

JUNE 2022

# ERAS and Data Analytics

How to Practically Make It Work



# Project Model

- Children's recently underwent the ACS Children's Surgery Verification Certification (CSV)
- **Same key project elements as ERAS reporting**
  - Collaboration
  - Measure Development
  - Data Structure
  - Documentation
  - Measure Validation
  - Tableau Reporting
  - Continuous Development Cycle



# Collaboration

## Established Project Scope

- Our initial task was to prepare for the American College (ACS) of Surgeons Children's Surgery Verification Program
- Provided an FTE to hire a dedicated software engineer/data analyst to support periop quality and patient safety
- Allowed for specific focus on project



# Collaboration

## Engaged Multidisciplinary Team

- Senior leader sponsorship
- Pediatric Cardiac Anesthesiologist, Associate Chief, Division of Pediatric Anesthesiology
- Cardiac Intensive Care, Medical Director of Quality & Safety for Center for Children's Surgical Services
- Pediatric Surgery-Urology, Medical Director of Surgical Informatics
- Pediatric Surgery-General
- Patient Safety Improvement Lead
- Software Engineer/Outcomes Data Analyst



# Measure Development

## Measure Identification

- ACS Children's Surgery Verification Certification provided a foundation of 15 measures
- Concurrently added additional measures
  - Examples: bathing prior to surgery and Emergency Department returns
- Children's Hospital Colorado has developed an ERAS protocol by specialty/operation

Counsel about ERAS	Regional anesthesia <i>(ropivacaine 0.2% single agent)</i>	No nasogastric tube
Carbohydrate load <i>(omit if &lt; 1 year age)</i>		N/V prophylaxis
Avoid prolonged fasting	Avoiding excess drains	Early feeding
No bowel prep	Euvolemia	Early mobilization
Pre-medications	Normothermia	Non-opioid pain meds <i>caution on use of ketorolac if bilateral grade IV or V reflux, known CKD &gt; stage 2, solitary kidney, allergy</i>
Antibiotic prophylaxis	Minimizing opioids	Early D/C IVF
	Lap- or robot-assisted	Early D/C of excess drains
	DVT prophylaxis <i>omit if age &lt; 10, regardless of risk factors</i>	Minimizing opioids



# Measure Development

## Measure Data Definition

- Discrete elements already available
  - ICD10 billing codes
  - Complications database (IRIS, QSRs)
  - County mortality database
  - EMR flowsheets
- Build additional data capture in EMR
  - Postop destination
  - Planned return to OR
- RedCap Projects (details next slide)





# Measure Development

## RedCap Projects

- Some measures can't be cleanly captured using discrete data
- RedCap projects allow project specific review, flows into data warehouse
- Each case within broad population is reviewed in RedCap and adjudicated before being included in the measure
  - Example: postop stroke
- Replaces disparate Excel data collection where possible
  - Examples: transfusion reactions and SSI bundle compliance

The screenshot shows a RedCap form for reviewing surgical cases. It includes a table of fields for data entry, a 'Review Status & Notes' section with a question 'Is it appropriate to include this record in this measure?' and radio buttons for 'Yes' and 'No', a 'Notes' section with a text area, and a 'Form Status' section with a dropdown menu set to 'Complete'. At the bottom are buttons for 'Save & Exit Form', 'Save & ...', and 'Cancel'.

Epic ID of the surgical case. This column identifies the surgical case (ORC) and log (ORL) records	
Date and time the patient started receiving care at the hospital	
Date and time the patient was discharged from the hospital or departed the ED without being admitted	
Age in years of the patient at the time of the admission	
Name of the location for the procedure	
Name of the procedure location department:	
Primary surgical service for the case	
Flag for if the anesthesia procedure was emergent	
Primary procedure for the case:	
Date and time when the procedure started, or when the incision was made; when null, it's the surgery start date.	
Primary surgeon for the record.	
Responsible anesthesiologist for the record.	
Information specific to each complication	

**Review Status & Notes**

Is it appropriate to include this record in this measure? ☐ Yes ☐ No reset

\*\* must provide value

**Notes** Expand

**Form Status**

Complete? Complete

Save & Exit Form Save & ...

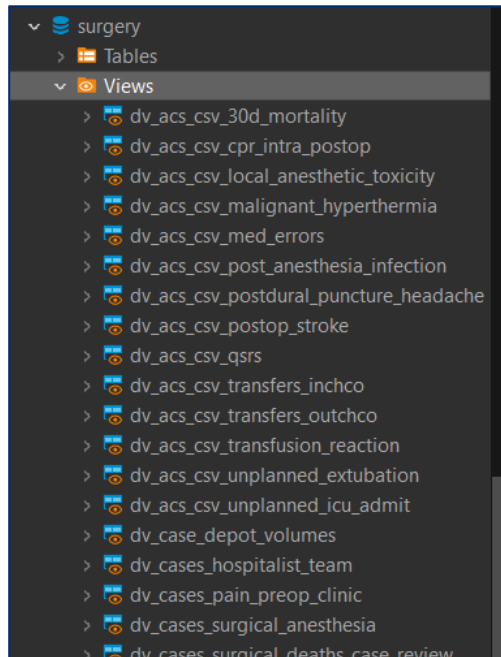
Cancel



# Data Structure

## Data Warehouse SQL Views

- Data warehouse is a virtual environment (Denodo)
- Separate SQL views for base population and each measure
  - Must be designed efficiently with a consistent base population
  - Feed RedCap projects
  - Available to analysts outside of periop quality and safety
    - Examples: Heart Institute and Research
  - SQL code pushed to Git for versioning and continuity





# Documentation

## Documentation

- High-level data definitions easily accessed by users within reports
- Detailed technical data definitions for continuity
- Process documents for more detailed projects (data gathering to reporting)
  - Examples: SSI and NSQIP
- Data warehouse SQL documentation for use by other analysts

Periop Quality Outcomes					
<u>Exclusions</u>					
<u>Primary Service</u> : Dental, Hematology					
<u>Primary Procedures</u> : lumbar puncture, lumbar puncture with chemo, bone marrow biopsy, bone marrow aspiration, bone marrow & lumbar puncture, organ retrieval liver/heart/kidney, deceased donor cut down/split - liver transplant, deceased donor whole organ - liver transplant					
Category	Complication	Data Source	Count Type	Level of Details	Definition
ACS	30-Day Mortality	Epic/CDPHE	MRN	All cases in final encounter before death	Raw/unreviewed deaths that occurred within 30 days of surgery; inc
	CPR-Intraop	Anesthesia/Codes Database	Case	Applicable case	Documented as an anesthesia complication or event (including "CPR"
	CPR-Postop (48 Hours)	Anesthesia/Codes Database	Case	Case closest to CPR	Documented in Redcap within 48 hours of surgery
	Local Anesthetic Toxicity	Anesthesia	Case	Applicable case	Complication recorded during the anesthesia event
	Malignant Hyperthermia	Anesthesia	Case	Applicable case	Complication recorded during the anesthesia event
				Closest case to error	Medication errors documented in OSRS, done through data integration by Med Safety, categorized as NCC MERP

Data Definitions



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Link to definitions  
on every tab



# Measure Validation

- When a new measure is published to the Tableau report, a clinical subject matter expert validates it
- Tableau Report includes case level detail
- Additional review in EMR

Transfers-Higher Level of Care	Encounter	Readmits/Transfer Center	In Validation	
Transfers-Out of CHCO	Encounter	Discharges	In Validation	
Transfusion Reaction	Encounter	Lab	In Validation	
Unplanned Extubation	Case	Anesthesia	Validated	
Unplanned ICU Admission-Floor to ICU	Case	ADT Info	In Validation	
Unplanned ICU Admission-OR to ICU	Case	ADT Info	In Validation	
Unplanned ICU Admission-PACU to ICU	Case	ADT Info	In Validation	
Effective	ED Returns Within 30-Days	Encounter	Returns	In Validation

Case Detail Click on table above to filter case detail													
Complication	Location	Department	MRN	Encounter ID	Log ID	Primary Service	Primary Procedure	Admission Date	Discharge Date	Procedure Date	Death Date	Details A	Details B
Transfers-Higher Level of Care													




# Tableau Reporting


- Single, unified view in data warehouse brings individual measures together for use within Tableau
- Normalizes all column names, allowing shared filters across report
- Tightly controlled permissions
- Can embed related Tableau reports using URLs
- Can embed or link to Tableau reports in Epic dashboards




# Periop Outcomes-ACS CSV Measures

Periop Quality Outcomes All Services

[Data Definitions](#)




Children's Hospital Colorado



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Location

(All)

Department

(All)

Primary Service

(All)

Primary Procedure

(All)

Age Years

0 17

MRN

(All)

Hospitalist Comanaged

(All)

Counts and Rates (occurrence per 1000 cases/encounters/MRNs)

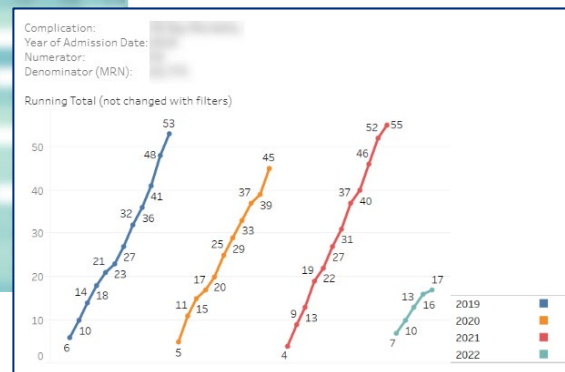
Hover over counts for trend chart

Last Update: 5/27/2022 10:15:48 AM

Category	Complication	Count Type	Data Source	Status
ACS	30-Day Mortality	MRN	Epic/CDPHE	Validated
	CPR-Intraop	Case	Anesthesia/Codes Database	Validated
	CPR-Postop (48 Hours)	Case	Anesthesia/Codes Database	Validated
	Local Anesthetic Toxicity	Case	Anesthesia	Validated
	Malignant Hyperthermia	Case	Anesthesia	Validated
	Medication Errors	Case	QSRs	Validated
	Postdural Puncture Headache	Case	Anesthesia/Coding	Validated
	Postop Stroke	Encounter	Coding	In Validation
	QSRs-Anesthesia Complications	Case	QSRs	In Validation
	QSRs-Burn	Case	QSRs	In Validation
	QSRs-Retained Foreign Body	Case	QSRs	In Validation
	QSRs-Specimen Handling	Case	QSRs	In Validation
	QSRs-Wrong Patient	Case	QSRs	In Validation
	Transfers-Higher Level of Care	Encounter	Readmits/Transfer Center	In Validation
	Transfers-Out of CHCO	Encounter	Discharges	In Validation
	Transfusion Reaction	Encounter	Lab	In Validation
	Unplanned Extubation	Case	Anesthesia	Validated
	Unplanned Extubation	Case	ANP Info	In Validation



Running total  
on hover



# Continuous Development Cycle

- Weekly small-group meetings
- Review/validate measure development
- Assess RedCap projects
- Prioritize additional measures and projects
- Tasks and files tracked and documented with Teams channel

PeriOp PIPS (Performance Improvement and Patient Safety-Patient Safety)

Private group | Internal Use Only

[+ New](#) [Edit in grid view](#) [Share](#) [Export](#) [Automate](#) [Integrate](#) [...](#)

Data Requests

Timeframe	Priority	Category	Title	Progress	Assigned to	Dash Ticket
1-Current	High	ACS	Postop Stroke	Blocked	Whitney, Gina Gort, Wendy	Dash 7093
1-Current	High	ACS	QSRs Complications	Blocked	Whitney, Gina Gort, Wendy	Dash 7093
1-Current	High	ACS	Transfusion Reaction	Blocked	Whitney, Gina Gort, Wendy	Dash 7093
1-Current	High	ACS	Unanticipated ICU Admission-Floor to ICU	Needs Validation	Whitney, Gina Gort, Wendy	Dash 7093
1-Current	High	ACS	Neurologic deficit following surgery or regi...	Not started	Whitney, Gina Gort, Wendy	Dash 7093
1-Current	High	ACS	Transfer Within CHCO	In progress	Whitney, Gina Gort, Wendy	Dash 7093
1-Current	High	ACS	Transfer-Out of CHCO	Blocked	Whitney, Gina Gort, Wendy	Dash 7093

basePoint





# Achieved ACS Level I Children's Surgery Verification!



May 12, 2022

Children's Hospital Colorado  
13123 East 16th Avenue, B323  
Aurora, CO 80045

Dear Children's Hospital Colorado,

On behalf of the American College of Surgeons (ACS) Children's Surgery Verification Program (CSV), we would like to congratulate you and your team on achieving Level I Children's Surgery Verification. Congratulations for this notable achievement. Children's surgery verification formally acknowledges your commitment to providing and supporting quality improvement and patient safety efforts for children who require surgical services. As a verified program you have demonstrated that your center meets the needs of your patients by providing multidisciplinary, high-quality, patient-centered care.

