



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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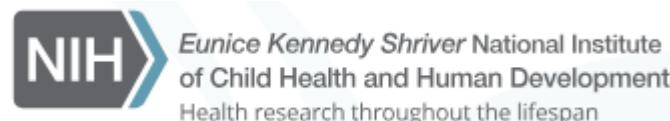
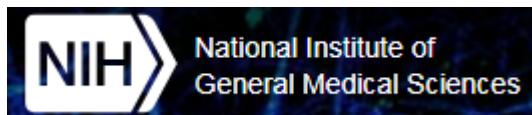
University of Oklahoma HSC

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

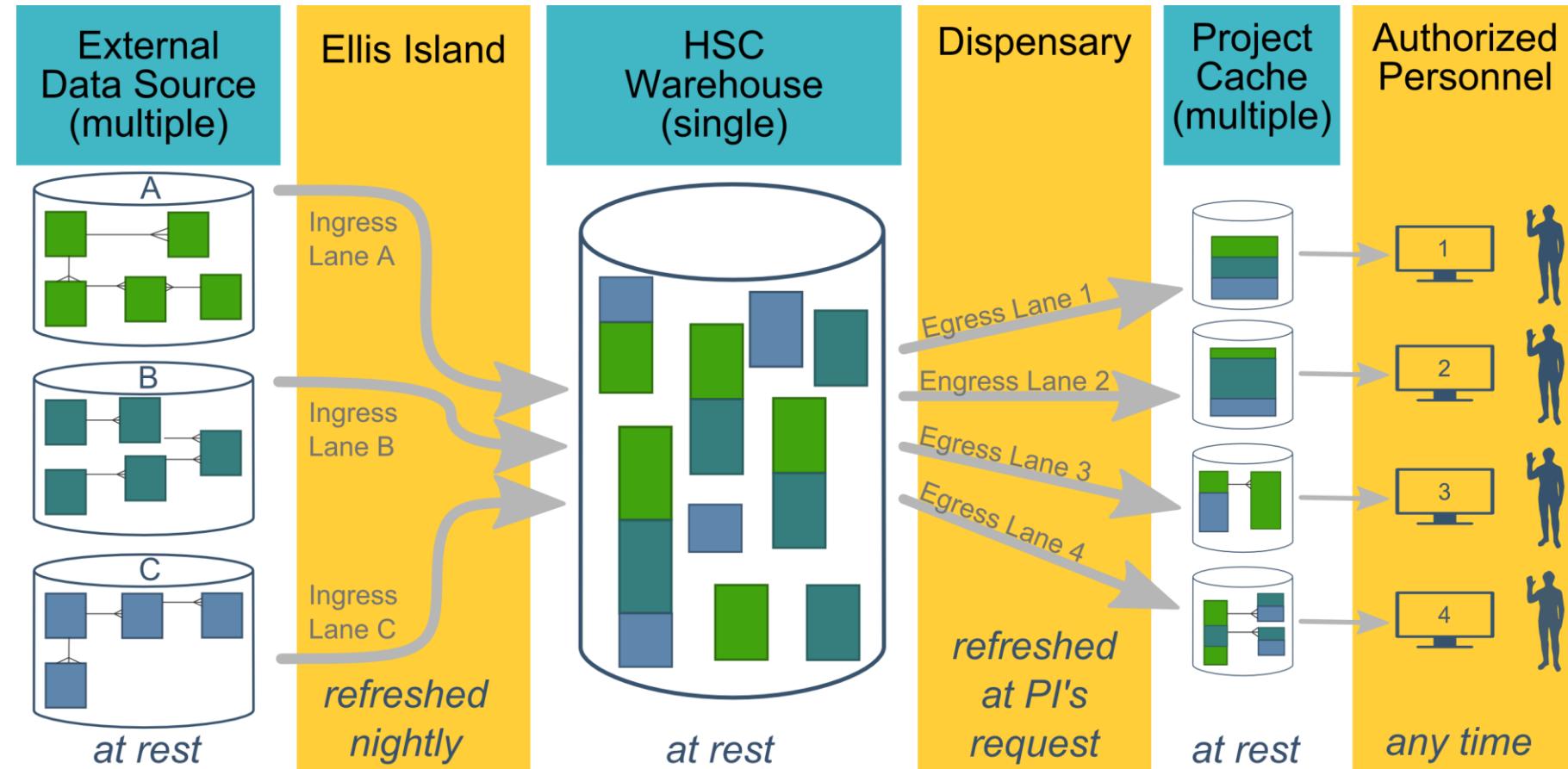
- **CDW:** Clinical Data Warehouse

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>

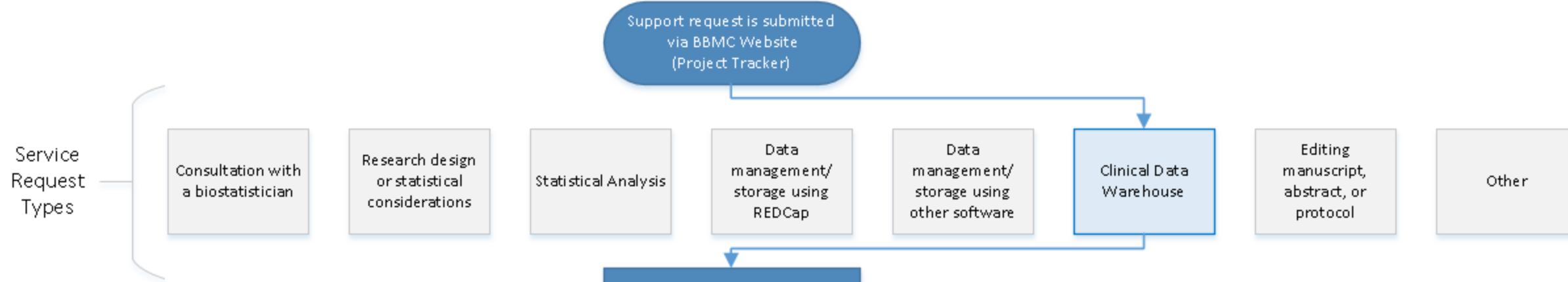
Ecosystem Architecture



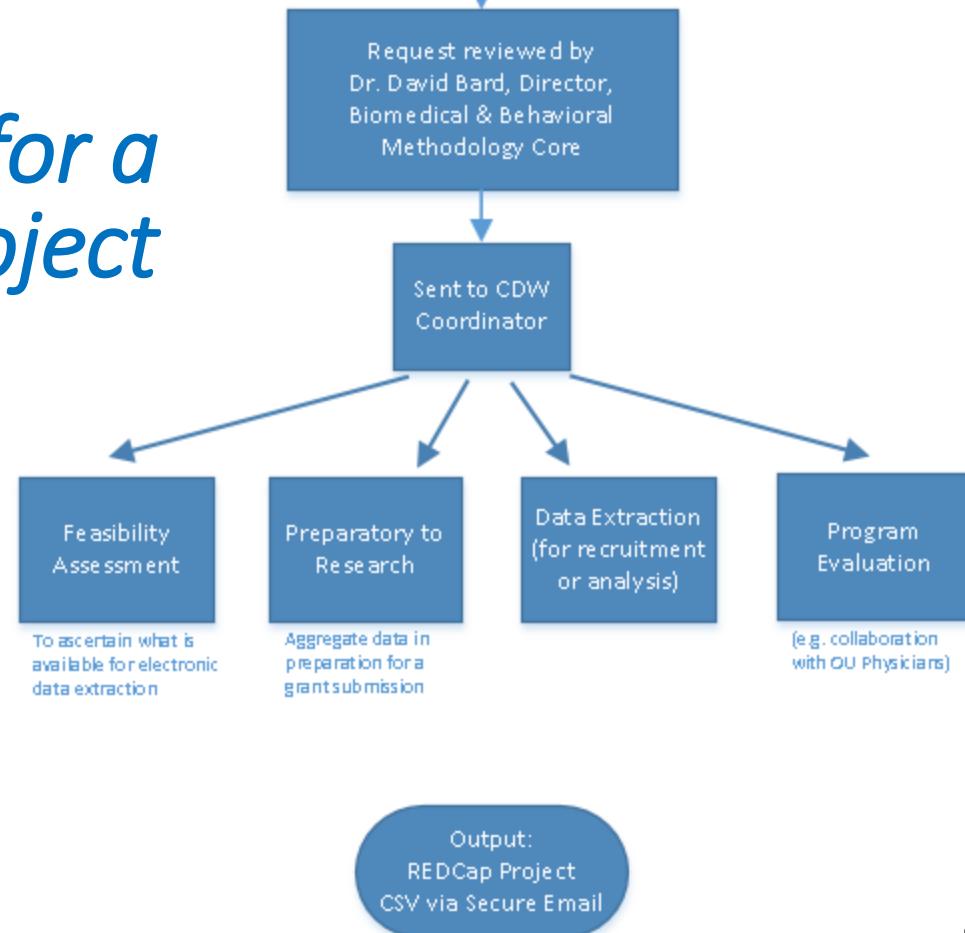
- **Data Source** (column 1): contains unique info
- **Warehouse** (column 3): contains copy after manipulation
- **Project Cache** (column 5): contains copy of copy after a lot of manipulation

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/
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

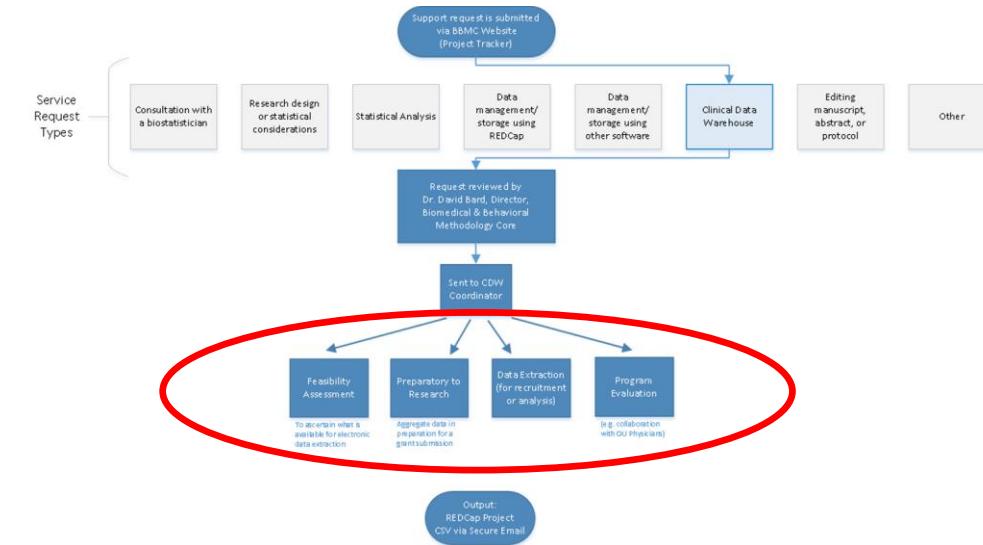
since 2017; page 3

| 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. Krempel | ORL |
| Cervical Spondylotic Myelopathy (CSM) | Z. Smith | Neurosurgery |
| Sellar and Parasellar Tumors | I. Dunn | Neurosurgery |

| Short Name | PI | Department |
|--|---------------|------------------|
| Detection and Management of Bladder Cancer | S. Patel | Urology |
| Survey of Patients Regarding Care Utilization During COVID-19 | D. Hahn | Pediatrics |
| Circumcision Complications Requiring Surgical Revision | D. Frimberger | Urology |
| Genetic Counseling Services for Children with Neurodevelopmental Disorders | A. Wadley | Genetics |
| ECO-RESET | R. Harty | Gastroenterology |
| Vasopressor Use in Microvascular Free-Flap Reconstruction of the Head and Neck | N. Vasan | ORL |
| Genetic Testing for the BRCA gene | I. Shim | Genetics |
| Bronchiolitis | A. Sparkman | Pediatrics |
| Mirikizumab in Patients with Moderately to Severely Active Crohn's Disease | H. Bitar | Gastroenterology |
| Renal Cell Carcinoma | J. Heinlen | Urology |

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 | 2-12 Yrs | 13-16 Yrs | 17-20 Yrs |
| 1 | Drug of Interest (DOI) | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | alfentanil (IV) ¹⁶ | | | | X | X | X | X | X | Closed | Closed | | X X |
| 5 | amikacin ⁵ | X | | | X | X | X | X | X | X | X | X | X |
| 6 | atropine (IV) ¹⁴ | | | | X | X | X | X | X | X | X | X | X |
| 7 | cefepime ⁵ | X | | | X | X | X | X | X | X | X | X | X |
| 8 | ceftazidime | | | | | | | | | | | | X X |
| 9 | cidofovir | | | | | | | | | | | | X |
| 10 | ciprofloxacin | | | | | | | | | | | | X |
| 11 | clozapine ⁴ | | | | X | X | X | X | X | X | X | X | X |
| 12 | dexmedetomidine ¹³ | | | | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | X X X |
| 13 | diazepam | | | | | | | | | | | | X |
| 14 | etomidate ^{2,14} | | | | X | X | X | X | X | X | | | X X |
| 15 | fosphenytoin | | | | | | | | | | | | X |
| 16 | haloperidol ⁴ | | | | X | X | X | X | X | X | X | X | X X |
| 17 | heparin (low molecular weight) ⁸ | | | | X | Closed | Closed | Closed | Closed | Closed | Closed | Closed | X X |
| 18 | hydromorphone ^{15,16} | | | | 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 ⁴ | | | | X | X | X | X | X | X | X | X | X X |
| 21 | meropenem (IV) ^{2,5} | X | | | X | X | X | X | X | | | | |
| | methylprednisolone ¹¹ (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

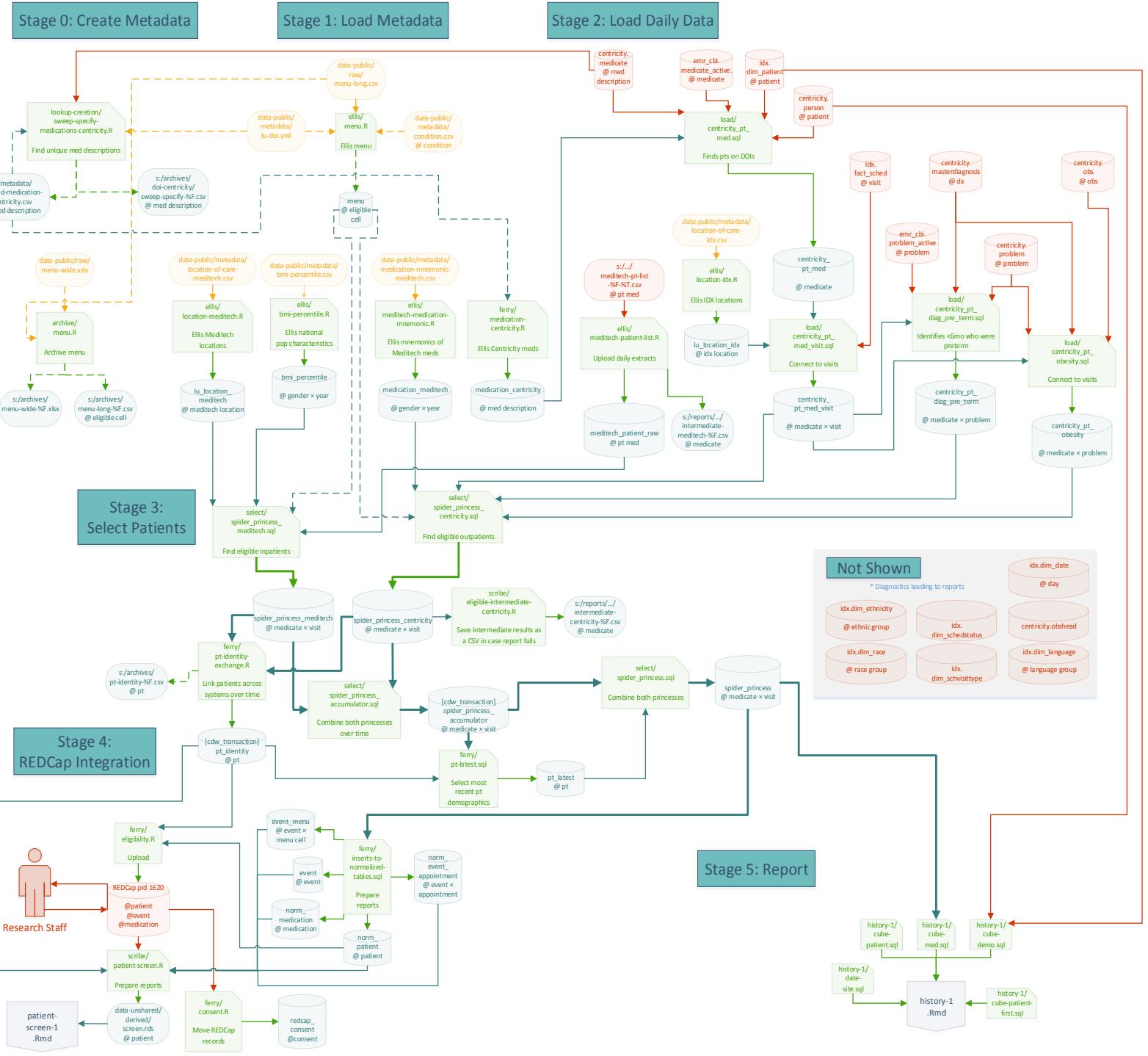
- Finds patients who received a drug of interest *and meet an age range or condition currently open for enrollment*
- 31 unique patients
- Record review: ~5 min/pt
- ~155 minutes

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...) | |
| \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)

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

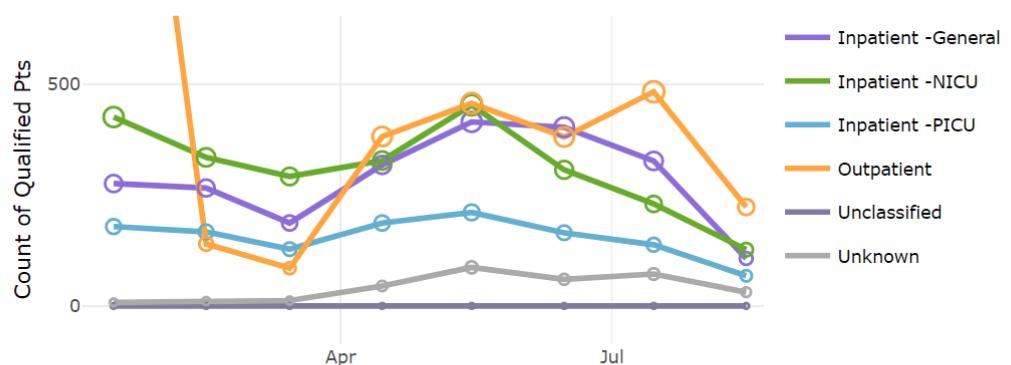
2.1 Patients Qualified

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.

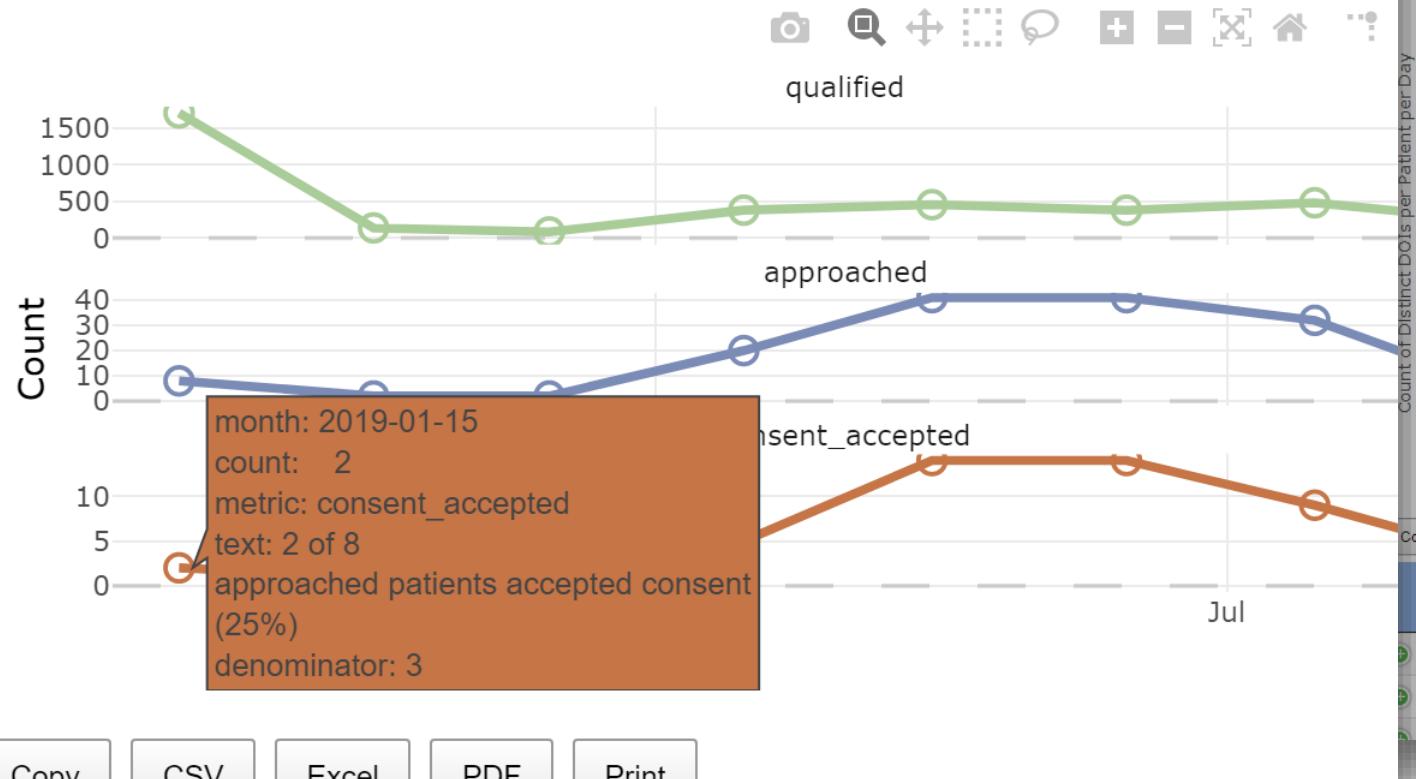
3.1 General

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.

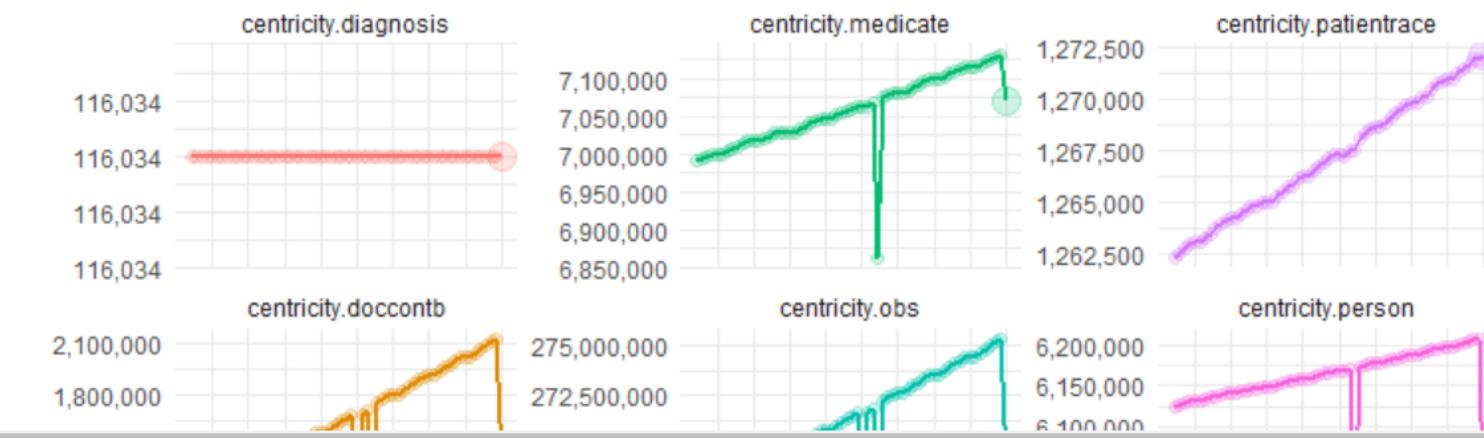
2.1 Warehouse

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*

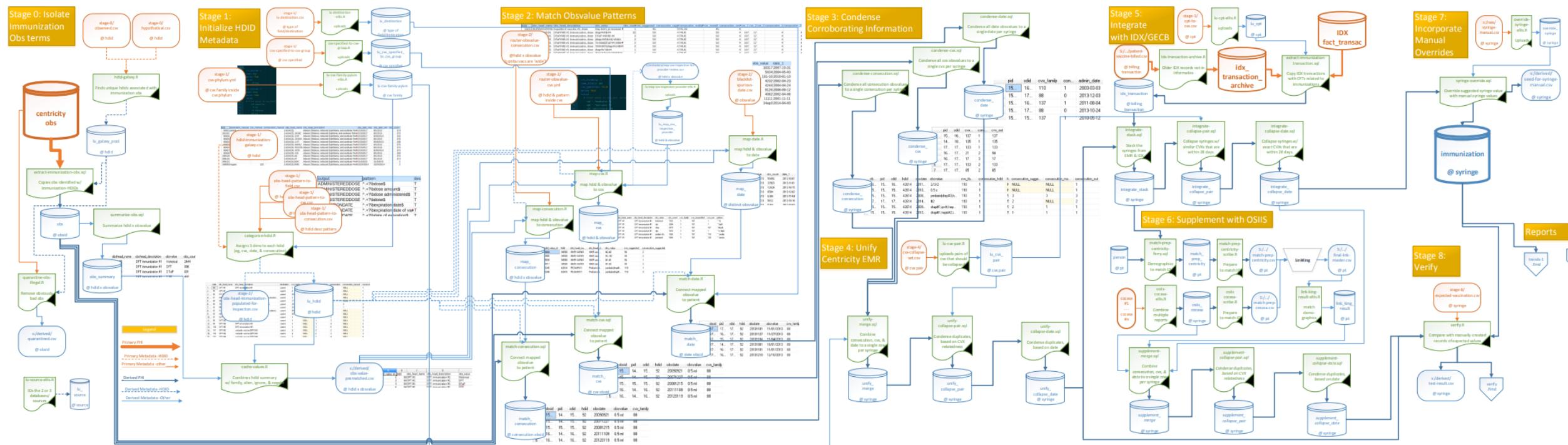
National Registry

- 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

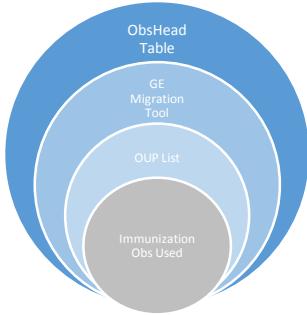
Immunization Project

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

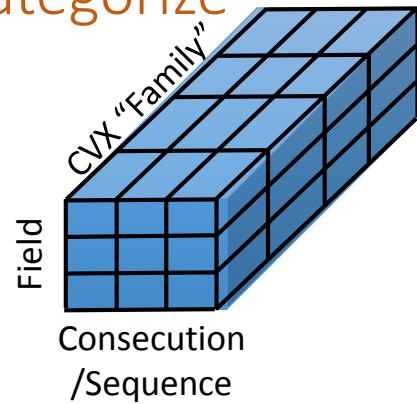
Flow Diagram



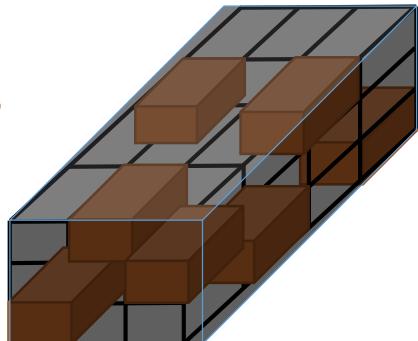
Stage 0: Isolate immunization hdids/obs terms



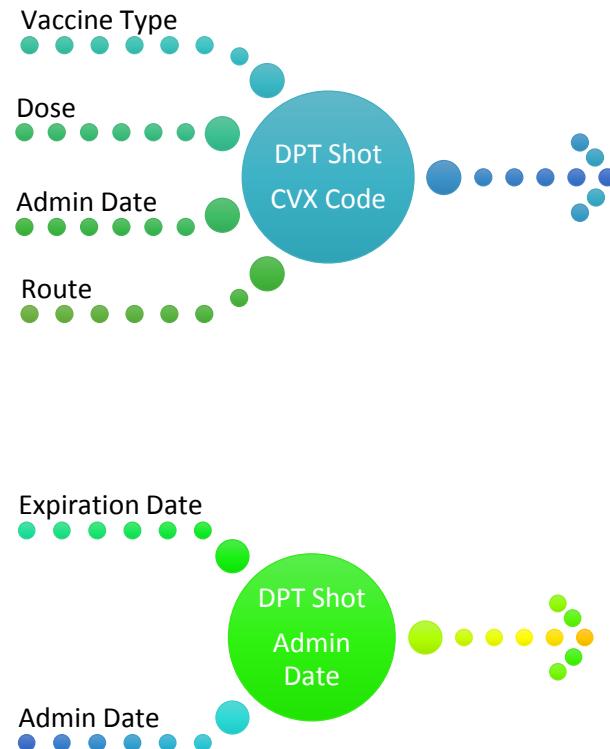
Stage 1: Categorize HDID/Obs



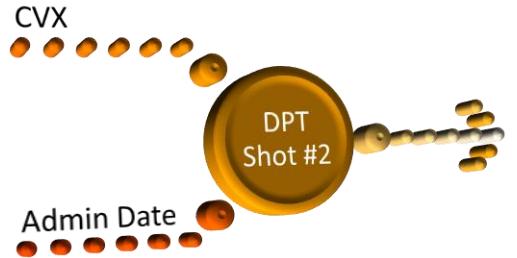
Stage 2: Categorize value *within* hdid/obs



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

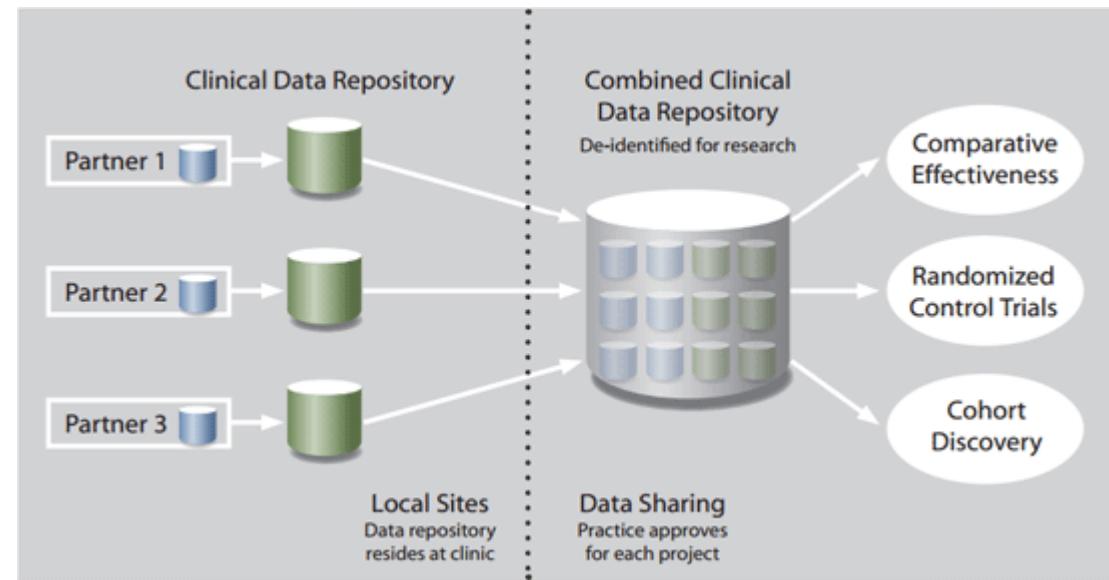
Brief Summary of CDW Value

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

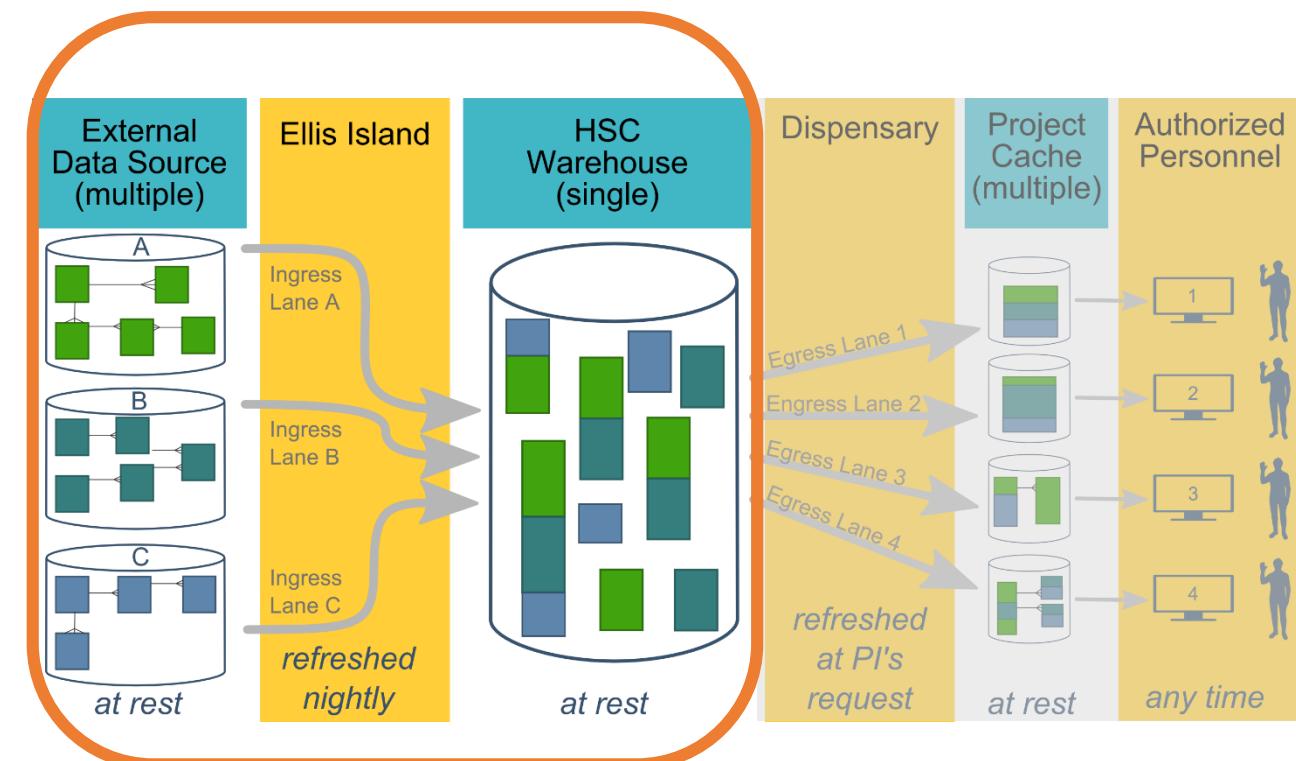
- Cohort discovery: determine if enough patients meet a given set of conditions which match recruitment criteria
- Statistics: quickly pull numbers, “How many patients were seen last month?”
- Chart Abstraction: Generate a dataset for research or quality improvement purposes

<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.

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



IDeA States
Pediatric Network



SCTR
Oklahoma Shared Clinical
& Translational Resources

Thank you

Will Beasley, PhD

Ashley Thumann, MHA

Wale Oluborode, MD, MPH

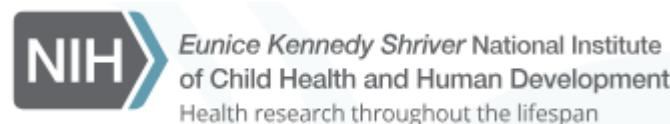
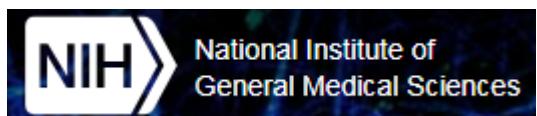
David Bard, PhD

University of Oklahoma HSC

Biomedical & Behavioral Methodology Core (BBMC)



Award Numbers:
UG1OD024950
U54GM104938

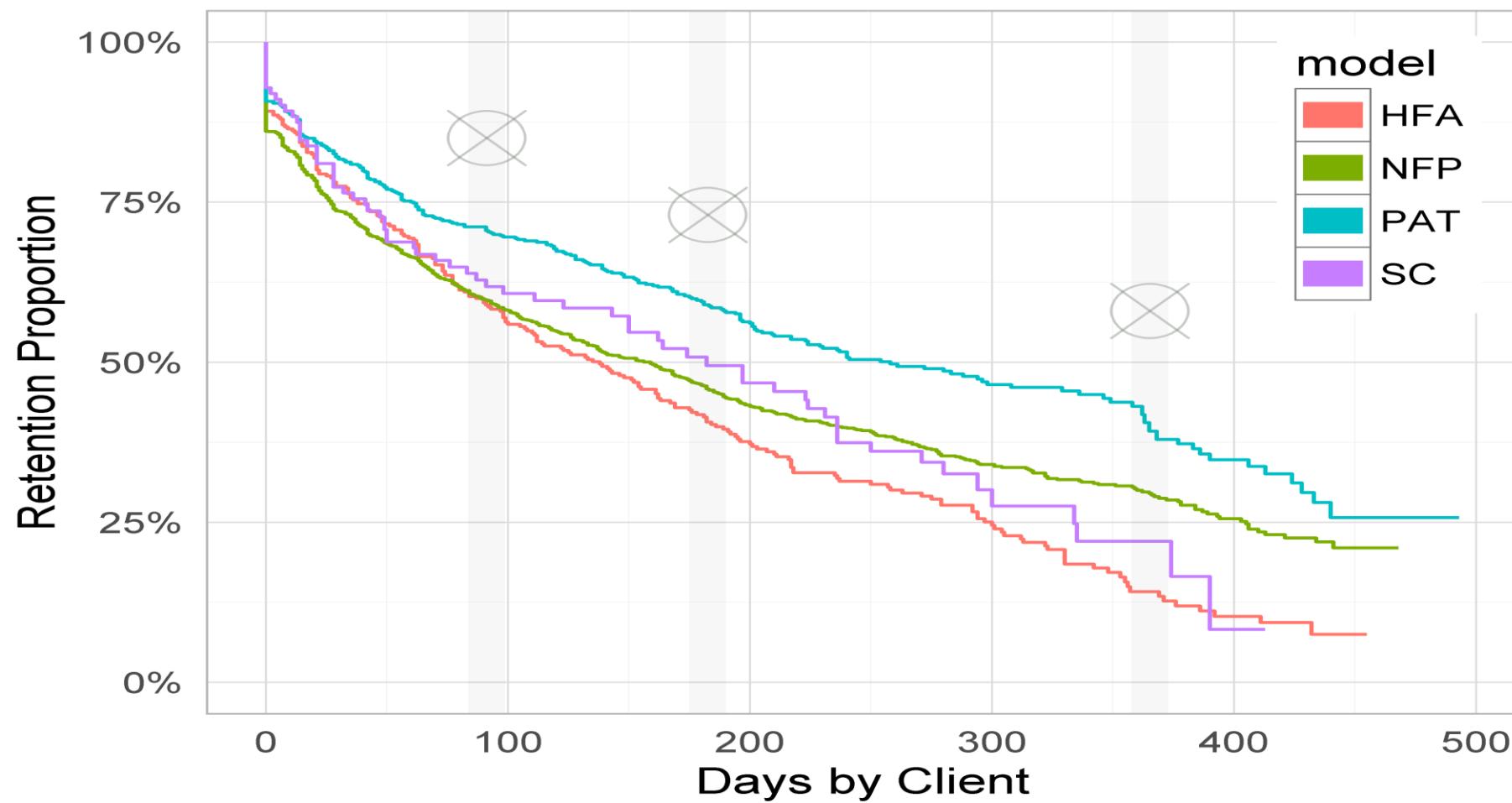


Extra Slides

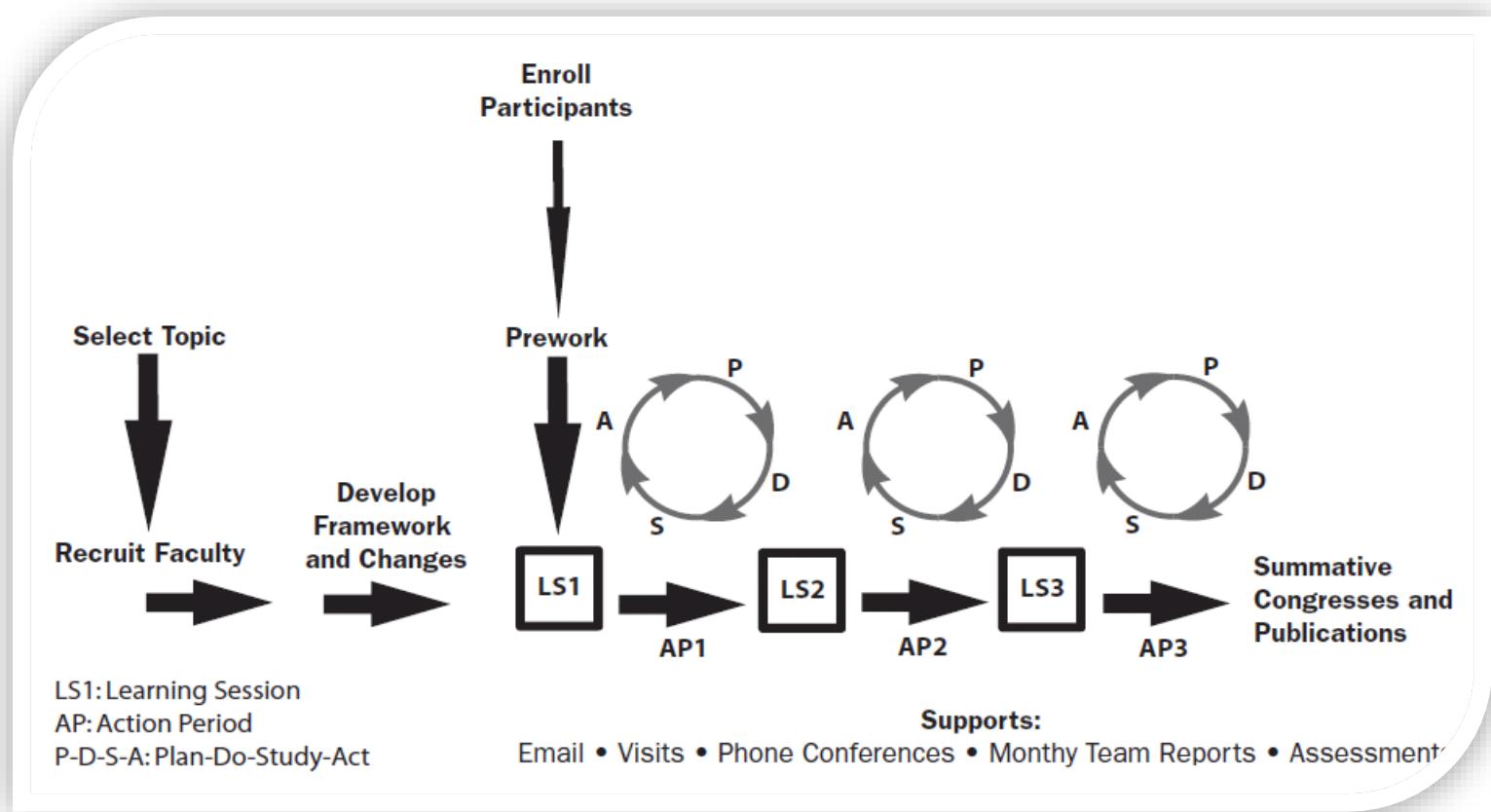
OK HV-CollN

Oklahoma Home Visiting Collaborative Improvement and Innovation Network

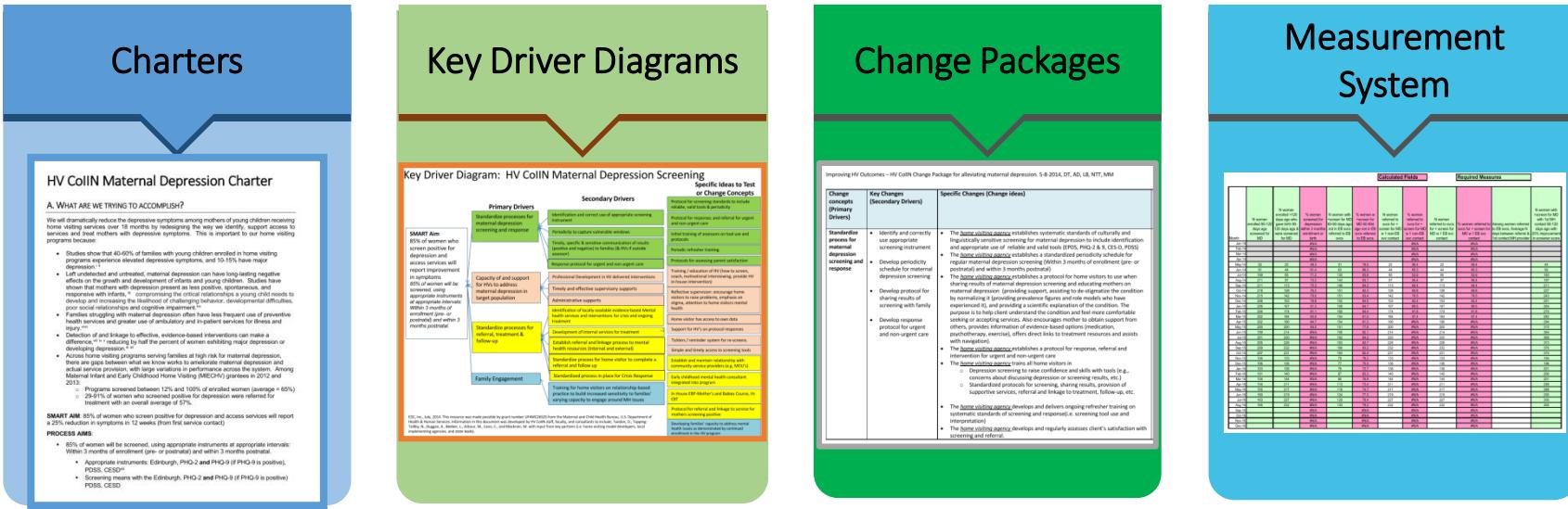
Retention by Model, Oklahoma, 2015 Referrals



The IHI Breakthrough Series as the HV CollN Framework



Developed a HV CollIN “Playbook” for each topic

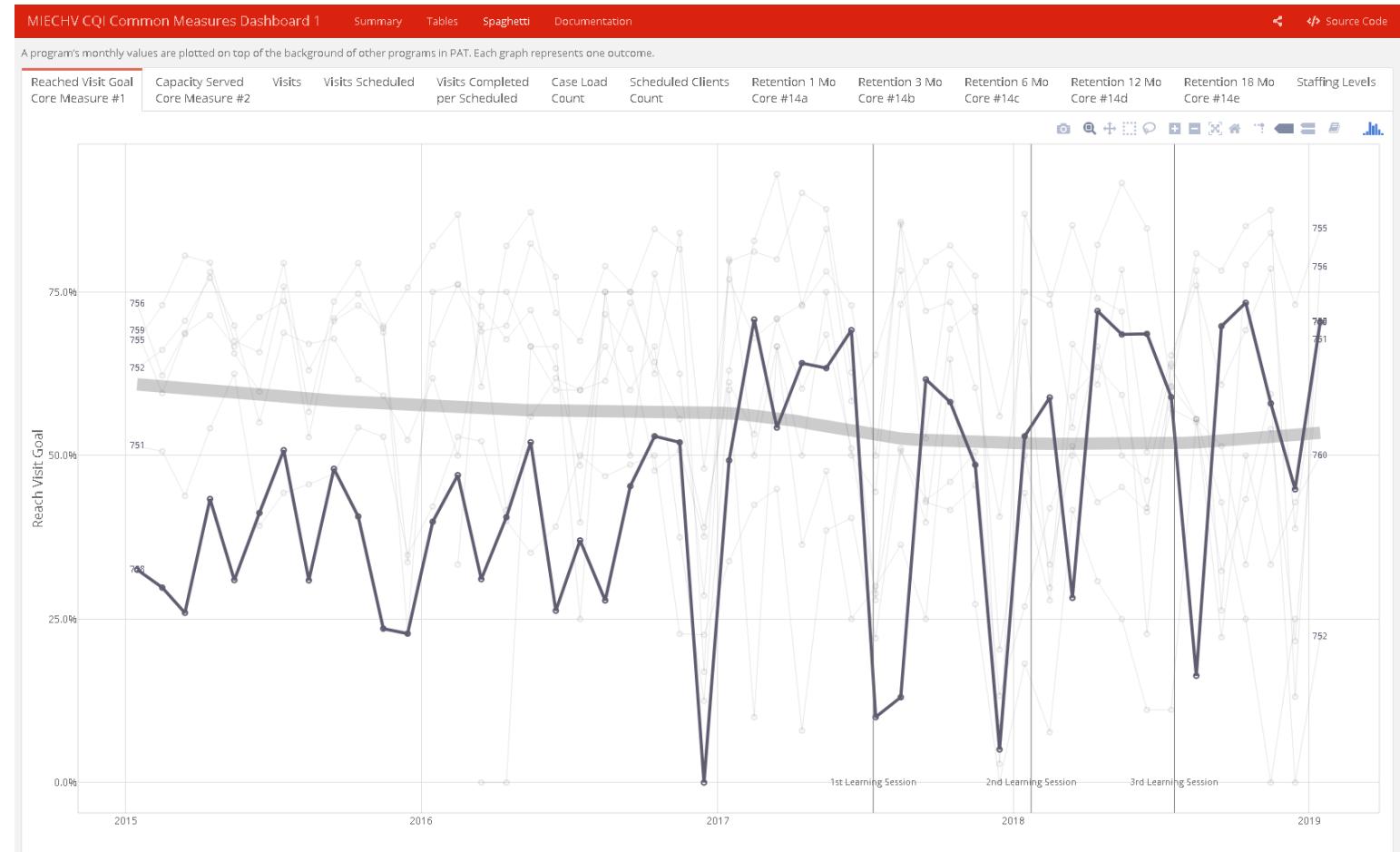


Helping Teams with the
“Why, What and the How”

Dashboards

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

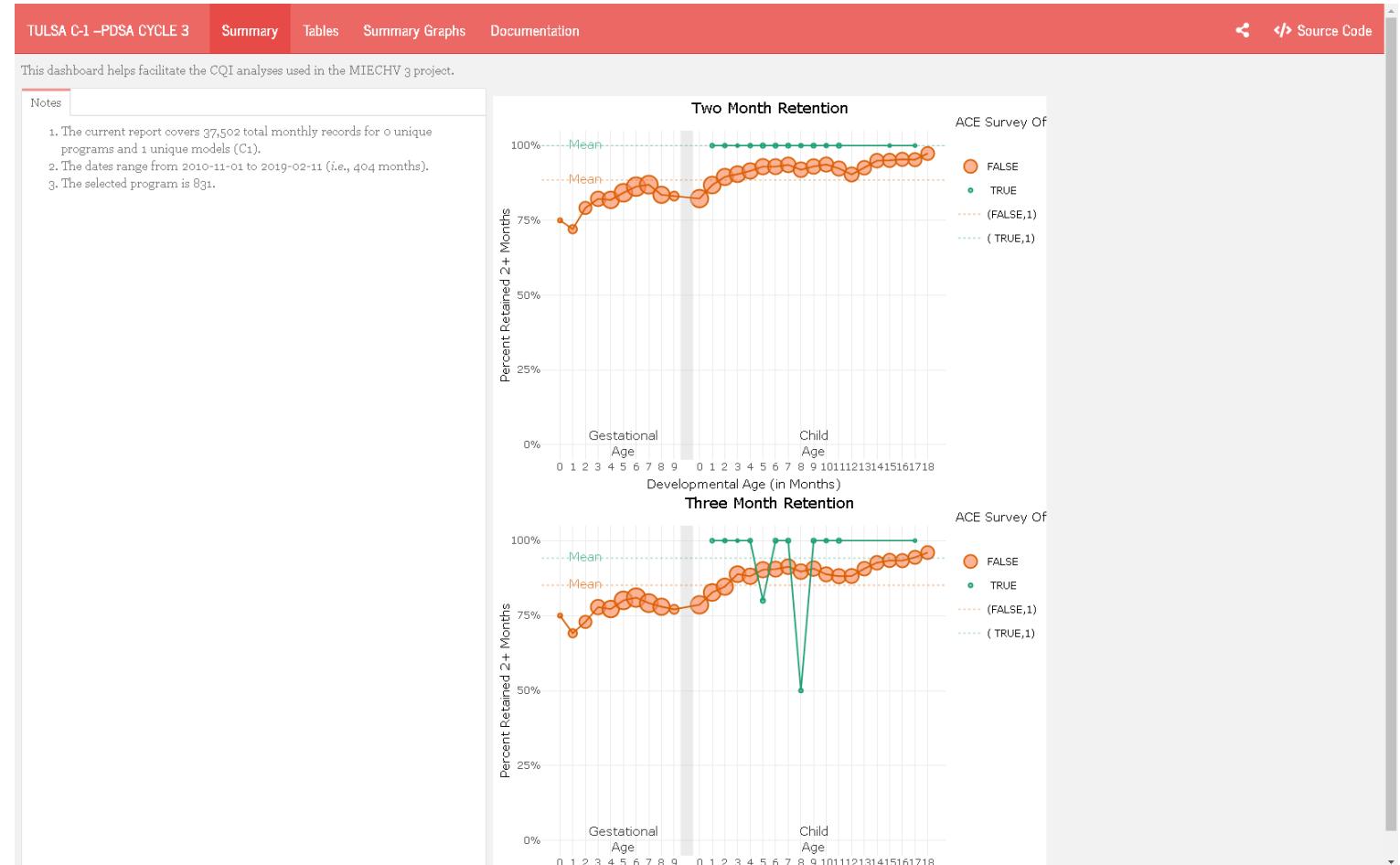
- Common measures
- Individual



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 | | |
|---|--|--|
| 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

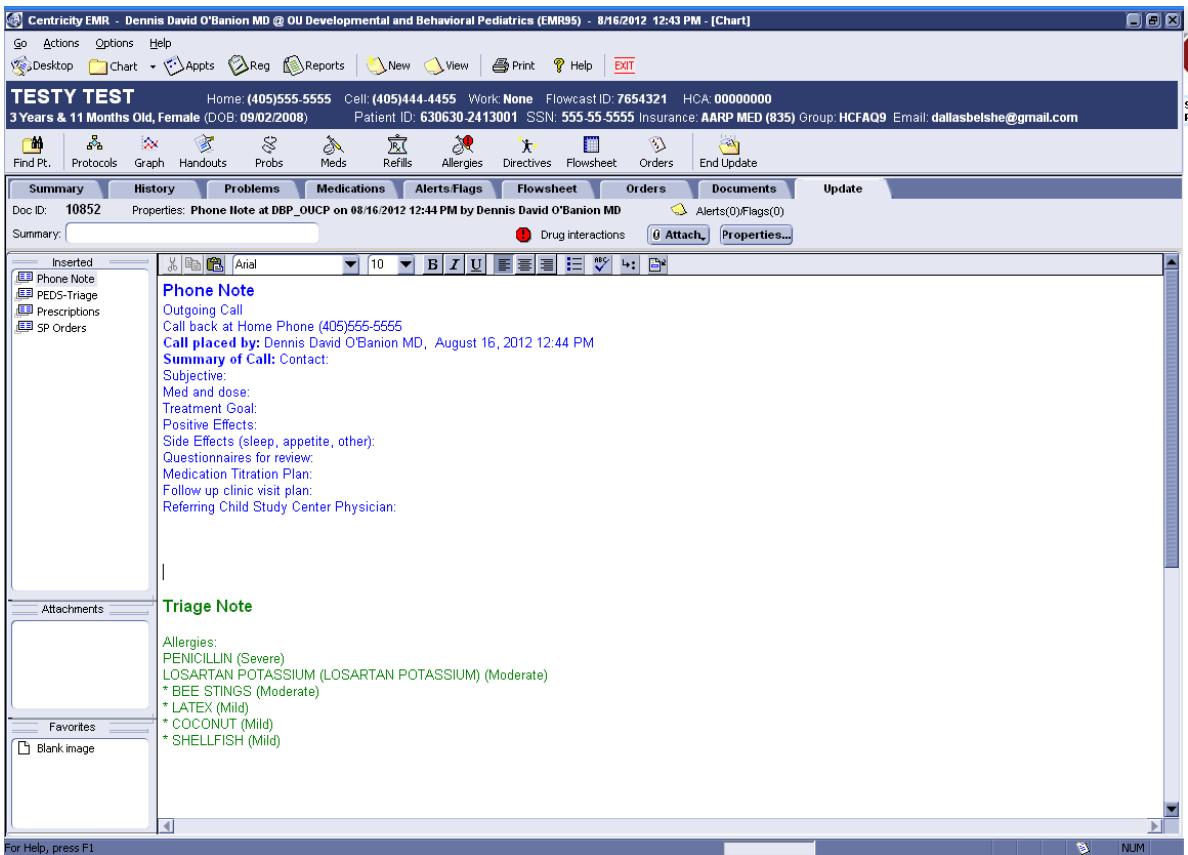
- CQI project with administrative outcome measures
- Investigators requested recurring reports to:
 - monitor compliance with utilization of the PHQ-9 screener at select appointments
 - assess the prevalence of PPD in new mothers
- Inclusion criteria: well child check appointments for children ages 1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

1

Patients are grouped by:

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



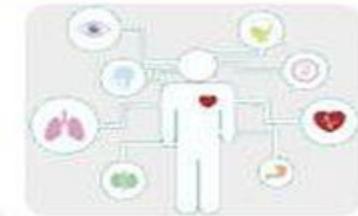
To

Precision Medicine

2

Individual patient level:

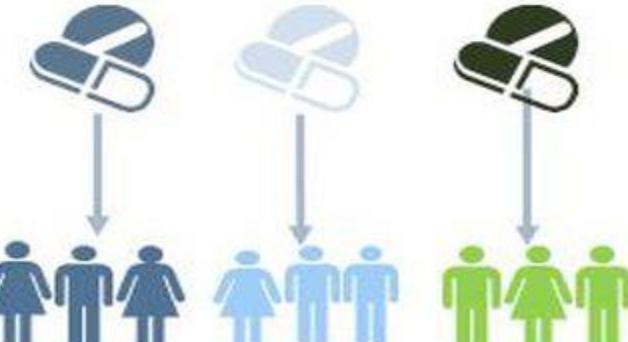
- Genomics and Omics
- Lifestyle
- Preferences
- Health History
- Medical Records
- Compliance
- Exogenous Factors



Companion Diagnostic (CDx)
Biomarker

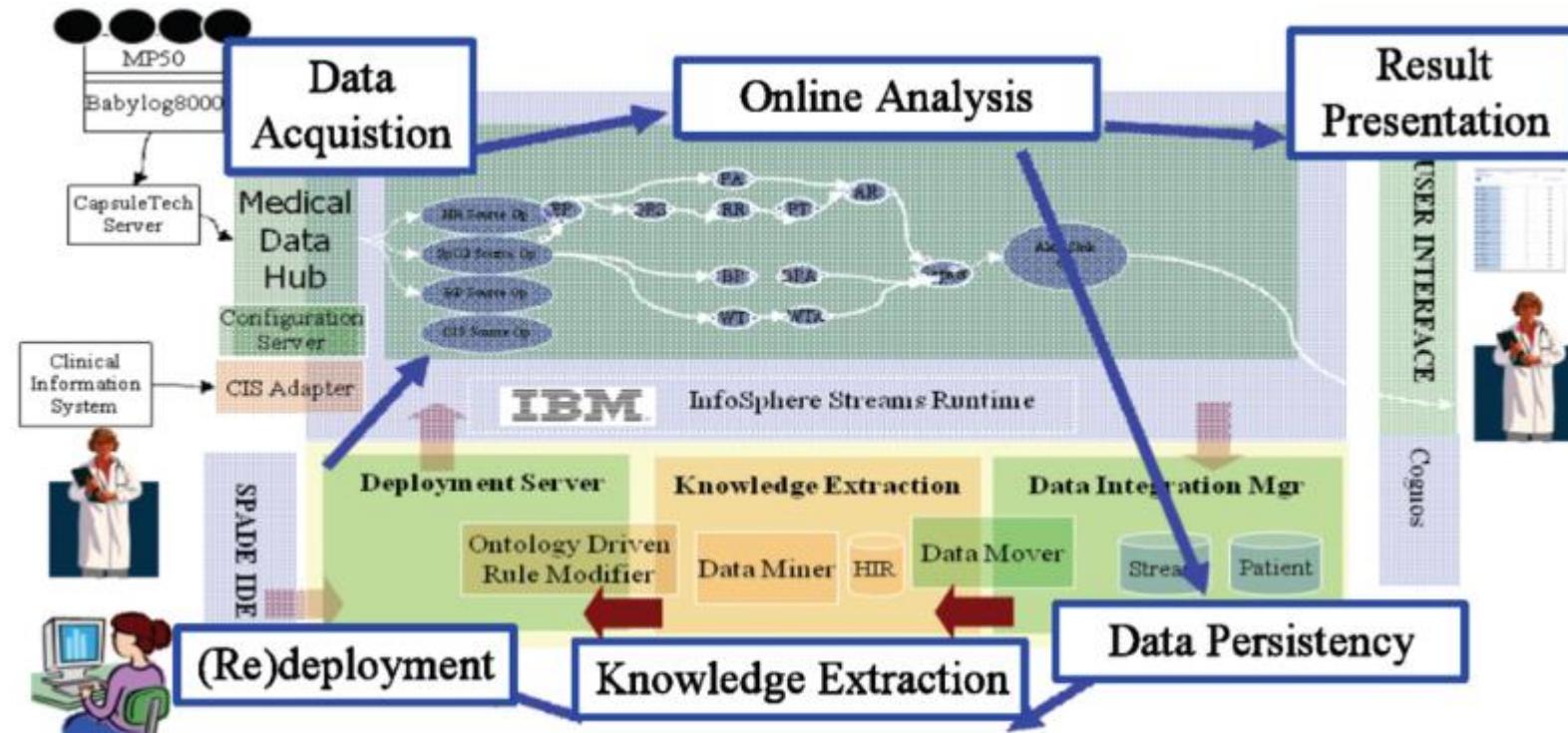
Therapy
(Rx + Dx = CDx)

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



Each Patient Benefits From Individualized
Treatment

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.

NIH Value Set Authority Center
U.S. National Library of Medicine

Welcome Search Value Sets Download Q B

Search the NLM Value Set Repository. Program: All Release: Latest

Refine by: Steward Code System

Query: Enter value set id, codes, words... Q Search Clear

Search Results

Results for All : Latest

Select a hyperlinked OID to see its value set details.

Matched Value Sets

| Name | Code System | Definition Type | Steward | OID |
|-----------------|-------------------------------|-----------------|-------------|--|
| ADHD | ICD10CM | Extensional | Mathematica | 2.16.840.1.113883.3.67.1.101.1.316 |
| ADHD | SNOMEDCT | Extensional | Mathematica | 2.16.840.1.113883.3.67.1.101.1.317 |
| ADHD | ICD10CM ICD9CM SNOMEDCT | Grouping | Mathematica | 2.16.840.1.113883.3.67.1.101.1.314 |
| ADHD | ICD9CM | Extensional | Mathematica | 2.16.840.1.113883.3.67.1.101.1.315 |
| ADHD Counseling | SNOMEDCT | Extensional | Mathematica | 2.16.840.1.113883.3.67.1.101.1.310 |

Value Set Members

Expanded Code List

| 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 ...)