



IDeA States
Pediatric Network



Leveraging OUHSC Bioinformatics to Inform Research & Practice



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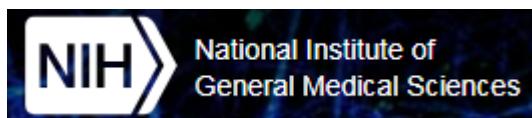
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University of Oklahoma HSC

Biomedical & Behavioral Methodology Core (BBMC)

August 2019

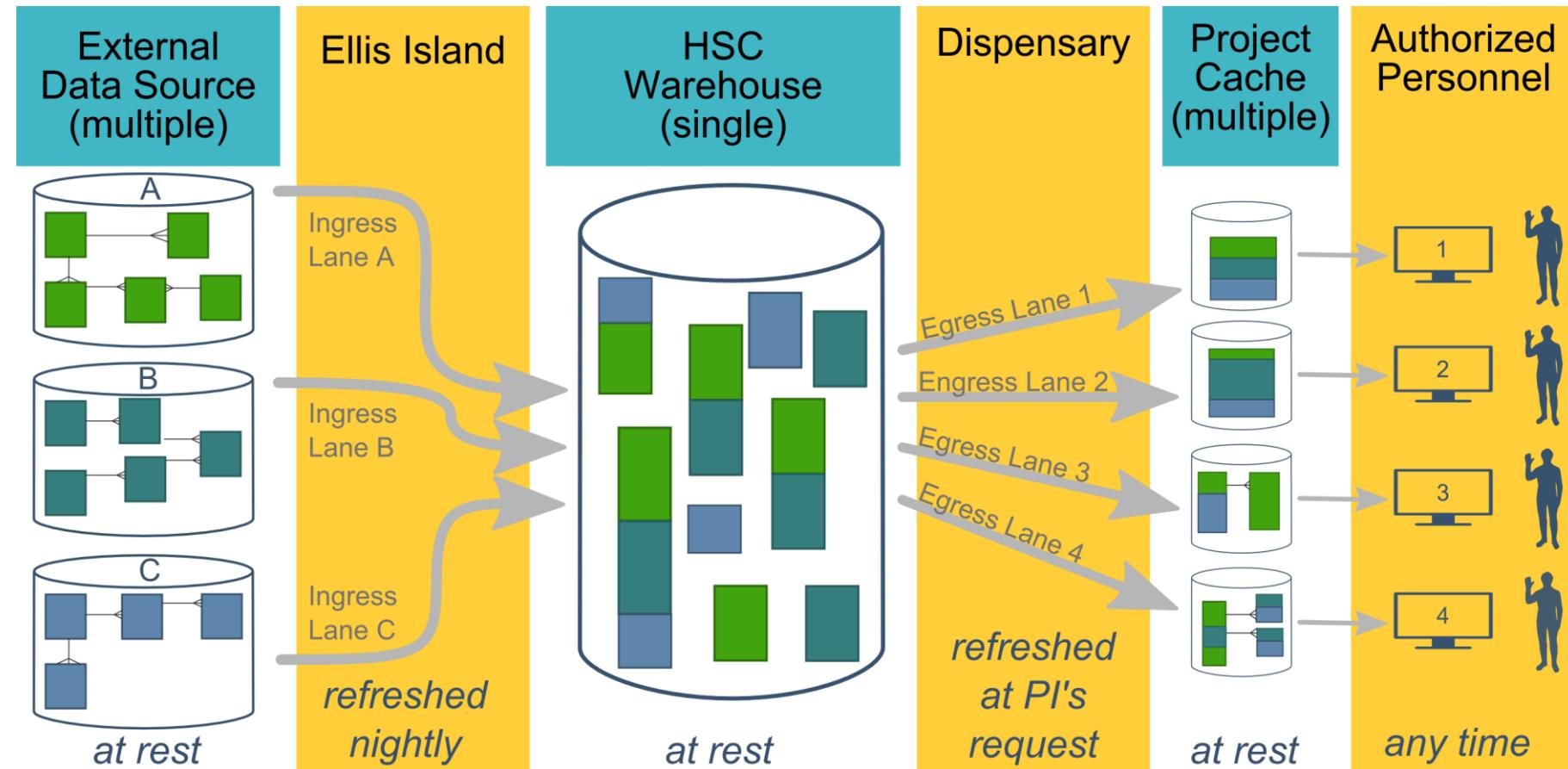
Award Numbers:
UG1OD024950
U54GM104938



Prairie Outpost – CDW (Clinical Data Warehouse)

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

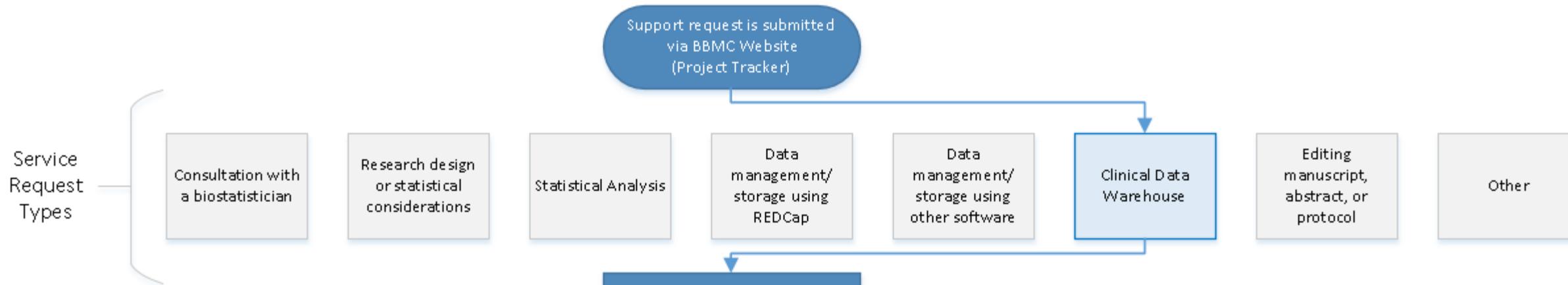
Ecosystem Architecture



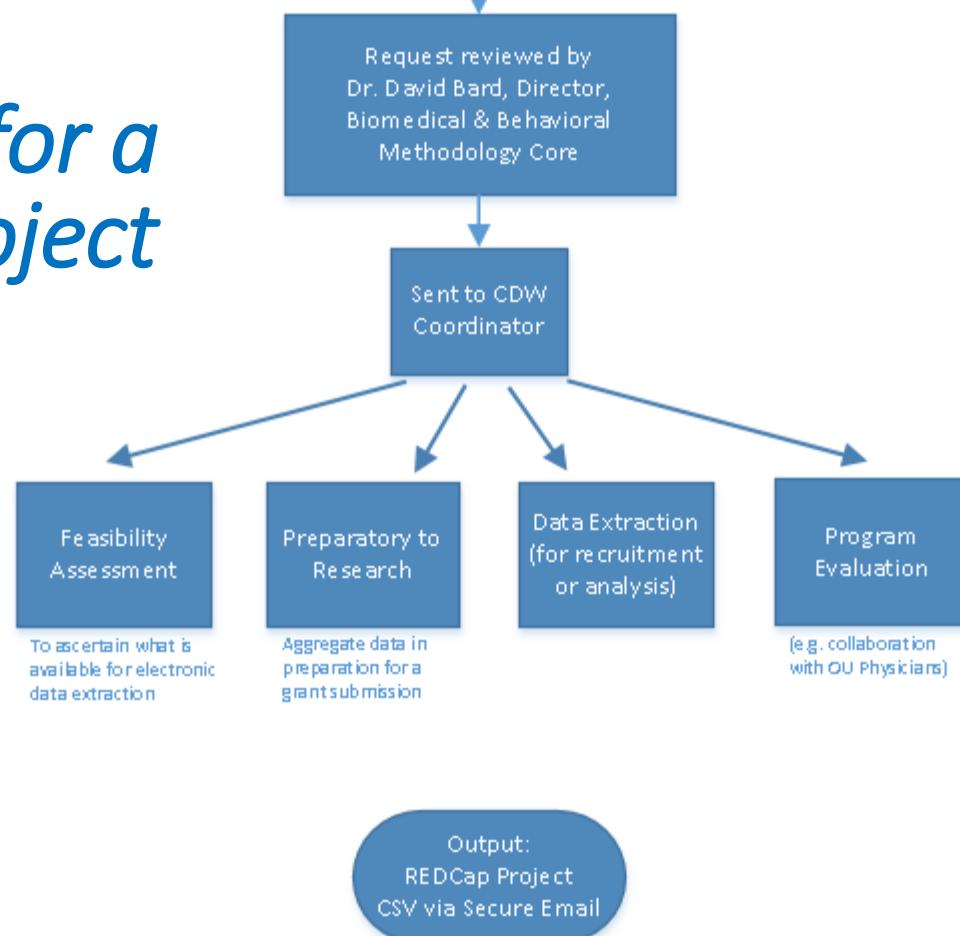
- **Data Source** (column 1): contains unique info
- **Warehouse** (column 3): contains copy after manipulation
- **Project Cache** (column 5): contains copy of copy after a lot of manipulation

HSC Data Sources

- Patient
 - Outpatient (Centricity)
 - Billing and Claims Data
 - Inpatient (Meditech)
 - Dozens of departmental sources
 - Biomedical Research Data
- 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)
 - ...
- Administrative Cost
- Employee & Student



Typical Workflow for a CDW Research project by the BBMC



Since 2017, the CDW has facilitated more than 80 studies with 44 investigators.

Department	Percentage
Pediatrics	55%
Orthopedics	16%
Cancer Center	7%
Women's Health	7%
Pharmacy	4%
Dermatology	2%
Infectious Disease	1%
Cardiovascular	1%
Endocrinology	1%
Otolaryngology	1%
Other	5%

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

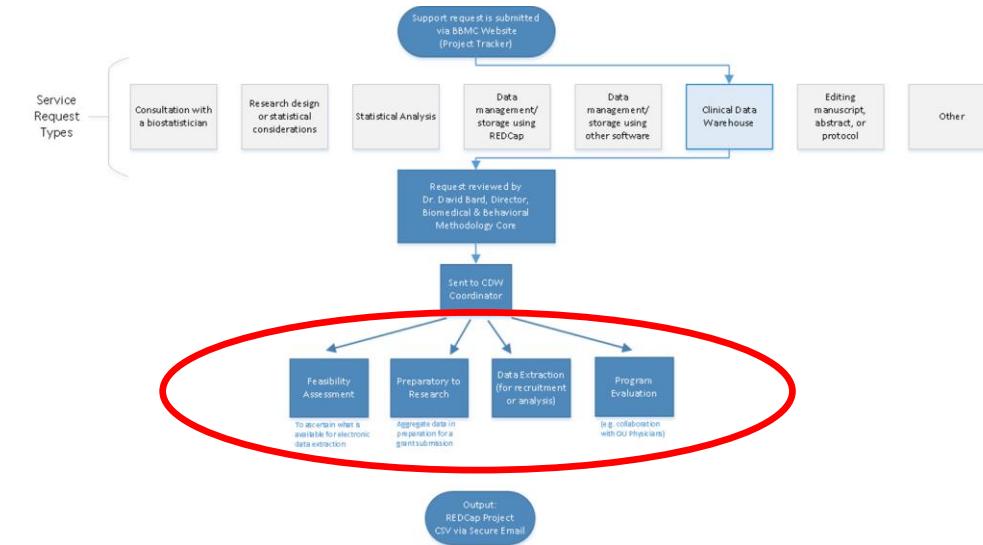
since 2017; page 2

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

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 ³	O		
				Pre-term	<1 mo	1-5 mos	6-11 mos	1 Yr	2-4 Yrs	5-8 Yrs	9-12 Yrs	13-16 Yrs	17-20 Yrs		
1	Drug of Interest (DOI)														
2	alfentanil (IV) ¹⁶				X	X	X	X	X	Closed	Closed		X	X	
3	amikacin ⁵	X			X	X	X	X	X	X	X	X	X	X	
4	atropine (IV) ¹⁴				X	X	X	X	X	X	X	X	X	X	
5	cefepime ⁵	X			X	X	X	X	X	X	X	X	X	X	
6	ceftazidime													X	X
7	cidofovir													X	
8	ciprofloxacin													X	
9	clazospine ⁴													X	
10	dexmedetomidine ¹³													X	
11	disperazepam													X	
12	etomidate ^{2,14}				X	X	X	X	X	X	X	X	X	X	X
13	fosphenytoin													X	
14	haloperidol ⁴				X	X	X	X	X	X	X	X	X	X	X
15	heparin (low molecular weight) ⁸				X	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	X	X
16	hydromorphone ^{15,16}				Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	X	X
17	lidocaine (IV)				X	X	X	X	X	X	X	X	X	X	X
18	lurasidone ⁴				X	X	X	X	X	X	X	X	X	X	X
19	meropenem (IV) ^{2,5}	X			X	X	X	X	X	X	X	X	X	X	X
20	methylvioreldisulfone ¹¹ (See special)														
21	metivabrednisolone ¹¹ (See special)														

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

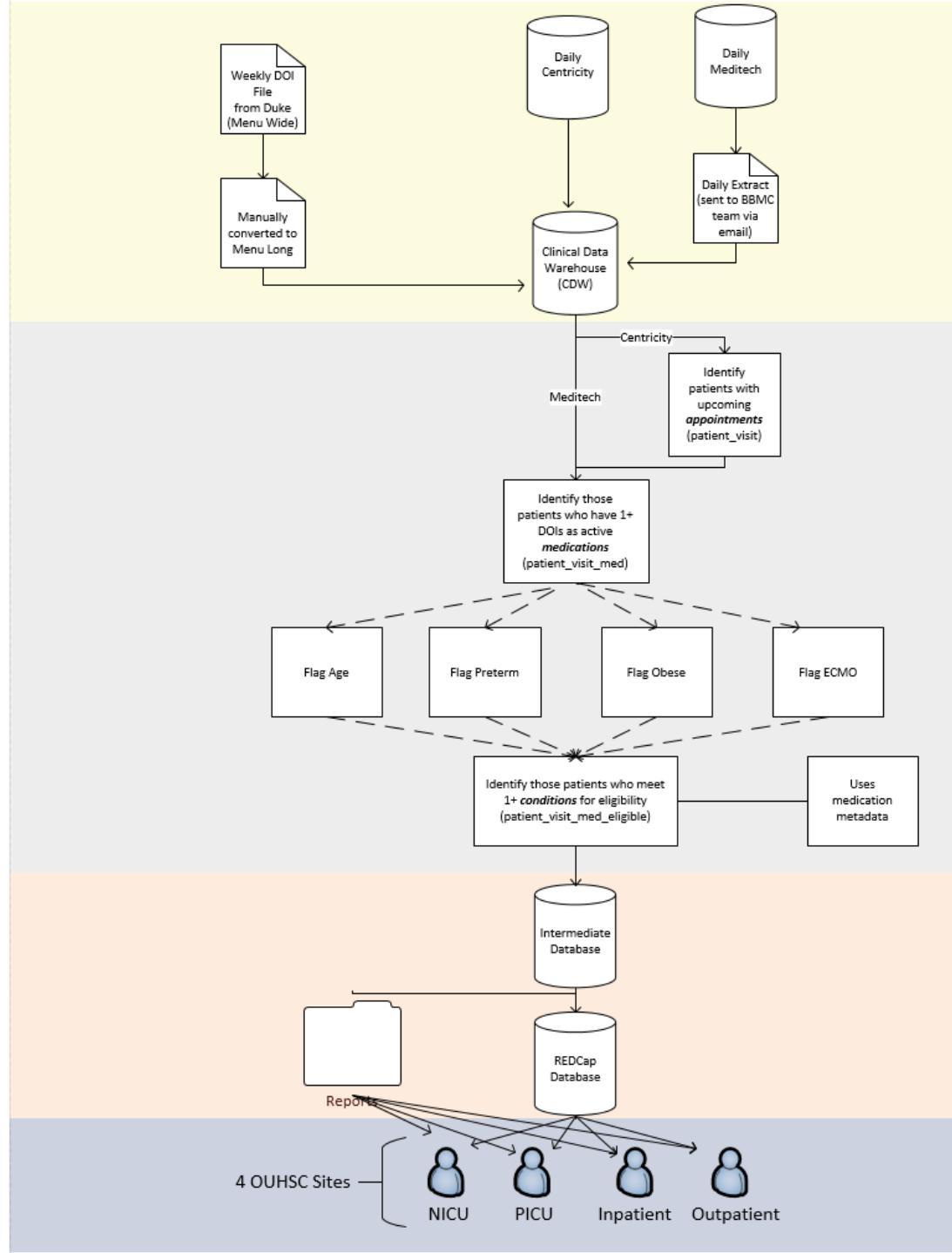
- 6 new patients @5 min/pt
(remembers yesterday)

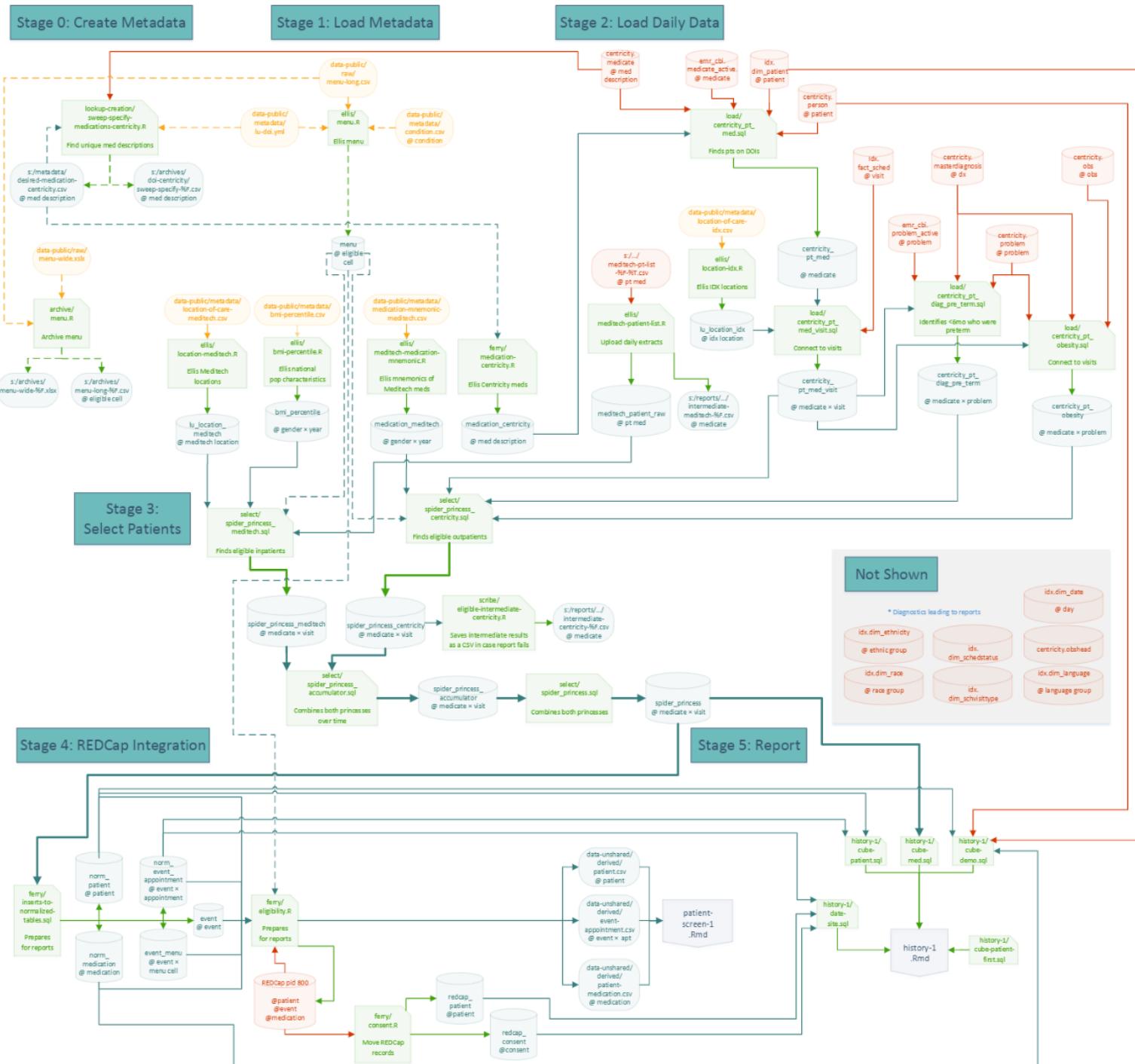
Enrollment Rate by Institution

ISPCTN Sites	Activation Date	Total # enrolled since activation	Months since activation	Average enrollment per month
Alaska Native Medical Center	6/19/2018	2	13	 0.15
Children's Mercy Hospitals and Clinics	8/7/2018	19	11	 1.73
Dartmouth-Hitchcock Medical Center	1/7/2019	8	6	 1.33
Kapiolani Women's and Children's Medical Center	11/14/2018	9	8	 1.13
Oklahoma University Medical Center	12/5/2018	59	7	 8.43
Rhode Island Hospital	8/3/2018	46	11	 4.18
Tulane University Health Science Center	5/8/2018	4	14	 0.29
University of Kansas Medical Center	5/14/2019	2	2	 1.00
University of Mississippi Medical Center	10/18/2018	16	9	 1.78
University of Montana	9/17/2018	12	10	 1.20
University of Nebraska Medical Center	7/3/2018	14	12	 1.17
University of New Mexico, Health Sciences Center	4/11/2018	15	15	 1.00
University of South Carolina - Palmetto Health	5/30/2018	19	14	 1.36
University of Vermont Medical Center	10/15/2018	2	9	 0.22
West Virginia University Hospital	6/6/2018	9	13	 0.69
Alfred I. duPont Hospital for Children	11/8/2013	150	68	 2.21
Arkansas Children's Hospital Research Institute	12/20/2011	69	91	 0.76
Medical University of South Carolina Children's Hospital	9/4/2012	90	82	 1.10
University of Louisville Norton Children's Hospital	2/1/2012	138	89	 1.55

New Participant Enrollment (by Site and Month)

	Outpatient	PICU	Inpatient	NICU	Grand Total	
2018						
Dec		1			1	incomplete month
2019						
Jan	7			1	8	
Feb	1				1	IRB
Mar	1				1	IRB
Apr	7	2			9	
May	13	1			14	
Jun	13	2	2	1	18	
Jul	7	3	3		13	
Aug	2				2	incomplete month
Grand Total	51	9	5	2	67	





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 amount)(\. \\b)	amount
(\d+)\s*(\D)	\1 \2
(\d+)\s*(grams? gm gr g ml mls ...)	\1 \2
(.*\bx)\s*(\d)(.*)	\1 \2\3
\b(a p)\.\.m\.	\1m
\bp\.\.o\.	po
\bm{g}\.	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[0o]ne\b	1
\btwo\b	2
\bthree\b	3
\bfour\b	4

pattern	replace
\b(scan test mri)\b	procedure
\b(prior to prior)\b	before
\b(removel)\b	removal
\b(catheter)\b	cath
@	at
^(takes? apply use instill give pu...)	
^(-+\s*)	
(takes? please her his the affect...)	
[\":;&~\?~\,\.*\(\)]+	
\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...)	
\bd+\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; --	
-----------	----------------------------	----------------	-----------	------	--	--	---	--

(Simulated patients)

Screening Report (for inpatients)

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		

Hyperlinks to REDCap

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

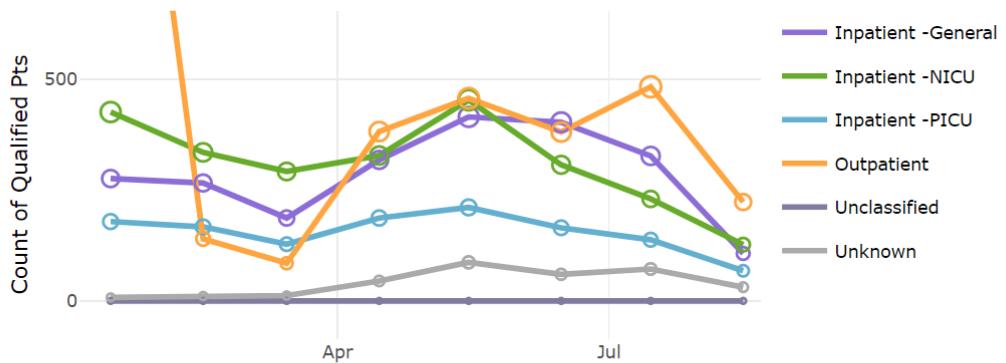
2.1 Patients Qualified

2.2 Patients Approached

2.3 Patient Consents

2.4 Patient Assents

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



Copy

CSV

Excel

PDF

Print

Search:

	date	Inpatient General	Inpatient NICU	Inpatient PICU	Outpatient	Unclassified	Unknown
1	2019-08-19	5	6	1	13	0	0
2	2019-08-18	4	6	1	0	0	0
3	2019-08-17	3	6	2	0	0	0
4	2019-08-16	3	5	4	6	0	0
	2019-08-15	0	0	0	0	0	0

See the forest.

3-way breakdowns of:

- time

- site

- drug

- age

- gender

- stage

1. qualified

2. approached

3. consented

4. assented

Progress Reports

3 Activity By Site

Summary of screening and recruitment activities by site.

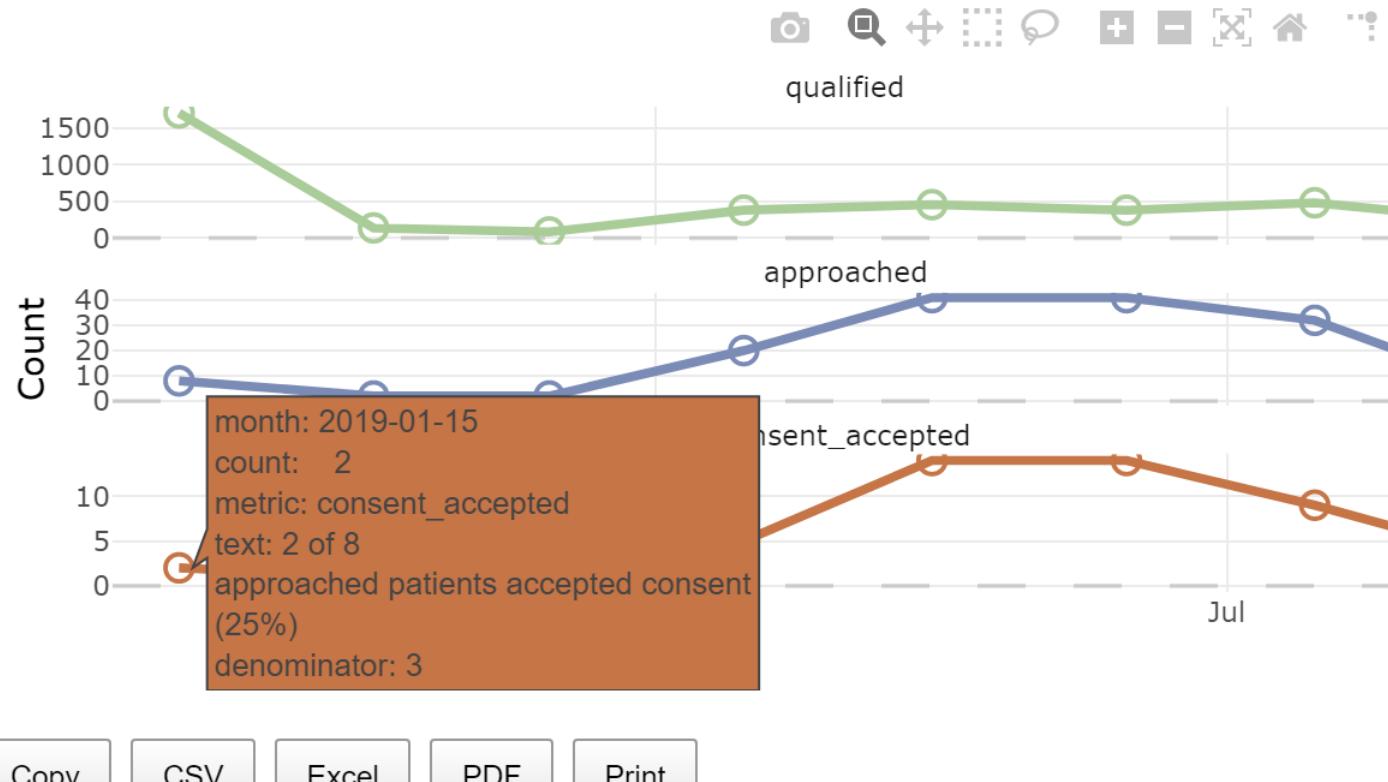
3.1 General

3.2 NICU

3.3 PICU

3.4 Outpatient

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



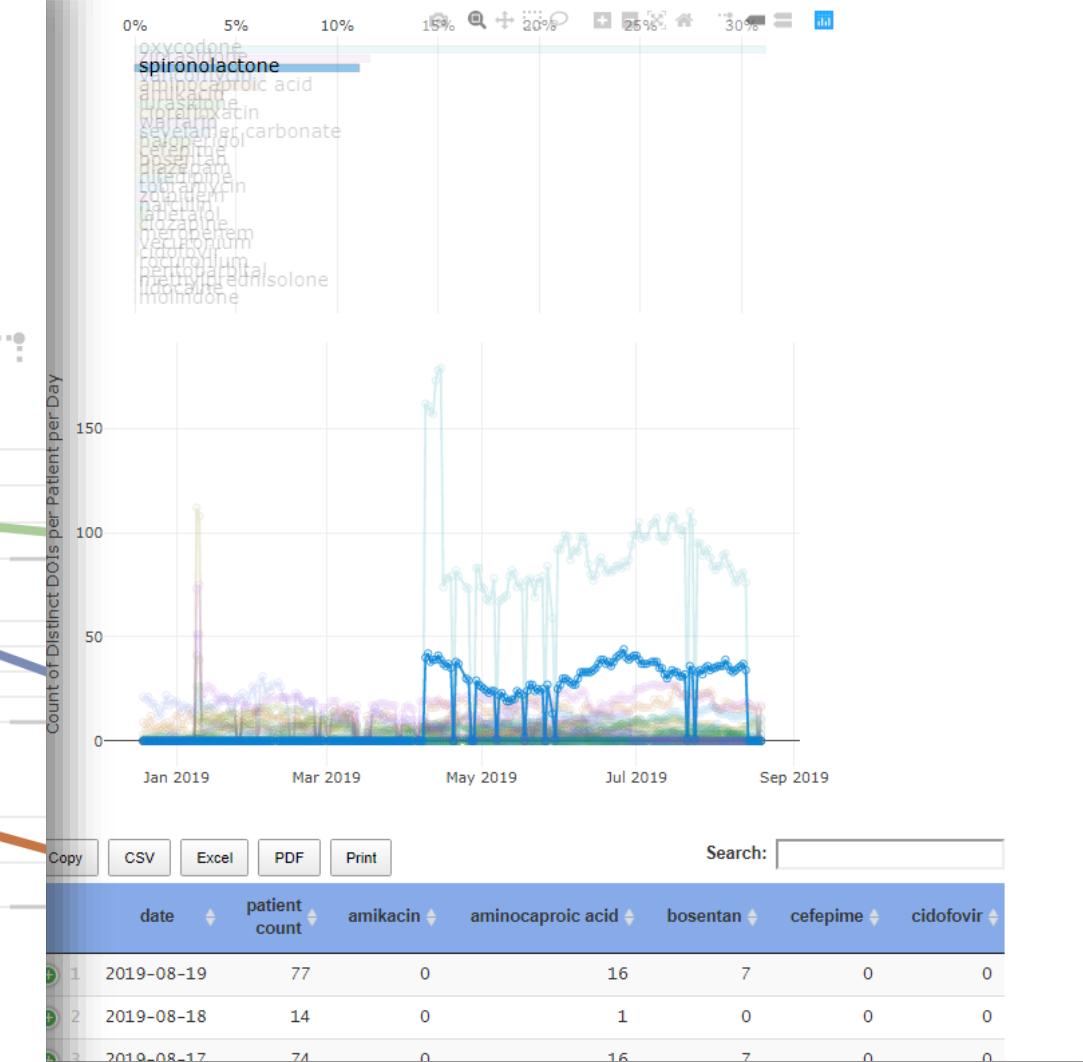
6 DOI

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 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.

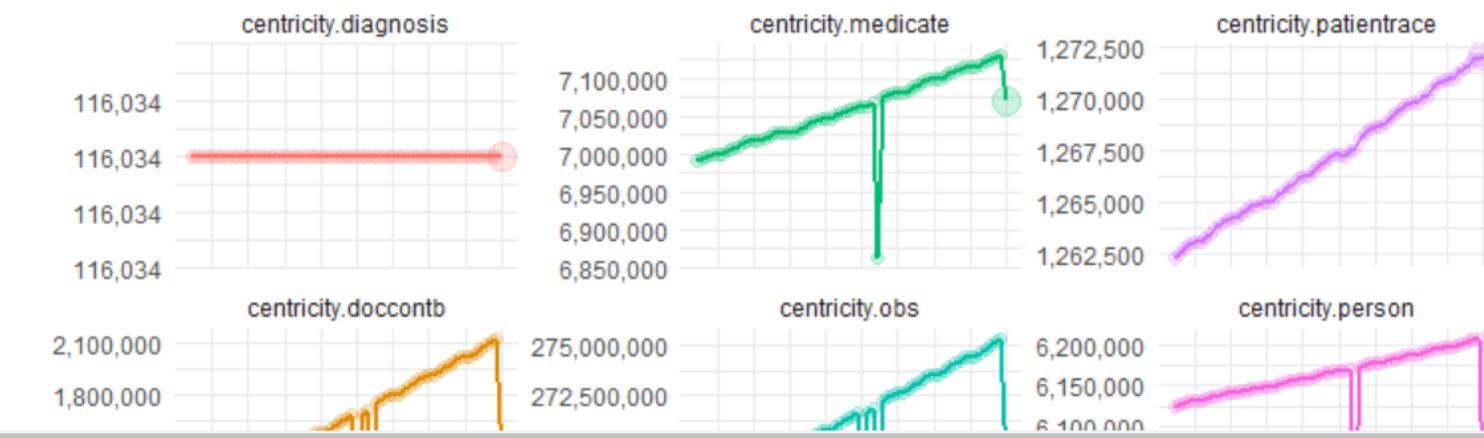
2.1 Warehouse

2.2 Waystation - Centricity

2.3 Waystation - IDX

2.4 Source - Centricity

2.5 Source - IDX



1 Summary

2 Spaghetti of Row Counts

3 Spaghetti of Delay

4 Recent

5 Complete

6 Stream

7 Code

8 Session Information

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	insurance	-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

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), and "Download". Below the navigation bar, there is a search interface with fields for "Program:" (set to "All"), "Release:" (set to "Latest"), and dropdowns for "Refine by: Steward" and "Code System". A query input field contains "Enter value set id, codes, words..." and a search button labeled "Search".

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" is shown, listing various entries for "ADHD". The table columns include Name, Code System, Definition Type, Steward, and OID. One row for "ADHD" is highlighted, showing the OID [2.16.840.1.113883.3.67.1.101.1.316](#). The table also lists other rows such as "ADHD Counseling" and several rows for "ADHD" with different code systems (ICD10CM, SNOMEDCT, ICD9CM, SNOMEDCT).

Below this, another table titled "Value Set Members" is displayed, with the heading "Expanded Code List". This table shows five rows of data for "F90.x" codes, each with a red box around the "Code" column. The columns are "Code", "Descriptor", "Code System", "Version", and "Code System OID". The rows correspond to:

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

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 ...)

Immunization Project

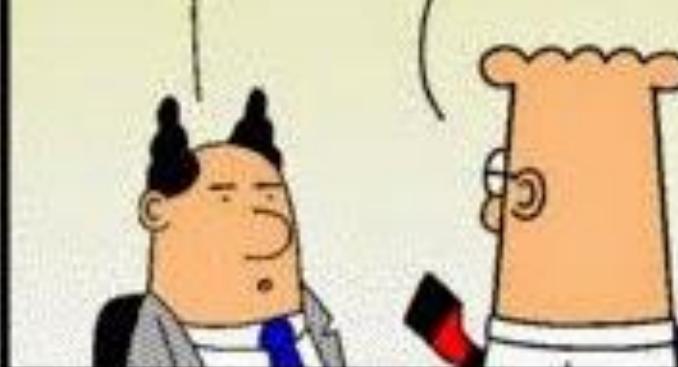
USE THE
CRS DATA-
BASE TO
SIZE THE
MARKET.

THAT
DATA IS
WRONG.



THEN
USE THE
SIBS
DATA-
BASE.

THAT
DATA IS
ALSO
WRONG.



www.dilbert.com scottadams@aol.com

CAN YOU
AVERAGE
THEM?

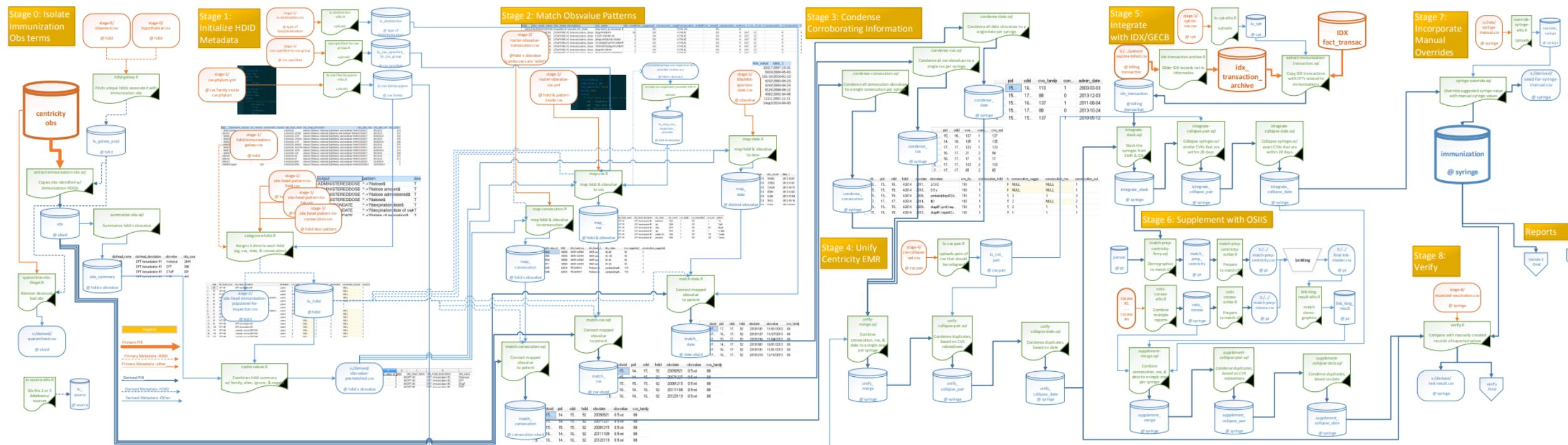
SURE. I CAN
MULTIPLY
THEM TOO.



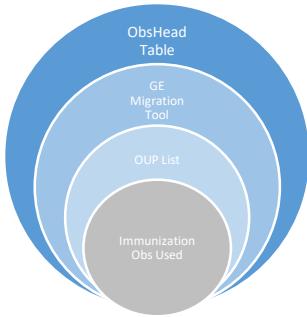
5-7-08 © 2008 Scott Adams, Inc./Dist. by UFS, Inc.

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.

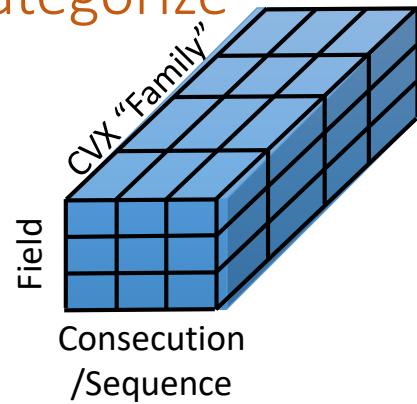
Flow Diagram



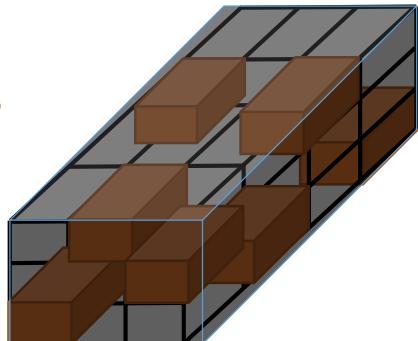
Stage 0: Isolate immunization hdids/obs terms



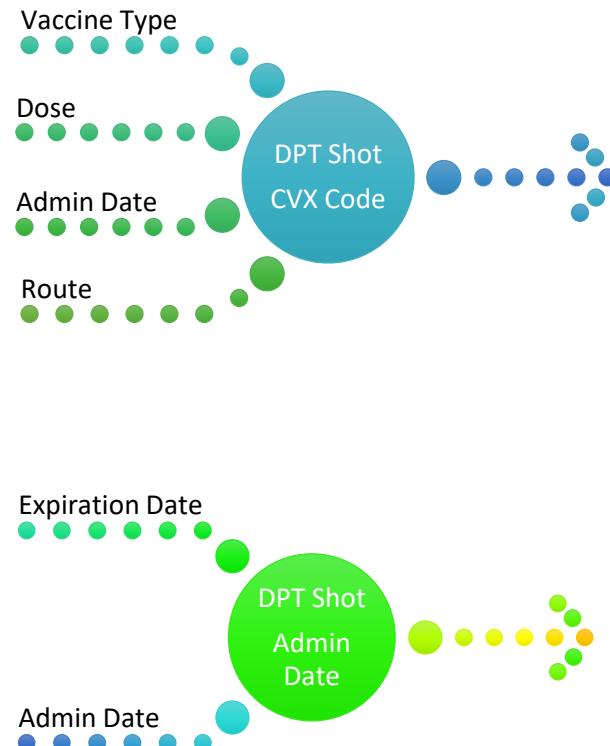
Stage 1: Categorize HDID/Obs



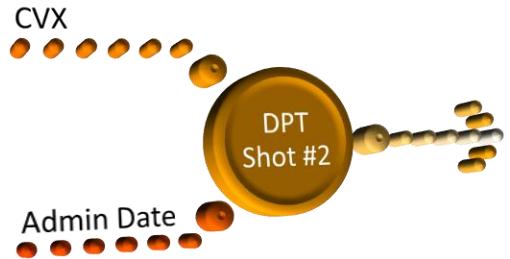
Stage 2: Categorize value *within* hdid/obs



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

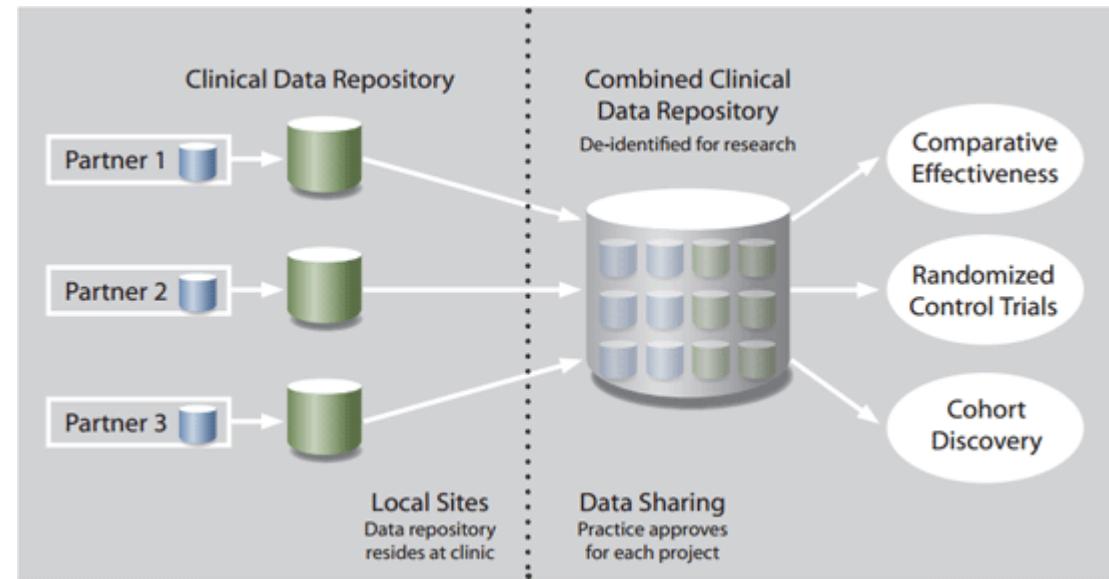
Brief Summary of CDW Value

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

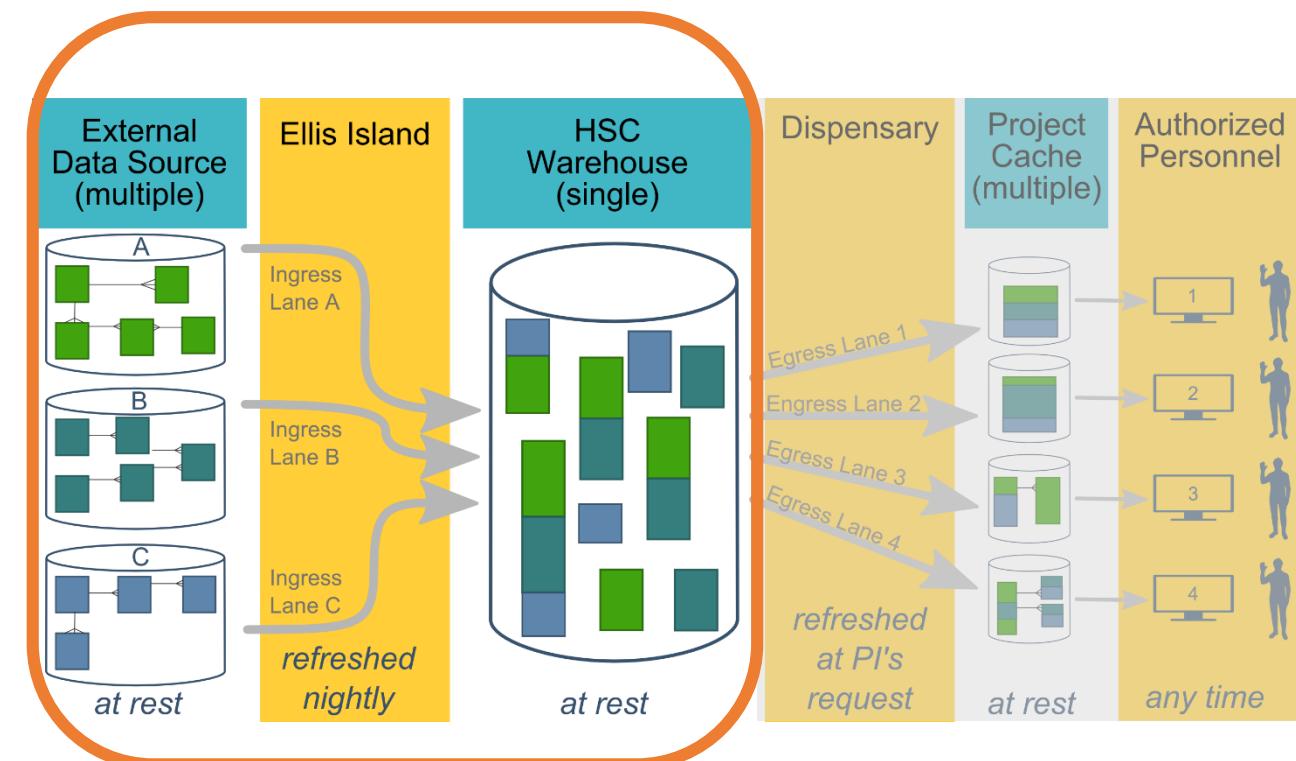
- Cohort discovery: determine if enough patients meet a given set of conditions which match recruitment criteria
- Statistics: quickly pull numbers, “How many patients were seen last month?”
- Chart Abstraction: Generate a dataset for research or quality improvement purposes

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

Current Developments: Common Campus-wide Warehouse

A tighter collaboration with

- IT
- BBMC
- OU Physicians
- Hospital



*Future Applications:
Disease Surveillance &
Learning Health Systems*

A rise in opioid overdoses is detected. What now?





IDeA States
Pediatric Network



Thank you

Will Beasley, PhD

Ashley Thumann, MHA

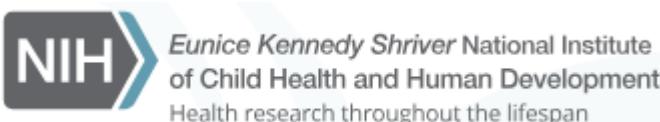
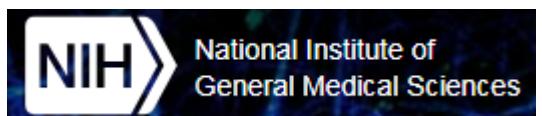
David Bard, PhD

University of Oklahoma HSC

Biomedical & Behavioral Methodology Core (BBMC)

August 2019

Award Numbers:
UG1OD024950
U54GM104938



Extras

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		
Section 1: Dates		
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
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.)		
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 th 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"> Oxygenation index (OI) ≥16 while FiO₂ ≥0.60 (OI: [FiO₂ × mPaw]/PaO₂ × 100) 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"> OSI ≥12.3 while FiO₂ ≥0.60 for 1st gas, then OI for 2nd gas (OSI: [FiO₂ × mPaw]/estimated PaO₂ × 100, where PaO₂ is estimated from SpO₂) 	<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

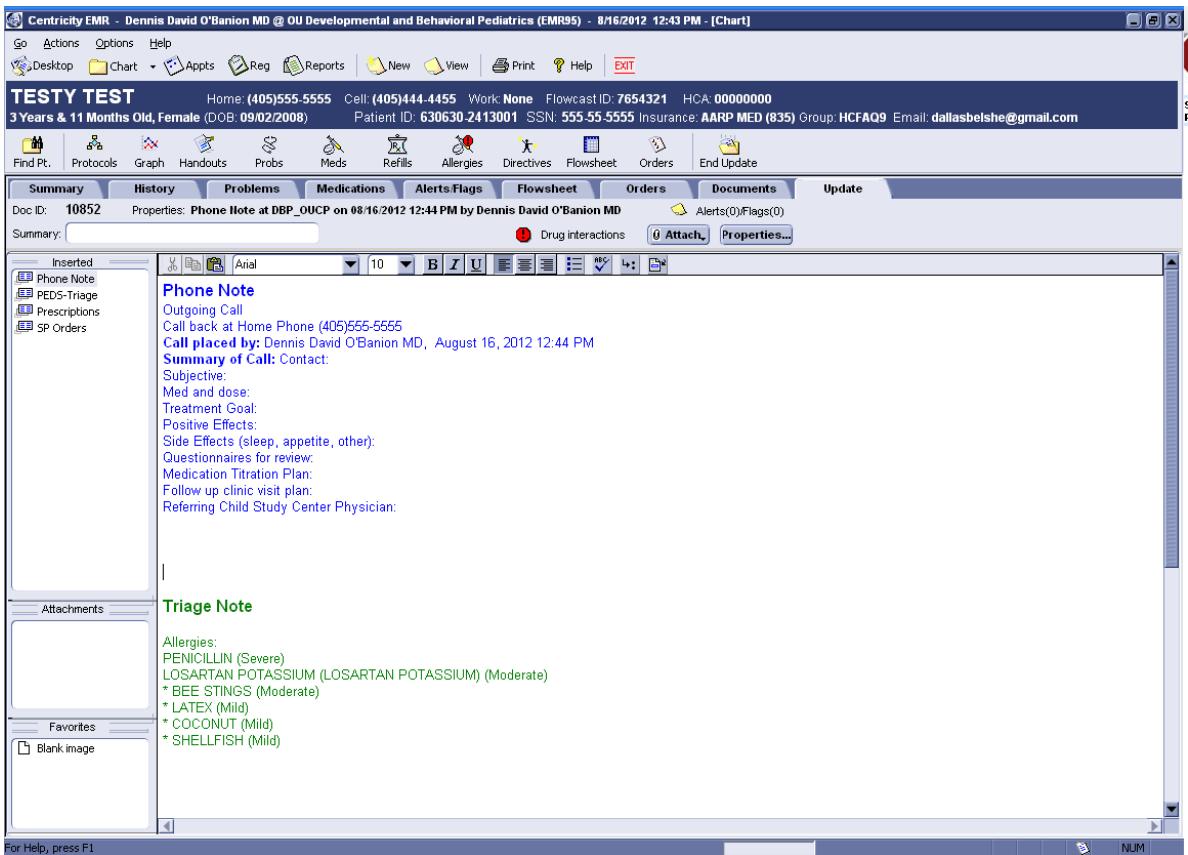
- CQI project with administrative outcome measures
- Investigators requested recurring reports to:
 - monitor compliance with utilization of the PHQ-9 screener at select appointments
 - assess the prevalence of PPD in new mothers
- Inclusion criteria: well child check appointments for children ages 1 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.

One-size-fit-all Medicine



Therapy
(Mainly Rx)



Adverse Event



No Benefit

Benefit

From

Stratified Medicine



Patients are grouped by:

- Disease Subtypes
- Risk Profiles
- Demographics
- Socio-economic
- Clinical Features
- Biomarker
- Molecular sub-populations



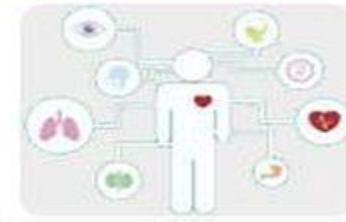
To

Precision Medicine



Individual patient level:

- Genomics and Omics
- Lifestyle
- Preferences
- Health History
- Medical Records
- Compliance
- Exogenous Factors



Companion Diagnostic (CDx)
Biomarker

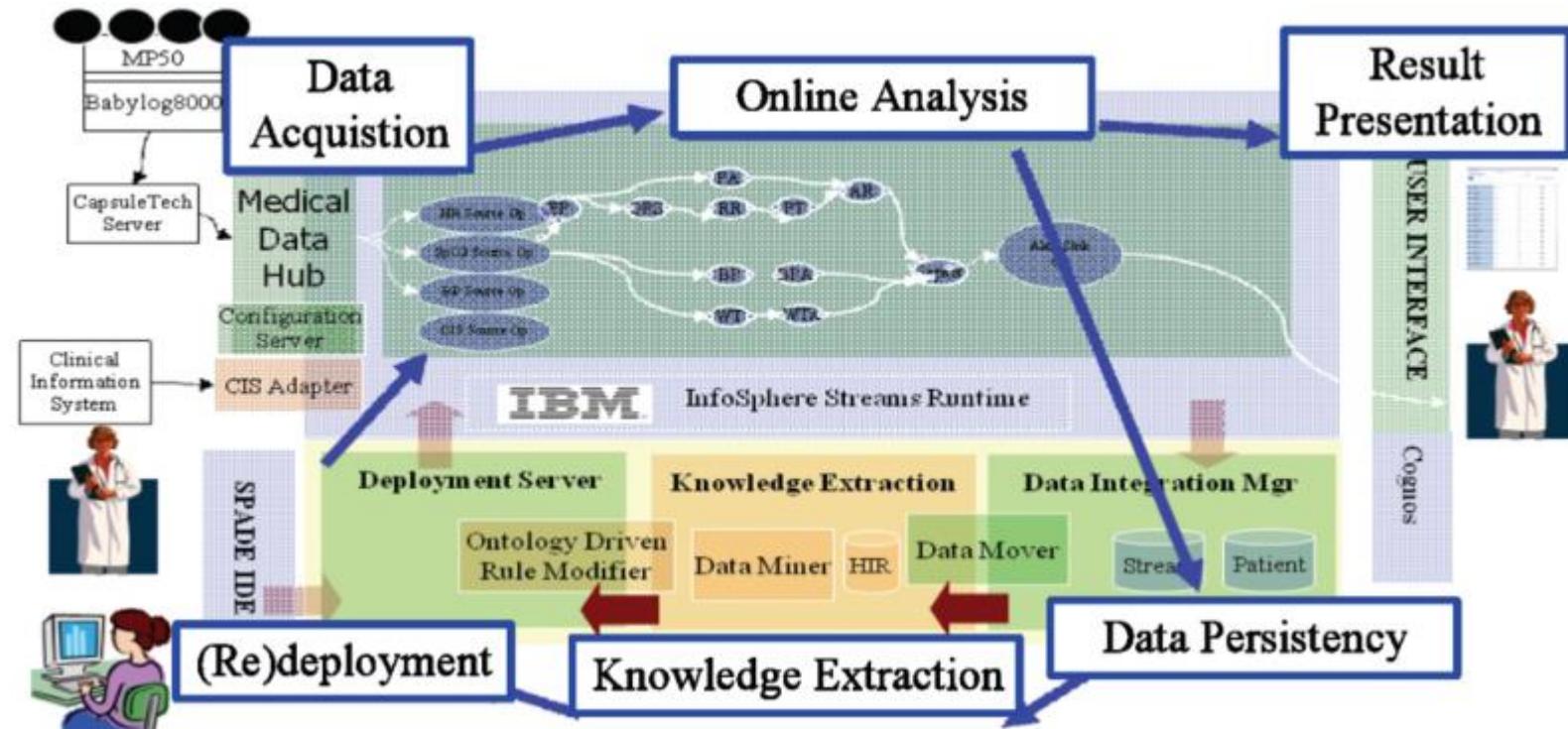
Therapy
(Rx + Dx = CDx)



Each Patient Benefits From Individualized Treatment

**Precision medicine ensures delivery
of the right intervention to the right
patient at the right time.**

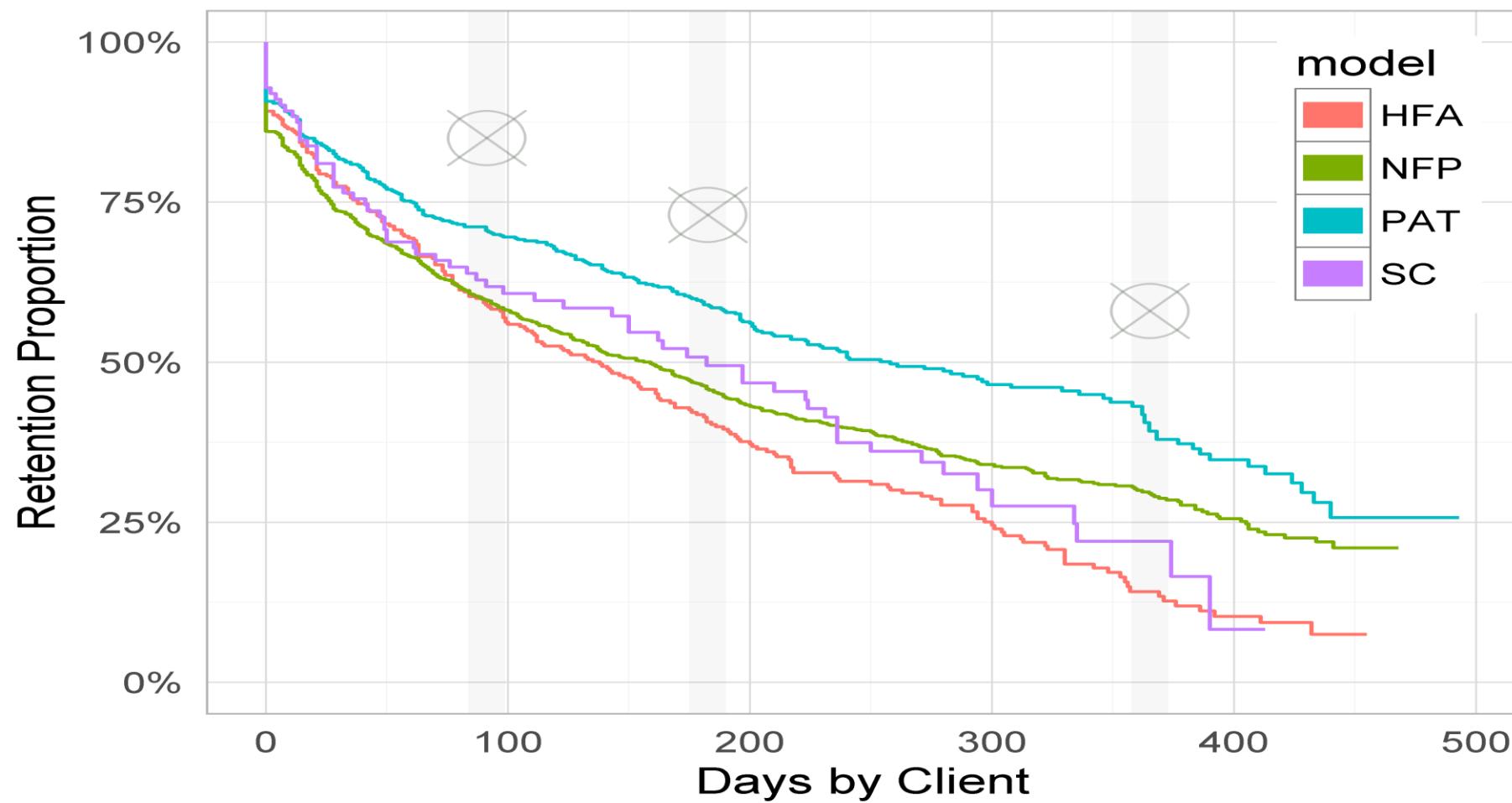
ARTEMIS



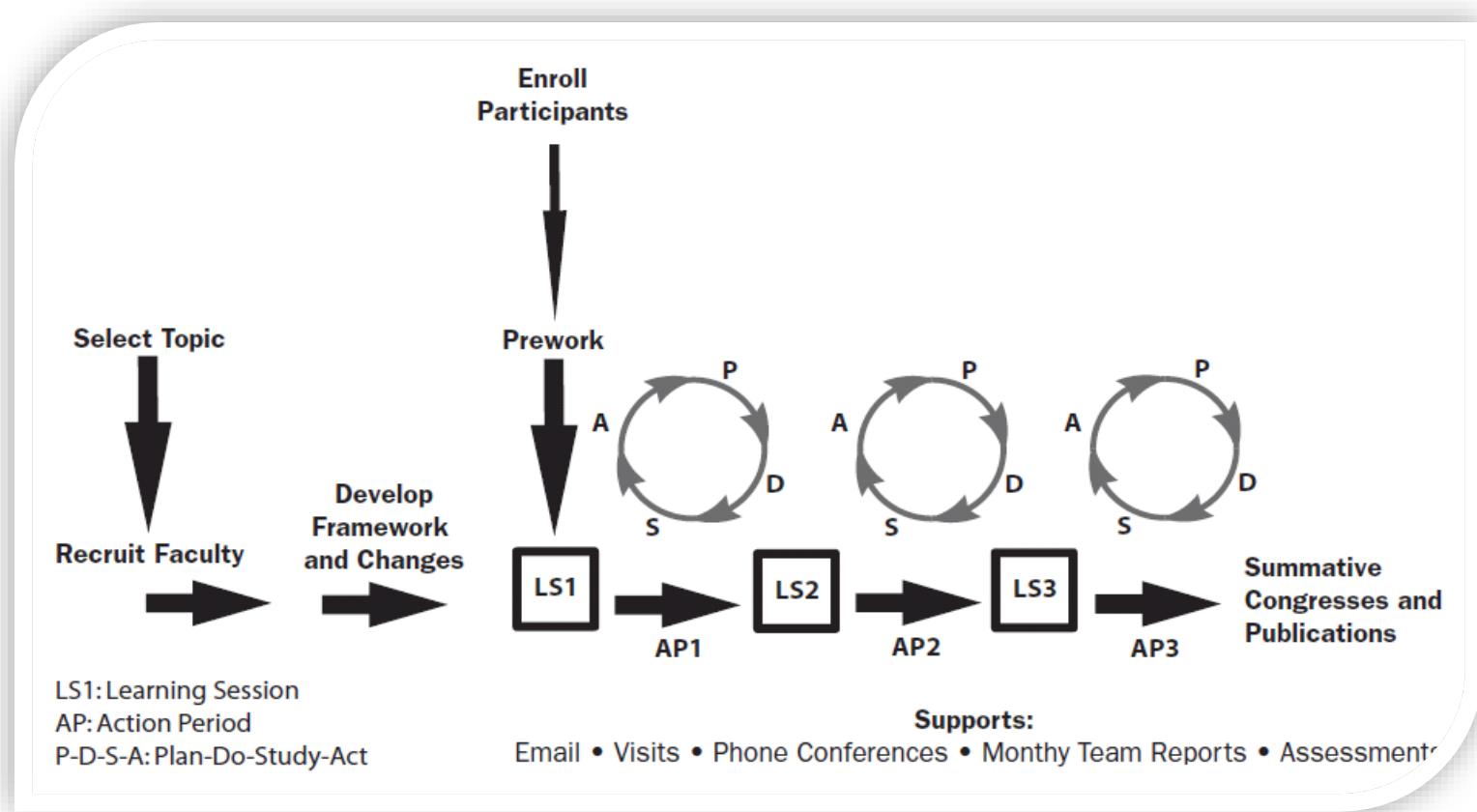
OK HV-CollN

Oklahoma Home Visiting Collaborative Improvement and Innovation Network

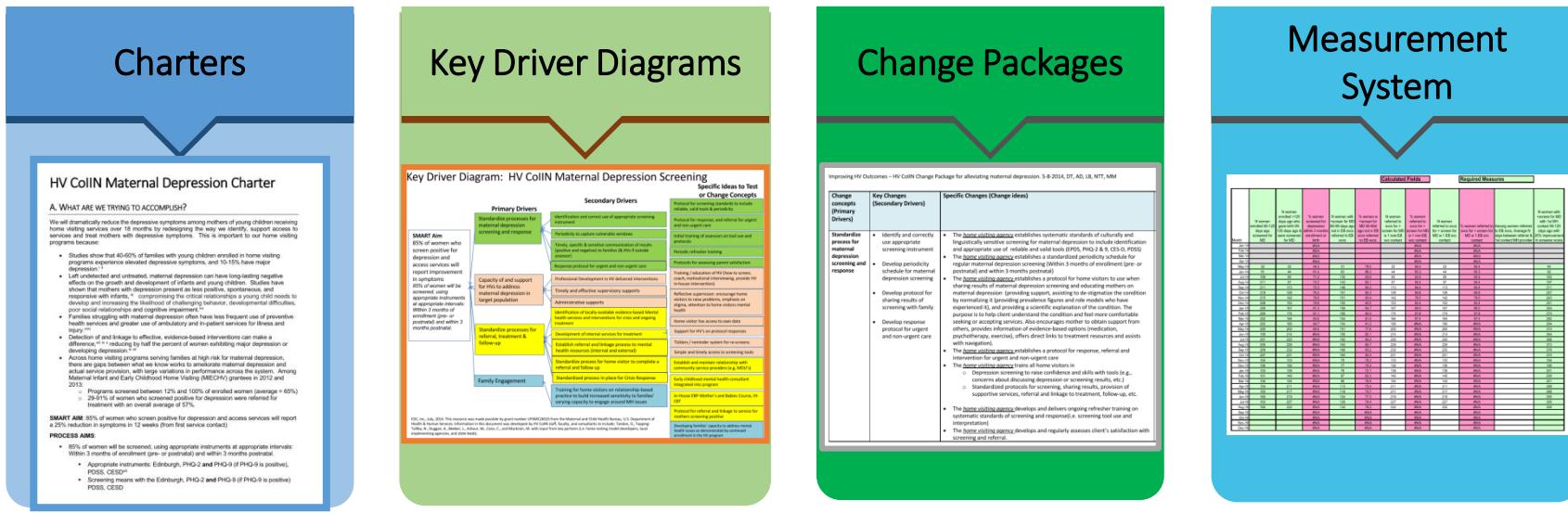
Retention by Model, Oklahoma, 2015 Referrals



The IHI Breakthrough Series as the HV CollN Framework



Developed a HV CollIN “Playbook” for each topic

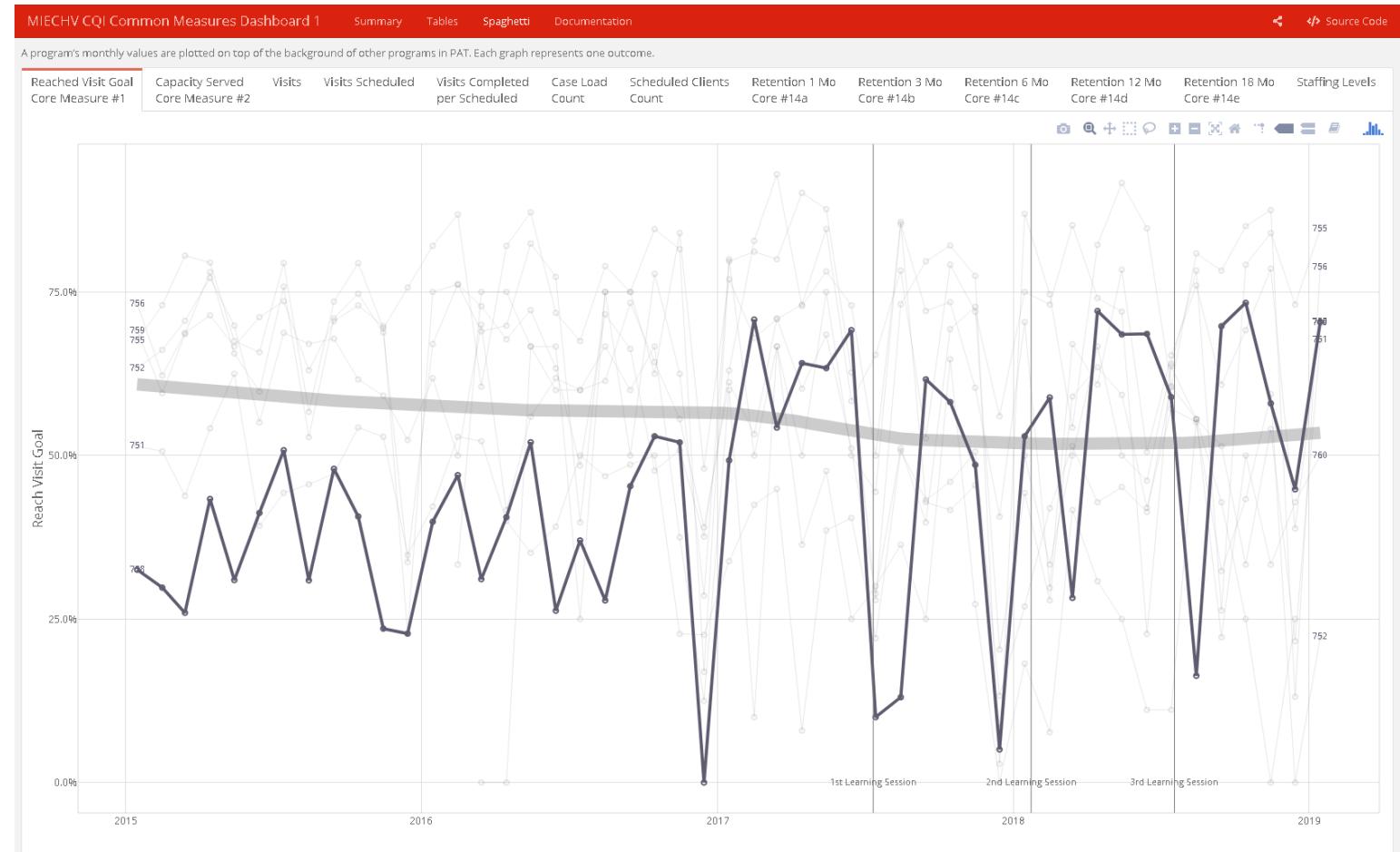


Helping Teams with the
“Why, What and the How”

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

