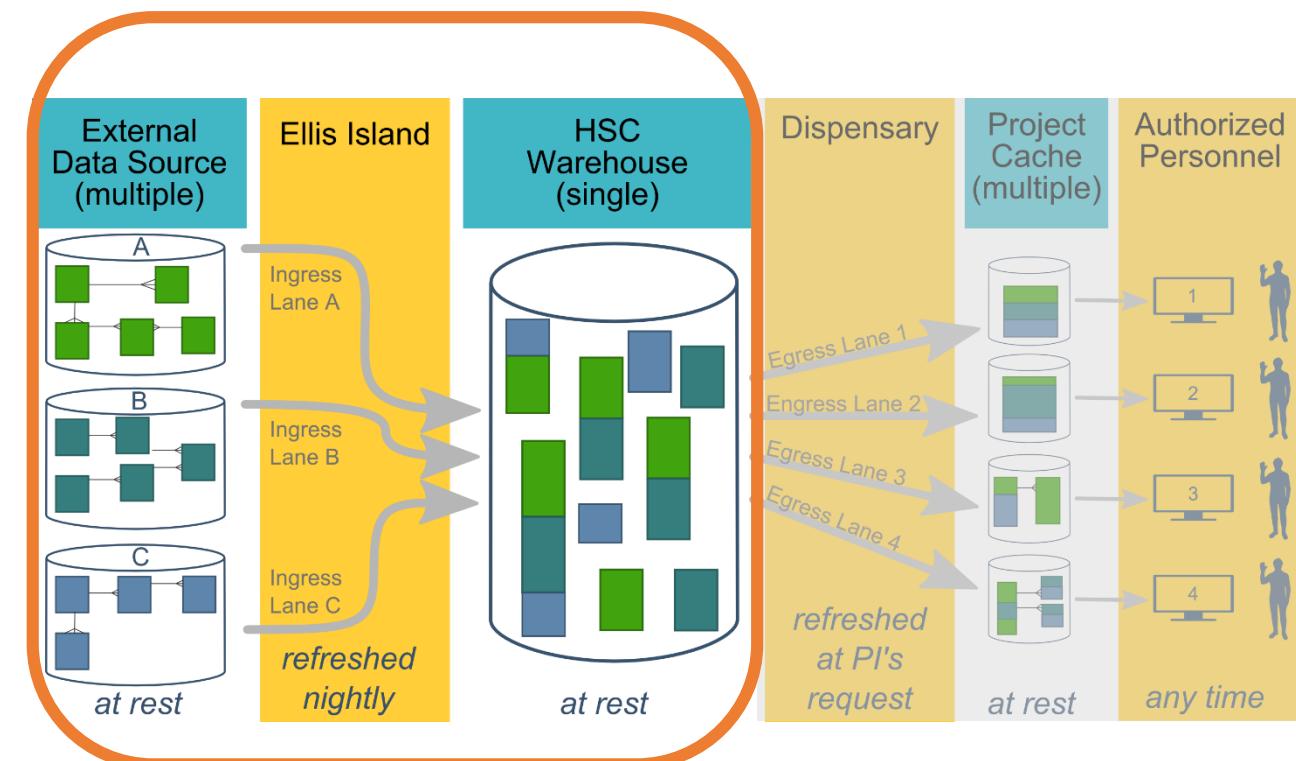
- Cohort discovery: determine if enough patients meet a given set of conditions which match recruitment criteria
- Statistics: quickly pull numbers, “How many patients were seen last month?”
- Chart Abstraction: Generate a dataset for research or quality improvement purposes

<https://www.iths.org/>

# Current Developments: Common Campus-wide Warehouse

A tighter collaboration with

- IT
- BBMC
- OU Physicians
- Hospital



# Starting a CDW Project

Submit a request at <https://ouhsc.edu/bbmc/>, then click “Request Support”

Please complete the form and a representative will contact you soon.  
Thank you!

Date of request: Click now.  
\* must provide value

Project Title  
\* must provide value

Do you have any deadlines regarding this request?  
 Yes  
 No

Primary Contact Information

Primary Contact: First Name  
\* must provide value

Primary Contact: Last Name  
\* must provide value

Primary Contact: Phone Number  
\* must provide value  
(555) 123-4567 ext89012

Primary Contact: E-Mail Address  
\* must provide value

Principal Investigator Information Complete if different from Primary Contact

Principal Investigator: First Name

Requestor Information

Requestor Type  
\* must provide value

- Principal Investigator
- Research Nurse
- Research Coordinator
- Faculty
- Staff
- Other

The following question is for the person filling out this request form:

Are you a BBMC member?  
 Yes  
 No

Do you have a BBMC member that you would prefer to work with on this request?  
 Yes  
 No

Please upload your research protocol or grant research plan.  
[Upload document](#)

College  
\* must provide value

- Medicine
- Other

Please indicate the services requested:  
Check all that apply.

This box routes it to the CDW team

- Consultation with a biostatistician
- Research design or statistical considerations
- Statistical Analysis
- Data management/storage using REDCap
- Data management/storage using other software
- Clinical Data Warehouse
- Editing manuscript, abstract, or protocol
- Other

Submit

**This helps us prep for the initial meeting w/ you**

**This box routes it to the CDW team**



IDeA States  
Pediatric Network



# Thank you

Will Beasley, PhD

Ashley Thumann, MHA

Wale Oluborode, MD, MPH

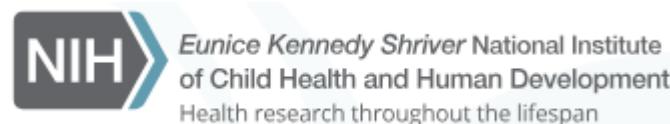
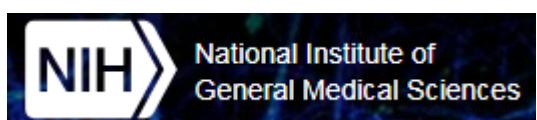
David Bard, PhD

University of Oklahoma HSC

Biomedical & Behavioral Methodology Core (BBMC)



Award Numbers:  
UG1OD024950  
U54GM104938

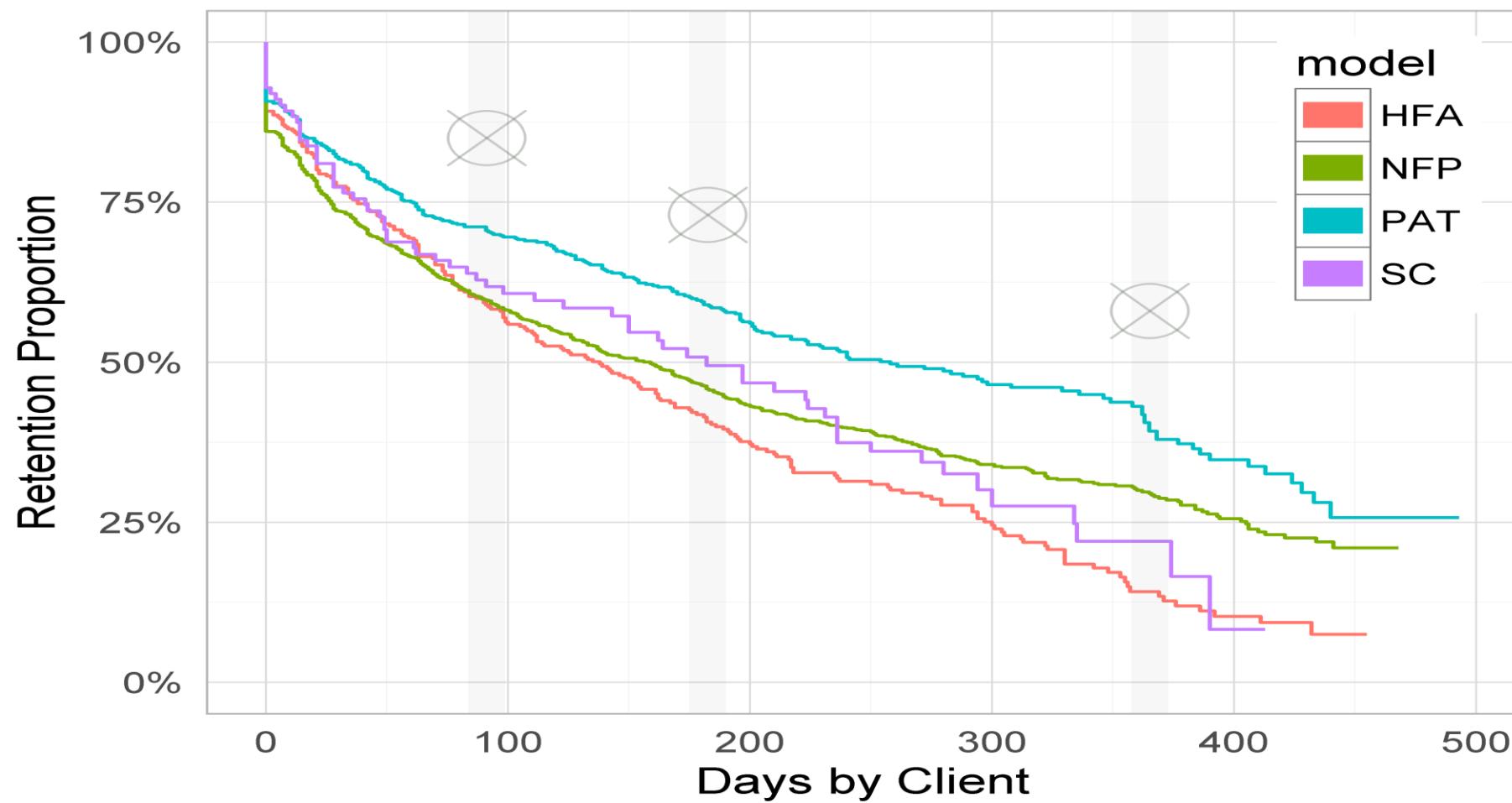


# Extra Slides

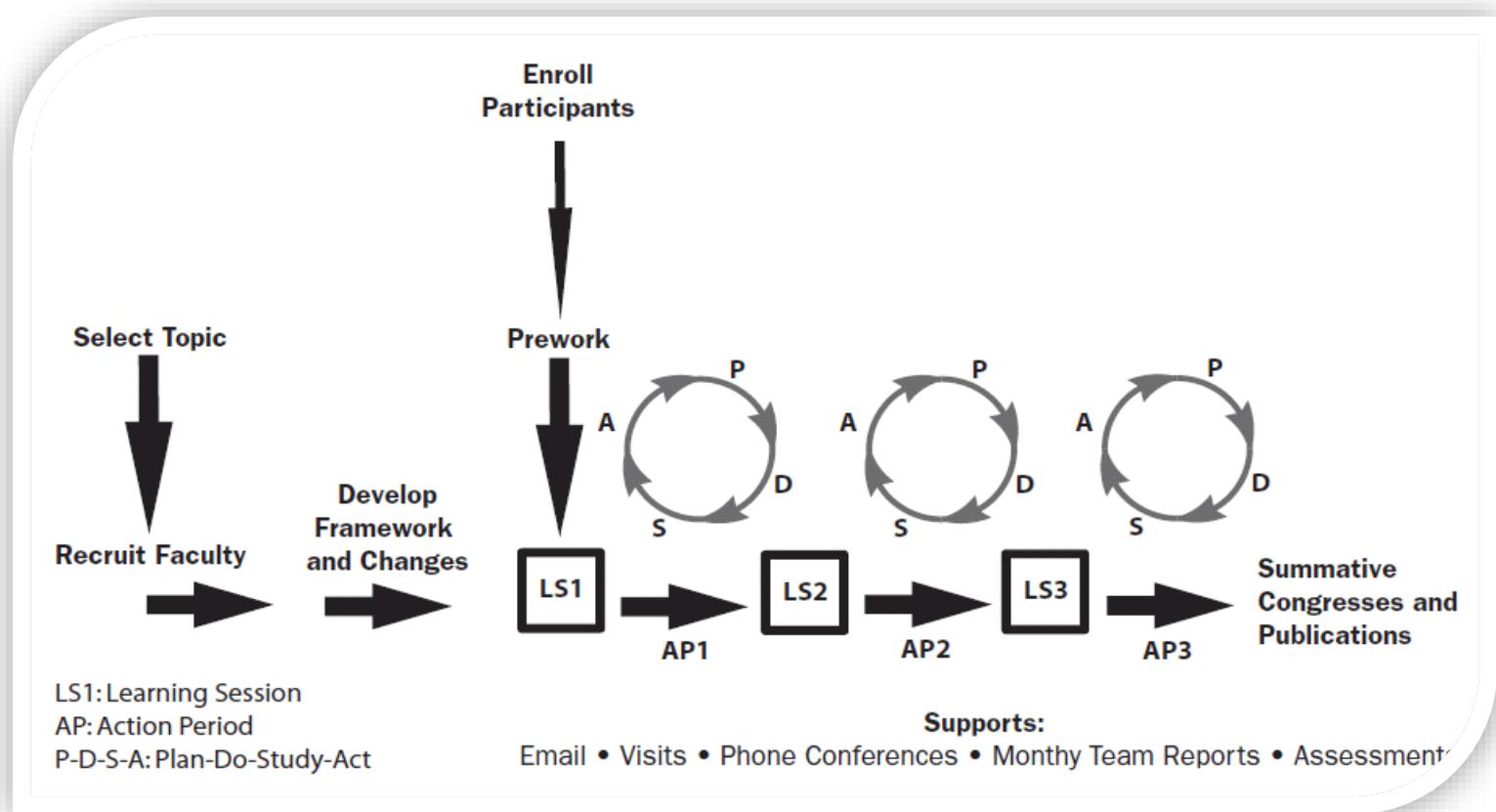
*OK HV-CollN*

Oklahoma Home Visiting Collaborative Improvement and Innovation Network

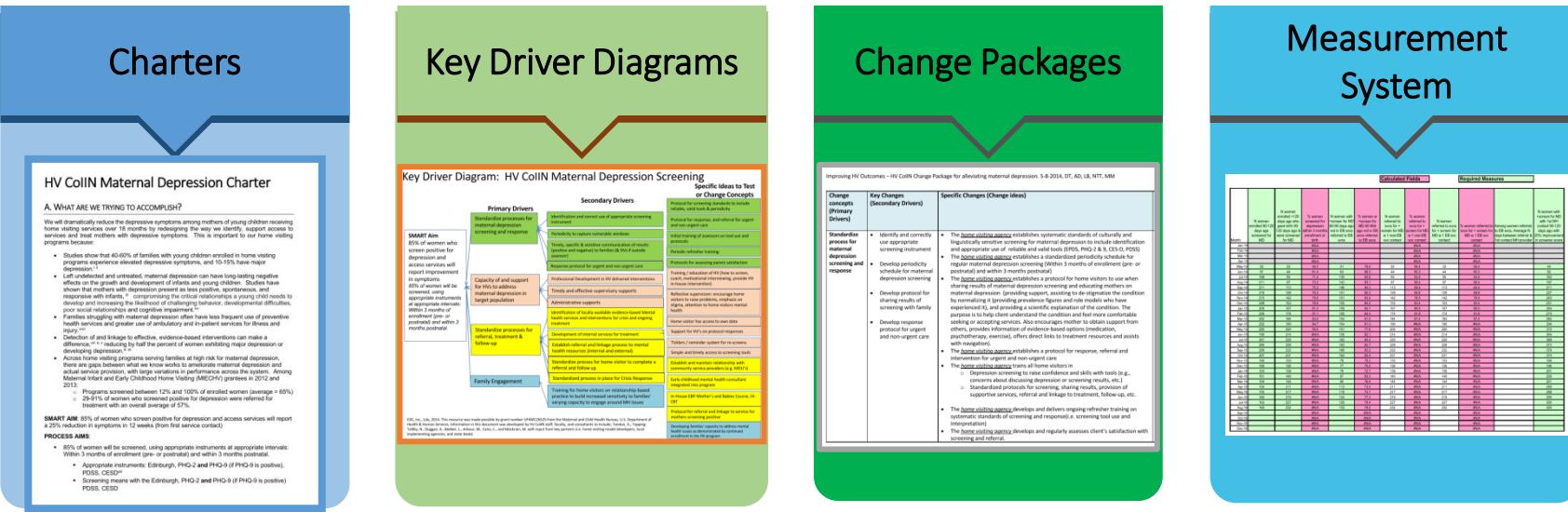
## Retention by Model, Oklahoma, 2015 Referrals



# The IHI Breakthrough Series as the HV CollN Framework



# Developed a HV CollIN “Playbook” for each topic

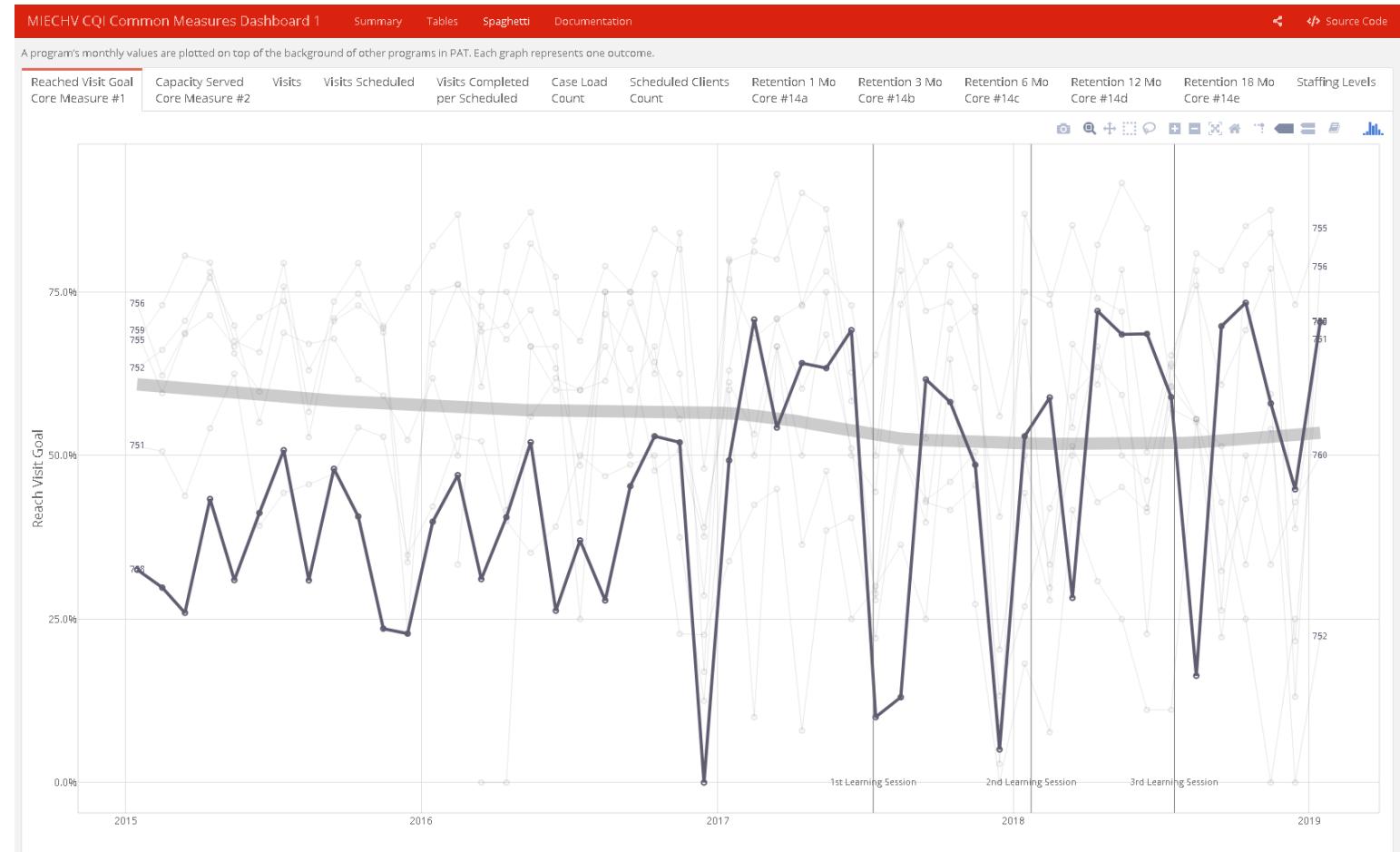


# Helping Teams with the “Why, What and the How”

# Dashboards

- Two versions of a user-friendly dashboard were developed and administered weekly by team of analysts

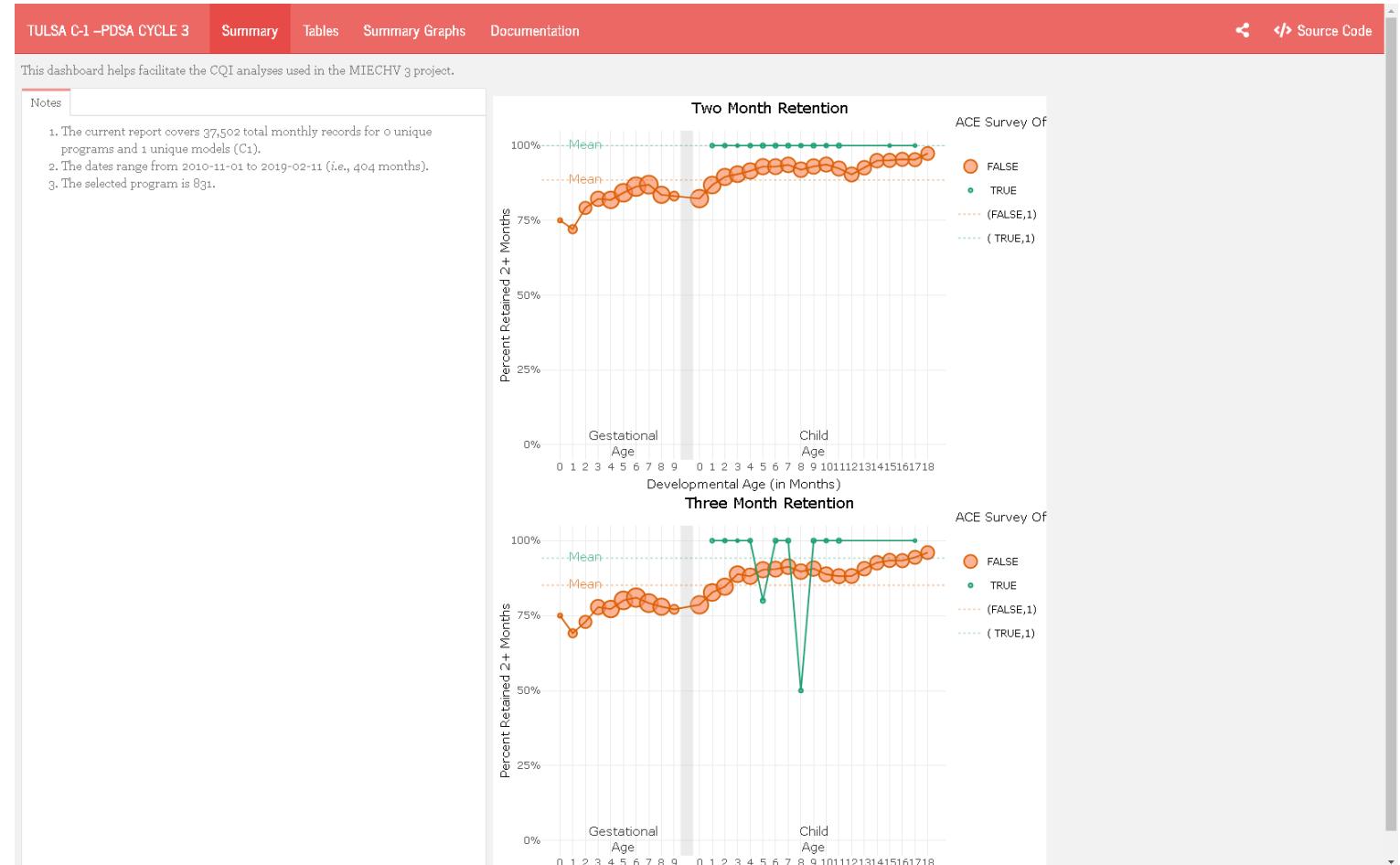
- Common measures
- Individual



# Dashboards

- Two versions of a user-friendly dashboard were developed and administered weekly by team of analysts

- Common measures
- Individual



# *Future Applications: Clinical Decision Support*



"If you want a second opinion, I'll ask my computer."



# **PROSpect Study**

**PRone and OSCillation PEdiatric Clinical Trial**

# PROSpect: PRone and OScillation PEdiatric Clinical Trial

- Two-by-two factorial, response-adaptive multi-center randomized clinical trial.
- Primary Aim: To provide evidence to support best ventilation practices in critically ill children with severe PARDS defined per PALICC guidelines.
- Enrollment Criteria:
  - Pediatric patients  $\geq$  2 weeks of age and  $<18$  years of age
  - Intubated and mechanically ventilated
  - Severe PARDS for  $<48$  hours per PALICC guidelines.

# PROSpect: PRone and OScillation PEdiatric Clinical Trial

PROSpect: Form 1: Eligibility		
<b>Section 1: Dates</b>		
1a.	Date of initial screening	____ - ____ - ____ mm-dd-yyyy Note: Please enter date as Month-Day-Year
1b.	Date and time of intubation	____ - ____ - ____ mm-dd-yyyy ____ : ____ 24-hr clock
<b>Section 2: Inclusion Criteria (All must be YES to be eligible. If all inclusion criteria are met, continue to Section 3: Exclusion Criteria. If not, skip to Section 4.)</b>		
2.	Intubated and mechanically ventilated for <96 hours (<4 days)	<input type="radio"/> Yes <input type="radio"/> No
3.	Age ≥2 weeks and corrected gestational age ≥42 weeks	<input type="radio"/> Yes <input type="radio"/> No
4.	Age <18 years (has not yet had 18 <sup>th</sup> birthday)	<input type="radio"/> Yes <input type="radio"/> No
5.	Chest radiograph with <u>bilateral</u> acute pulmonary parenchymal disease	<input type="radio"/> Yes <input type="radio"/> No
6.	Severe PARDS for <48 hours, defined as two consecutive blood gases separated by at least 4 hours: <ul style="list-style-type: none"> <li>Oxygenation index (OI) ≥16 while FiO<sub>2</sub> ≥0.60 (OI: [FiO<sub>2</sub> × mPaw]/PaO<sub>2</sub> × 100)</li> <li>Or if OI unavailable, oxygen saturation index (OSI) can be used to replace first blood gas <u>only</u> <ul style="list-style-type: none"> <li>OSI ≥12.3 while FiO<sub>2</sub> ≥0.60 for 1<sup>st</sup> gas, then OI for 2<sup>nd</sup> gas (OSI: [FiO<sub>2</sub> × mPaw]/estimated PaO<sub>2</sub> × 100, where PaO<sub>2</sub> is estimated from SpO<sub>2</sub>)</li> </ul> </li> </ul>	<input type="radio"/> Yes <input type="radio"/> No

Exclusion criteria: previous enrollment in PROSpect, perinatal related lung disease, congenital diaphragmatic hernia or congenital/acquired diaphragm paralysis, respiratory failure explained by cardiac failure or fluid overload, cyanotic heart disease, cardiomyopathy, primary pulmonary hypertension, intubated for status asthmaticus, obstructive airway disease, active air leak, bronchiolitis obliterans, post hematopoietic stem cell transplant, post lung transplant, home ventilator or home oxygen dependent...

# PROSpect: PRone and OScillation PEdiatric Clinical Trial

data (\\\pedsis\\peds) (S:) > BBMC > henry-intubate-1 > data-private > derived

Name	Date modified	Type	Size
patient-eligible-2019-05-23.csv	5/23/2019 2:12 PM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-24.csv	5/24/2019 12:45 AM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-25.csv	5/25/2019 12:45 AM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-26.csv	5/26/2019 12:45 AM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-27.csv	5/27/2019 12:45 AM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-28.csv	5/28/2019 12:45 AM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-29.csv	5/29/2019 12:45 AM	Microsoft Excel C...	42 KB
patient-eligible-2019-05-30.csv	5/30/2019 5:00 PM	Microsoft Excel C...	1 KB
patient-eligible-2019-05-31.csv	5/31/2019 1:40 PM	Microsoft Excel C...	1 KB
patient-eligible-2019-06-01.csv	6/1/2019 12:45 AM	Microsoft Excel C...	1 KB
patient-eligible-2019-06-02.csv	6/2/2019 11:44 PM	Microsoft Excel C...	1 KB
patient-eligible-2019-06-03.csv	6/3/2019 12:45 AM	Microsoft Excel C...	1 KB
patient-eligible-2019-06-04.csv	6/4/2019 12:45 AM	Microsoft Excel C...	2 KB
patient-eligible-2019-06-05.csv	6/5/2019 1:06 AM	Microsoft Excel C...	1 KB

account_meditech	mrn_meditech	name	dob	age_years	race	gender_male	ethnicity_hispanic	location	room	weight_in_kg	cardiac_patient	ecmo	vent_date	vent_time	vent_duration_days	eligible_vent_duration	eligible_age	eligible	extract_date
E00111222333	E001111111	A, AMY	1/1/2010	19	WHITE	FALSE	NA	EU.9N	EU.9230-A	13.30000019	FALSE	FALSE	6/3/2019	10	2	TRUE	TRUE	TRUE	6/5/2019
E0044555666	E002222222	B, BARBARA	1/2/2014	5	AMER INDIAN OR ALASKA NATIVE	FALSE	NA	EU.8N	EU.8244-A	12.60000038	FALSE	FALSE	6/3/2019	12	2	TRUE	TRUE	TRUE	6/5/2019
E00777888999	E003333333	C, CAROLINE	1/3/2017	2	OTHER	FALSE	NA	EU.8N	EU.8236-A	11.80000019	FALSE	FALSE	6/3/2019	14	2	TRUE	TRUE	TRUE	6/5/2019
E00123456789	E004444444	D, DAVID	1/4/2019	0	BLACK OR AFRICAN AMERICAN	TRUE	NA	EU.9N	EU.9224-A	2.90000095	FALSE	FALSE	6/3/2019	16	2	TRUE	TRUE	TRUE	6/5/2019

# A Nationally Representative Drug Utilization Study of OxyContin in Children Age 17 Years and Younger

# A Nationally Representative Drug Utilization Study of OxyContin in Children Age 17 Years and Younger

- Multicenter retrospective, observational cohort study
- Primary Aim: Conduct a nationally representative drug utilization study of sufficient detail to characterize OxyContin use in children.
- Enrollment Criteria:
  - Age < 18 years at the time of OxyContin prescription
  - 1+ dose of OxyContin as in/outpatient between 1-1-2011 & 12-31-2017

# A Nationally Representative Drug Utilization Study of OxyContin in Children Age 17 Years and Younger

- Inpatient EMR – Meditech
- Outpatient EMR – Centricity
- Data Manipulation was required to aid the study team in determining the order of participant and prescription data entry based on the following criteria:
  - Identify the most recent OxyContin prescription recorded for an inpatient or an outpatient, then
    - Identify the patient who received this prescription
    - Enter ALL OxyContin prescriptions the patient received in the study period
  - Proceed to the next most recent OxyContin prescription received by a different patient and repeat the process.

Date of prescription	Patient Number	Prescription Number		Order of data entry
12/30/2017	1	1	All prescriptions for patient #1	4
12/20/2017	1	2	All prescriptions for patient #1	2
12/15/2017	2	3	All prescriptions for patient #1	1
12/1/2017	1	4	All prescriptions for patient #2	6
10/1/2017	3	5	All prescriptions for patient #2	3
06/01/2016	2	6	All prescriptions for patient #3	5

# A Nationally Representative Drug Utilization Study of OxyContin in Children Age 17 Years and Younger

- Describe process w/o CDW
- Time Crunch
- If done manually
  - Basic report from MEDITECH
    - MRNS & prescription date & time & dose
  - Basic report from Centricity
    - MRNS & prescription date & time & dose
  - Comprehensive list of Oxycontin prescriptions would require merger & then resort
    - Patient matching is complex

# Implementation of Post-Partum Depression Screening in a General Pediatric Clinic

# Implementation of Post-Partum Depression Screening in a General Pediatric Clinic

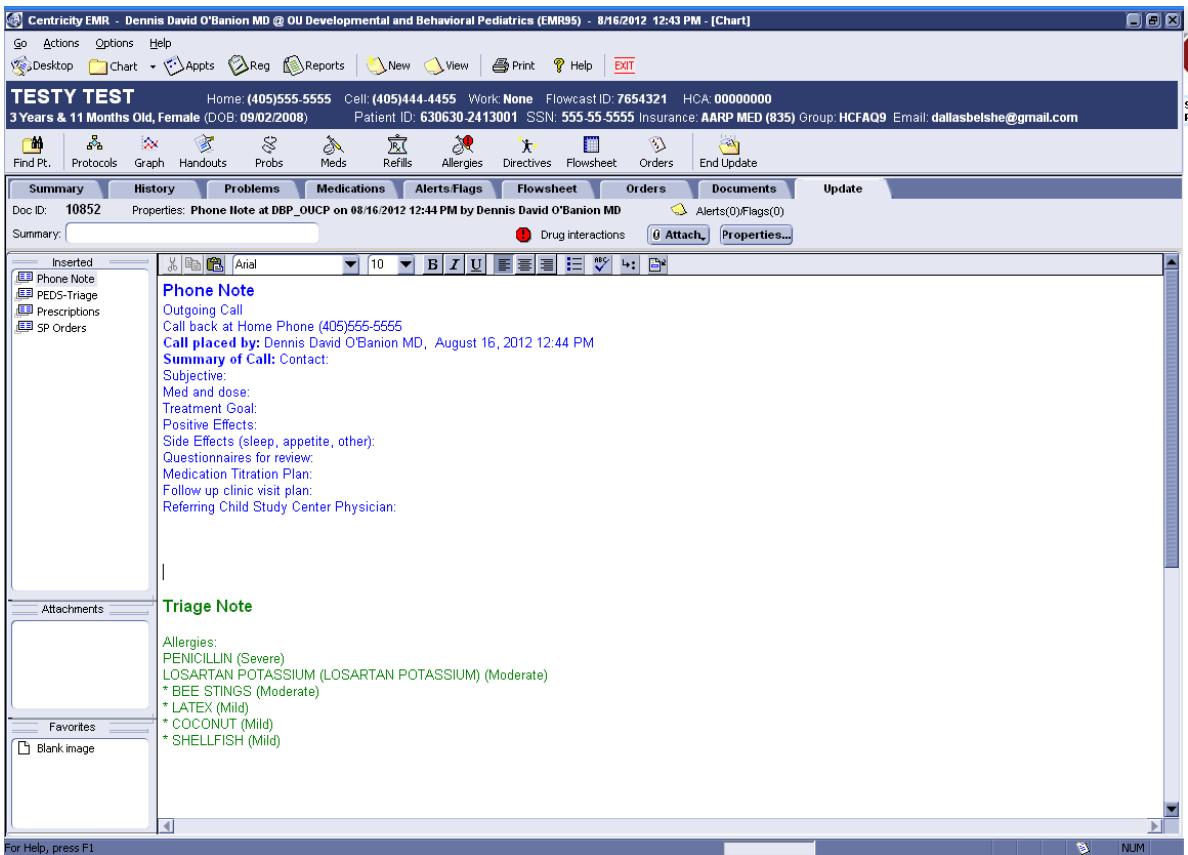
- CQI project with administrative outcome measures
- Investigators requested recurring reports to:
  - monitor compliance with utilization of the PHQ-9 screener at select appointments
  - assess the prevalence of PPD in new mothers
- Inclusion criteria: well child check appointments for children ages 1 day to 6 months of age.
- Variables provided:
  - Medical record number
  - Date of service
  - Provider name
  - Screened performed (Y/N) & date
  - Declination of screen
  - Score
  - Severity
  - Summary
  - Resources Provided
  - Comments
  - Count of previous screens administered
  - Last screen date

# *PST-ADHD*

Proactive Stimulant Titration in Attention Deficit/Hyperactivity Disorder: A pilot randomized control trial with implications for Developmental & Behavioral Pediatricians

# PST-ADHD trial

- Required searching older records where some of the data were stored in unstructured notes
- Built document extraction query to isolate all notes in single location for review
  - No need to review each chart separately
- Built regex expressions to extract required data
- Similar methods used to isolate images (e.g., radiology) and scanned documents





*Surveillance and data  
are the foundation of public  
health practice. That's one of the  
reasons why CDC continues to focus on  
strategically improving the systems and  
approaches we use to gather and connect data.*

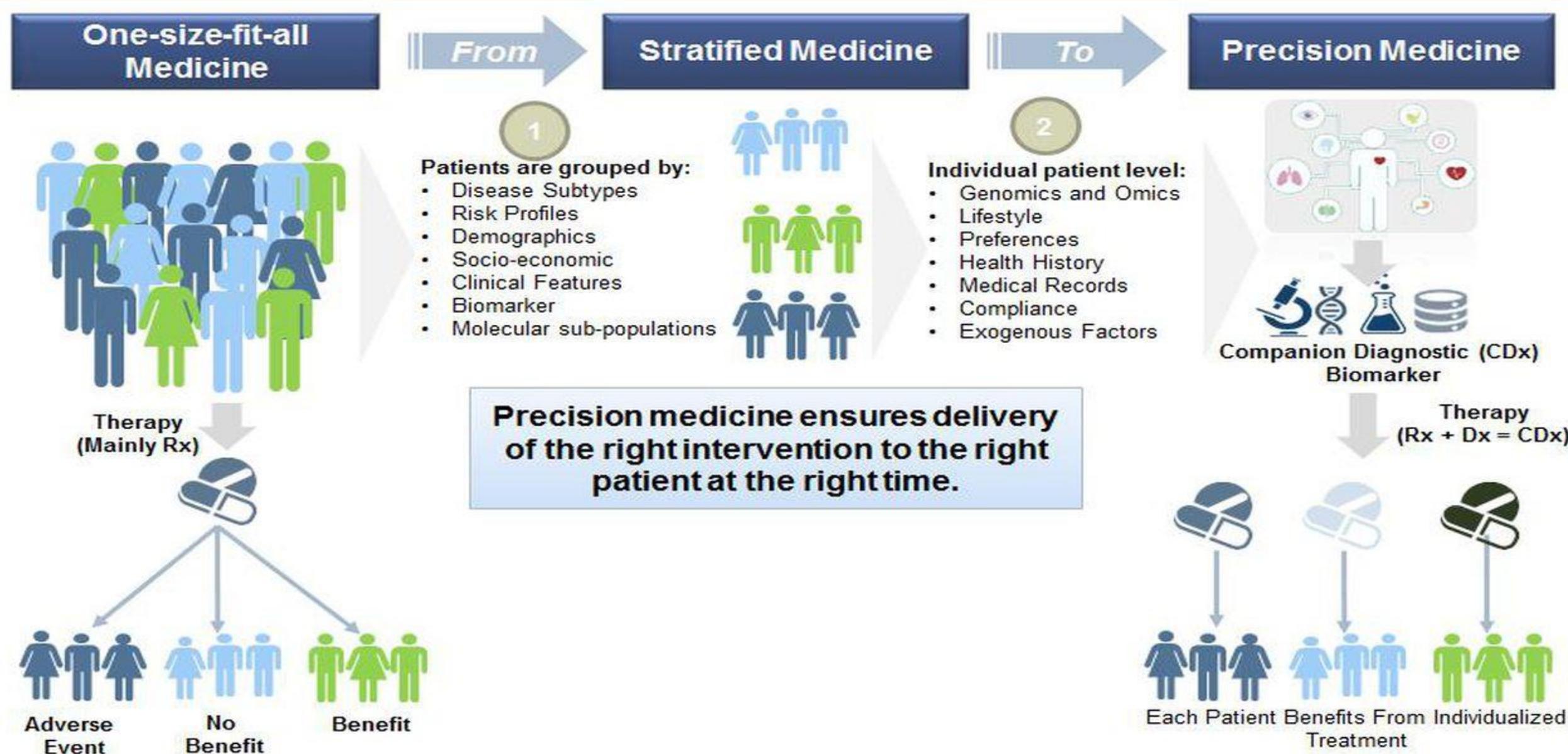
[Learn More](#)



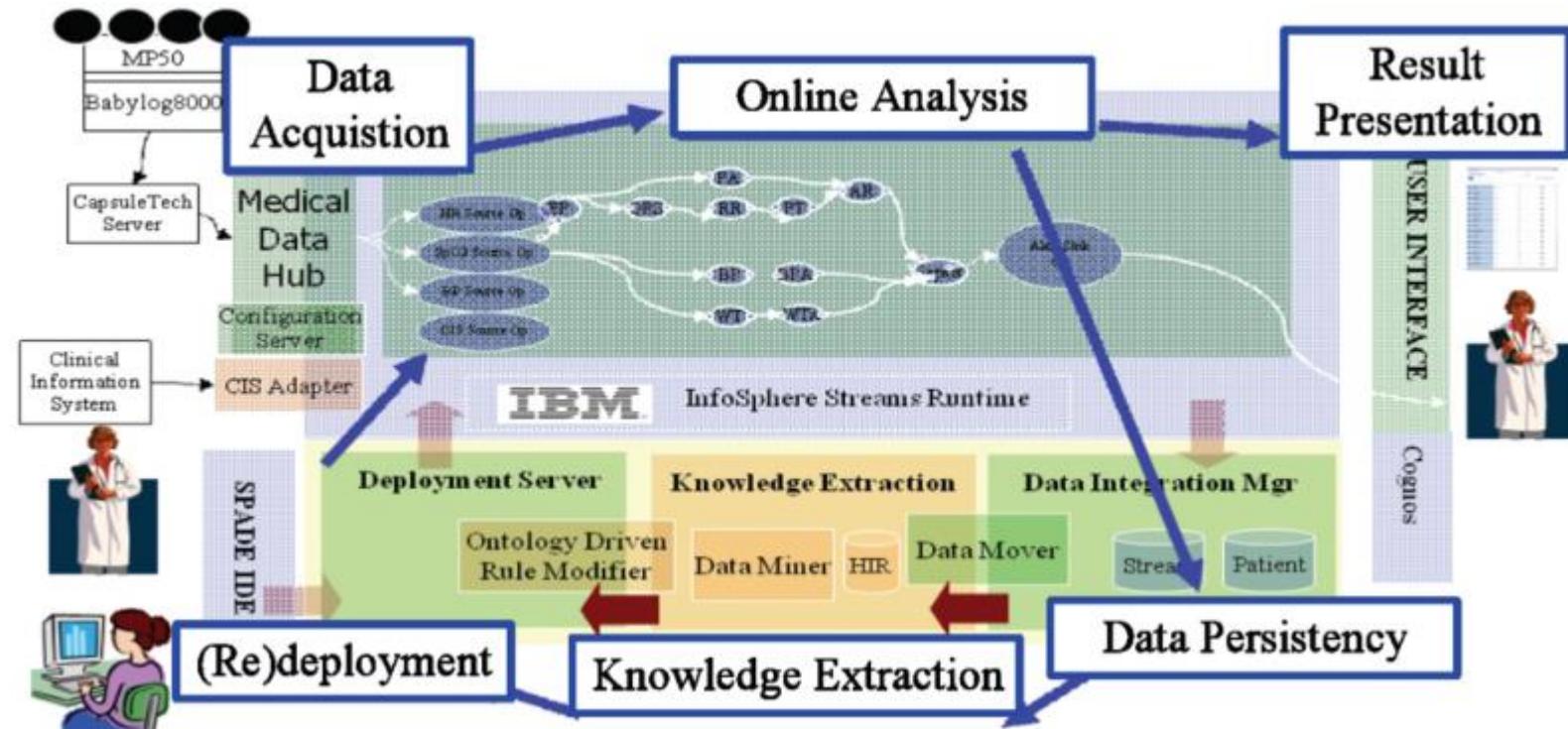
Future Applications:  
Personalized/Precision Medicine

# New Paradigm Shift in Treatment

Transitioning From the 'one-size-fits-all' to 'precision medicine' model with multi-level patient stratification.



# ARTEMIS



# *Mathematica*

Assessing a Clinical Quality Measure for ADHD of Symptom Change in Order to Detect Symptom Reduction and to Examine Differences Across Clinics

# *Mathematica*: Clinical Quality Measure for ADHD

- Assist ONC with the continued development, electronic specification, testing and maintenance of an electronic clinical quality measure (eCQM)
- OUHSC provided input and patient-level data to assess scientific acceptability (reliability and validity), importance (performance gap), feasibility, and usability of a clinical quality-of-care measure, which may be used in federal quality measurement programs.
- Enrollment Criteria:
  - Pediatric patients 4 - 18 years of age,
  - A visit during the measurement period,
  - Active diagnosis of ADHD
  - Documented mean inattentive and/or hyperactive baseline subtype scores

# Mathematica

This project required the application of **value sets**, defined as lists of codes and corresponding terms, from NLM-hosted standard clinical vocabularies (SNOMED, RxNorm, LOINC, and others) that define clinical concepts to support interoperable health information exchange.

The screenshot shows the NIH Value Set Authority Center website. At the top, there is a navigation bar with links for Welcome, Search Value Sets (which is highlighted in orange), Download, and a search bar labeled 'Q B'. Below the navigation bar, there are search filters for Program (set to All) and Release (set to Latest). Under 'Refine by', there are dropdown menus for Steward (set to Mathematica) and Code System (set to ICD10CM). A query input field contains 'ADHD' and a search button is visible. The main content area is titled 'Search Results' and displays 'Results for All : Latest'. It includes a sub-instruction 'Select a hyperlinked OID to see its value set details.' Below this, a table titled 'Matched Value Sets' lists various entries for 'ADHD' across different code systems and definition types. One row for 'ADHD' in ICD10CM is highlighted with a red box around its OID value: '2.16.840.1.113883.3.67.1.101.1.316'. At the bottom, another table titled 'Value Set Members' shows the detailed members of the 'ADHD' value set, with the first five rows (F90.0 through F90.9) also highlighted with a red box around their 'Code' column values.

Code	Descriptor	Code System	Version	Code System OID
F90.0	Attention-deficit hyperactivity disorder, predominantly inattentive type	ICD10CM	2019	2.16.840.1.113883.6.90
F90.1	Attention-deficit hyperactivity disorder, predominantly hyperactive type	ICD10CM	2019	2.16.840.1.113883.6.90
F90.2	Attention-deficit hyperactivity disorder, combined type	ICD10CM	2019	2.16.840.1.113883.6.90
F90.8	Attention-deficit hyperactivity disorder, other type	ICD10CM	2019	2.16.840.1.113883.6.90
F90.9	Attention-deficit hyperactivity disorder, unspecified type	ICD10CM	2019	2.16.840.1.113883.6.90

# *Pharmacist-led T2DM Care*

Long-term Clinical Outcomes of Pharmacist-led Care in Type 2 Diabetes Mellitus

# *Pharmacist-led T2DM Care*

- This was a multi-center, retrospective cohort study.
- Primary Aim: To determine the long-term clinical outcomes of pharmacist-led care in comparison to non-pharmacist led care in type 2 diabetes.
  - Change in HgbA1c from start date up to 5 years of follow-up
  - Time to patient-specific HgbA1c goal
  - Duration of HgbA1c at or below patient-specific goal from initial attainment of goal until loss of goal
  - Percentage of time at which HgbA1c is at or below patient-specific goal
  - Yearly completion of select components of the comprehensive diabetes medical evaluation
  - Included patients will be followed for a 5-year period.
- Enrollment Criteria:
  - Patients ages 18 years or greater
  - Initial appointment for management of Type II DM between 1-1-2008 and 12-31-2011
  - Patients are excluded if pregnant, if continuous care is not maintained for a period of 9 months, or if initial HgbA1c <= 7.0%.

# *Pharmacist-led T2DM Care*

For each cohort, six tables were provided using 4 main-stem sources:

- A list of included patients and relevant demographics
- Unique 5-year study period triggered by initial Type II DM management
- A comprehensive appointment history
- Active diagnoses
- Active medications
- Clinical outcomes to include HbgA1c, blood pressure, diabetic eye and foot exams, influenza and pneumococcal vaccines, lipid profile, and nephropathy

*Future Applications:  
Disease Surveillance &  
Learning Health Systems*

# A rise in opioid overdoses is detected. What now?



# *Diabetic Transitions of Care*

An assessment of a newly initiated transitions of care clinic at an academic health center

# *Diabetic Transitions of Care*

- Retrospective, observational study
- Study Aims:
  - all-cause hospital admissions 1 year pre- and post-transitions of care clinic intervention
  - 30-day all-cause readmissions pre- and post-transitions of care clinic intervention
  - all-cause emergency department (ED) utilization 1 year pre- and post-transitions of care clinic intervention
  - cost analysis of an existing transitions of care clinic
- Enrollment criteria:
  - All patients, ages 18 and older
  - Transition of Care (ToC) Clinic patient between June 12, 2017 and January 12, 2018.

# *Diabetic Transitions of Care*

- Evaluate the frequency of hospital admission, 30-day readmission, and ED utilization 1 year prior to each patient's initial ToC visit in comparison to the same outcomes after the patient's initial visit in the ToC service.
- *Demographic variables:* inpatient and outpatient medical record number, patient name, account number, date of birth, gender, race, ethnicity, insurance, and zip code
- *Inpatient variables:* date of admission, date of discharge, length of stay, discharge diagnoses (1-50), DRG, place of service, charges, payments
- *Outpatient variables:*
  - Appointments: date and time, type, reason, provider, duration, status
  - Medications: medication name, generic name, start date, stop date
  - Diagnoses: ICD code, code description, start date, stop date
  - Invoices: invoice number, location of care, provider name, charge, payments, diagnoses, cpt codes

# *Diabetes Care & Transition Studies*

Required most comprehensive collection of data from wide variety of sources

- Centricity EMR, Centricity Business (registration, scheduling, billing), MEDITECH EMR, MEDITECH Business (billing)
  - Would have required enormous time and effort to collect and aggregate manually
- Clinical outcomes were tricky
  - Lab results get stored in multiple obs terms (e.g., micro albumin: 1 of 20 obs terms with different units, so requires a lot of clean-up)
  - Complex measurement specifications (e.g., diabetic nephropathy: defined with micro albumin or with an order to nephrology clinic or ...)