PATHWAYS4KIDS

Supporting Evidenced Based Practices

Metrics 101

Ilana Waynik, MD & Mario Reyes, MD

Nicklaus Children's Hospital

Connecticut Children's

Why Metrics?

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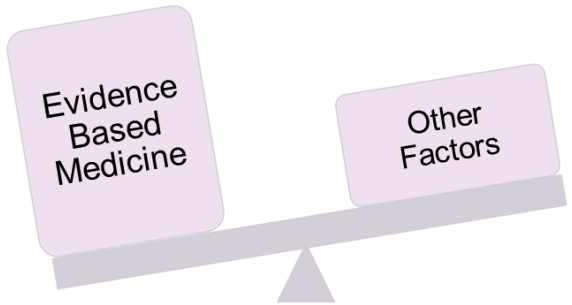
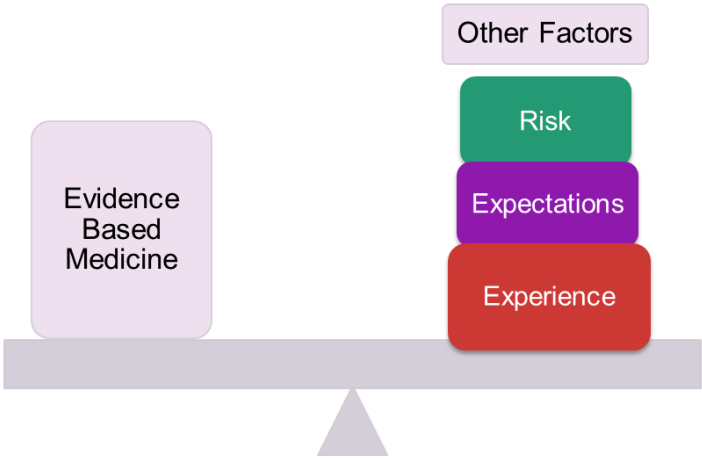
Clinical pathways enable the reliable delivery of high value, evidence-based care. A robust literature now supports the use of clinical pathways to improve standard of care, but also importantly, value of care.

$$\text{Value} = \frac{\text{Quality}}{\text{Cost}}$$





Credit: Eric Hoppa, MD

Excessive Measurement

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Table. Estimates of Annual US Health Care Waste, by Category[a]

	$ in Billions					
	Annual Cost to Medicare and Medicaid in 2011[b]			Annual Cost to US Health Care System in 2011		
	Low	Midpoint	High	Low	Midpoint	High
Failures of care delivery	26	36	45	102	128	154
Failures of care coordination	21	30	39	25	35	45
Overtreatment	67	77	87	158	192	226
Administrative complexity	16	36	56	107	248	389
Pricing failures	36	56	77	84	131	178
Fraud and abuse	30	64	98	82	177	272
Total[c]	**197**	**300**	**402**	**558**	**910**	**1263**

[a] Table entries represent the range of estimates of waste in each category from sources cited in the text. The total waste estimates are simply the sums of the category-level estimates. This simple summing is feasible because the categories are defined in such a way that wasteful behaviors could be assigned to at most 1 category and because, like Pacala and Socolow,[9] we did not attempt to estimate interactions between or among the categories.
[b] Including both state and federal costs.
[c] Totals may not match the sum of components due to rounding.

JAMA

Berwick, D. M. et al. JAMA doi:10.1001/jama.2012.362

Healthcare Context for Clinical Pathways

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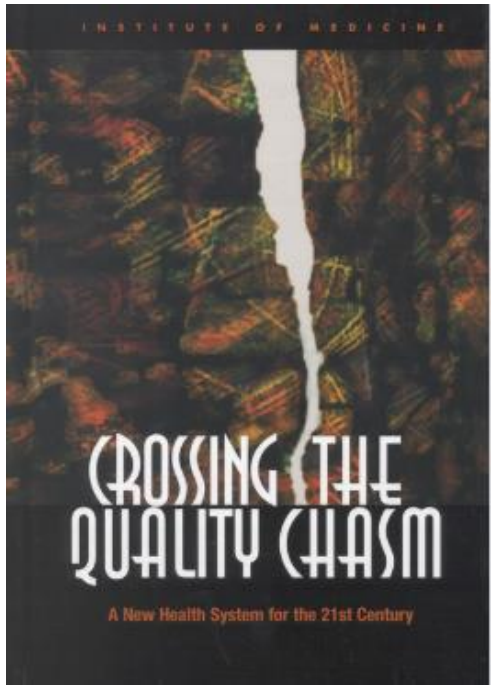

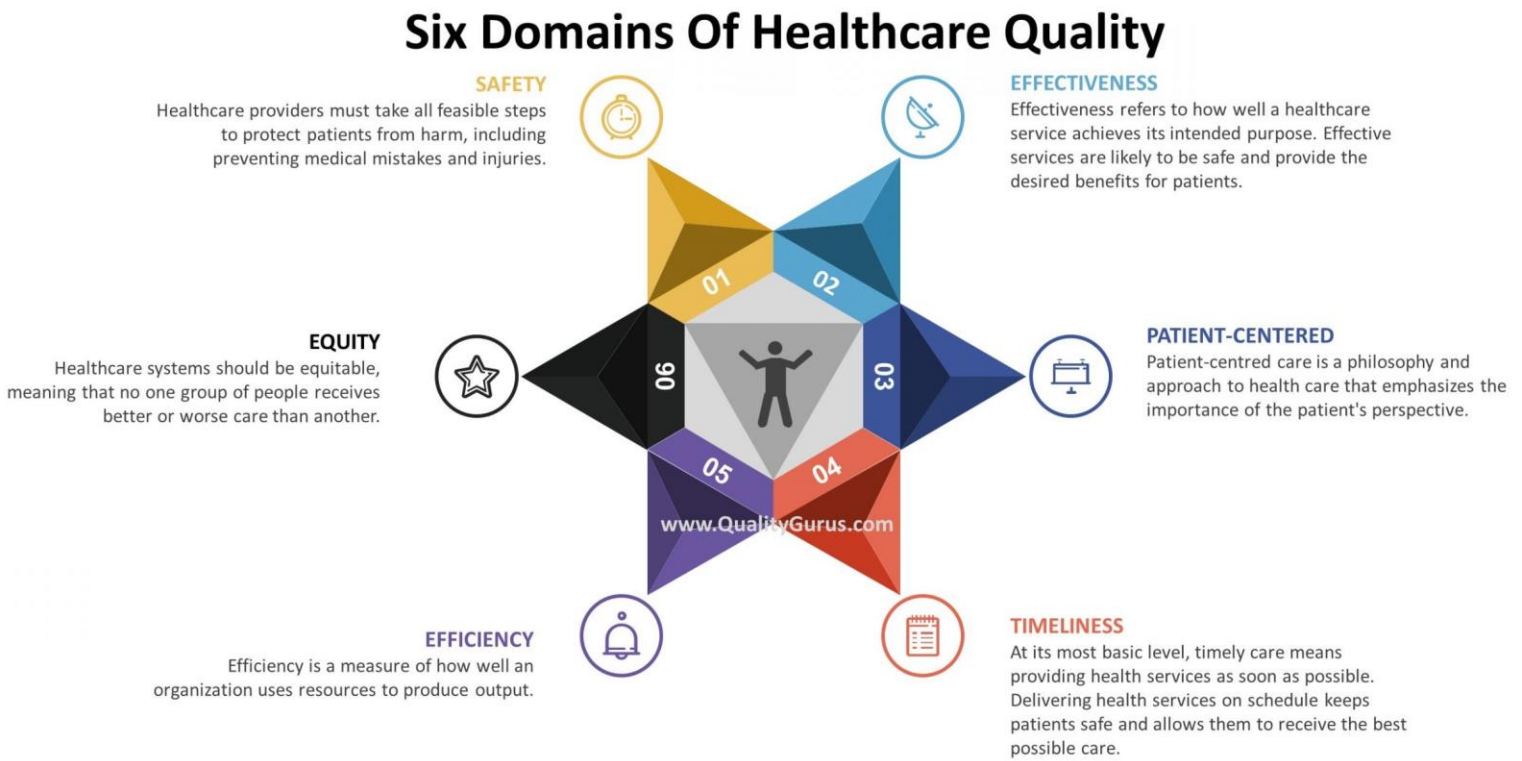

Corrigan, Janet M. "Crossing the quality chasm." *Building a better delivery system* 89 (2005).

Healthcare Context for Clinical Pathways

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Supporting Evidenced Based Practices

- Choosing Wisely
- AAP Quality Improvement Networks
- AAP Clinical Practice Guidelines
- Learning Health Systems
- IHI Category 3, #3: Board evaluates senior leaders' summary of metrics to ensure physician and staff ability to care for patients

Choosing Wisely®

An initiative of the ABIM Foundation

Institute for Healthcare Improvement

shm

Society of Hospital Medicine

Hospitalists. Transforming Healthcare. Revolutionizing Patient Care.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®

AHRQ Agency for Healthcare Research and Quality

Learning Health System

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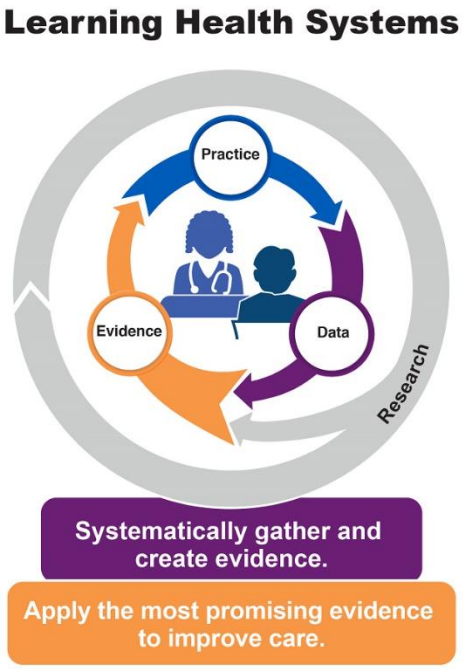
- Defined by the Agency for Healthcare Research and Quality as “a health system in which internal data and experience are systematically integrated with external evidence, and that knowledge is put into practice”
- Quintuple Aim Framework to improve:
  - Access
  - Outcomes
  - Equity
  - Value of care
- Clinical pathway programs as stepping stone to becoming Learning Health System



About Learning Health Systems. Content last reviewed May 2019. Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/learning-health-systems/about.html

Dr. W Edwards Deming

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"Without data, you're just another person with an opinion."

"Data are not taken for museum purposes; they are taken as a basis for doing something. If nothing is to be done with the data, then there is no use in collecting any. The ultimate purpose of taking data is to provide a basis for action or a recommendation for action."

The DIKW Model: from ‘DATA’ to ‘WISDOM’

Framework that organizes the transformation of raw data into actionable insights and decisions

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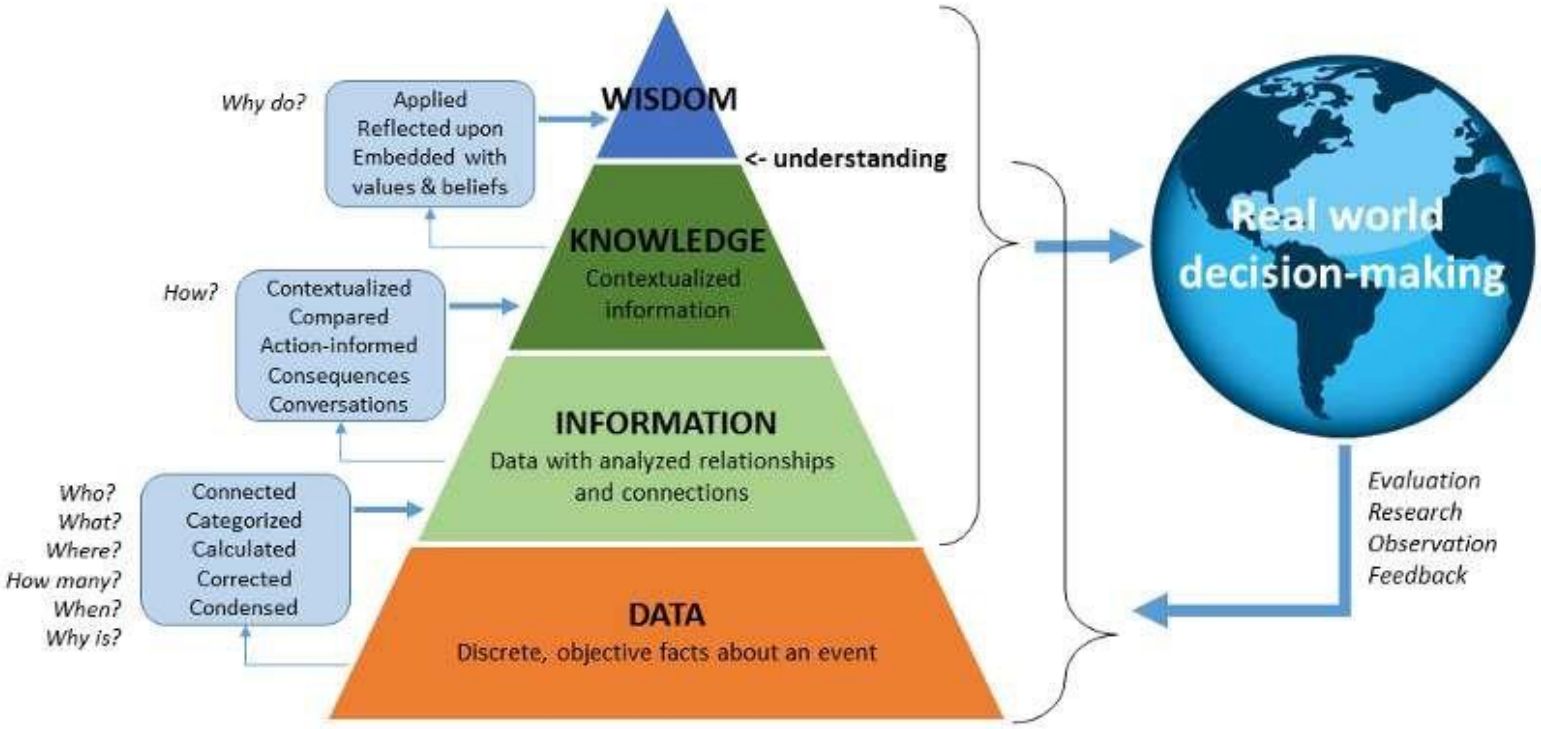

Data:
A collection of facts, signals, or symbols. it might be raw, inconsistent, or unorganized- not useful.

•**Information:** Data **–** *In -formation*
A collection of data arranged and ordered in a consistent way. More useful because storage and retrieval are easy.

•**Knowledge:**
A collection of information with its associated context (form of relationships between information sets collected over time).
The outcome of experience working with a pool of information.

•**Wisdom:**
The ability to select the best way to reach the desired outcome based on knowledge.
The outcome of experience from or knowledge

Impact of Clinical Pathways Program

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METRIC-BASED

- Decrease in length of stay (LOS) across a number of conditions (Inpatient and ED)
- Improved adherence to antimicrobial stewardship standards, leading to decrease in unnecessary usage of broad-spectrum antibiotics as well as decrease in overall antibiotic usage for certain medical conditions
- Decrease in unnecessary testing, treatments, and hospitalizations
- Improved coordination of multidisciplinary care
- Other improved patient outcomes (i.e. surgical outcomes, decreased time to administration of life-saving medications)
- Decreased costs
- Decreased readmissions/reutilization

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How to Select Pathway Metrics; Measuring Wisely

Evaluating ‘Quality’ and ‘Effectiveness’ of care : 60 years from Avedis Donabedian…

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- Quality: a remarkably difficult notion to define
- Set of value judgments applied to dimensions of medical care
- may be almost anything anyone wishes it to be…
- **process and outcomes : separation between means and ends**

- **The effectiveness of care**…in achieving or **producing health and satisfaction**, as defined for its individual members by a particular society or subculture is the ultimate **validator** of the quality of care.’

A. Donabedian

Donabedian, Avedis. "Evaluating the quality of medical care." *The Milbank memorial fund quarterly* 44.3 (1966): 166-206.

Healthcare Quality Measures: The Donabedian Model

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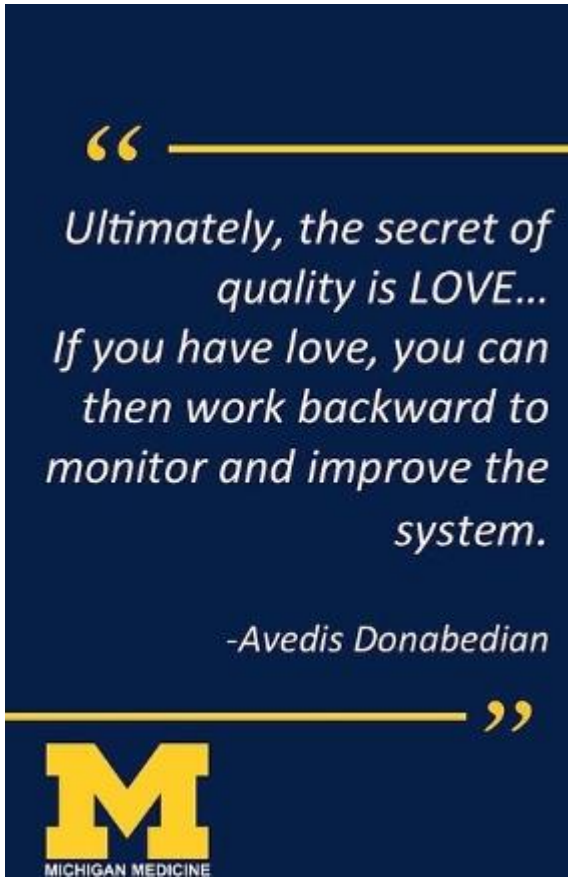

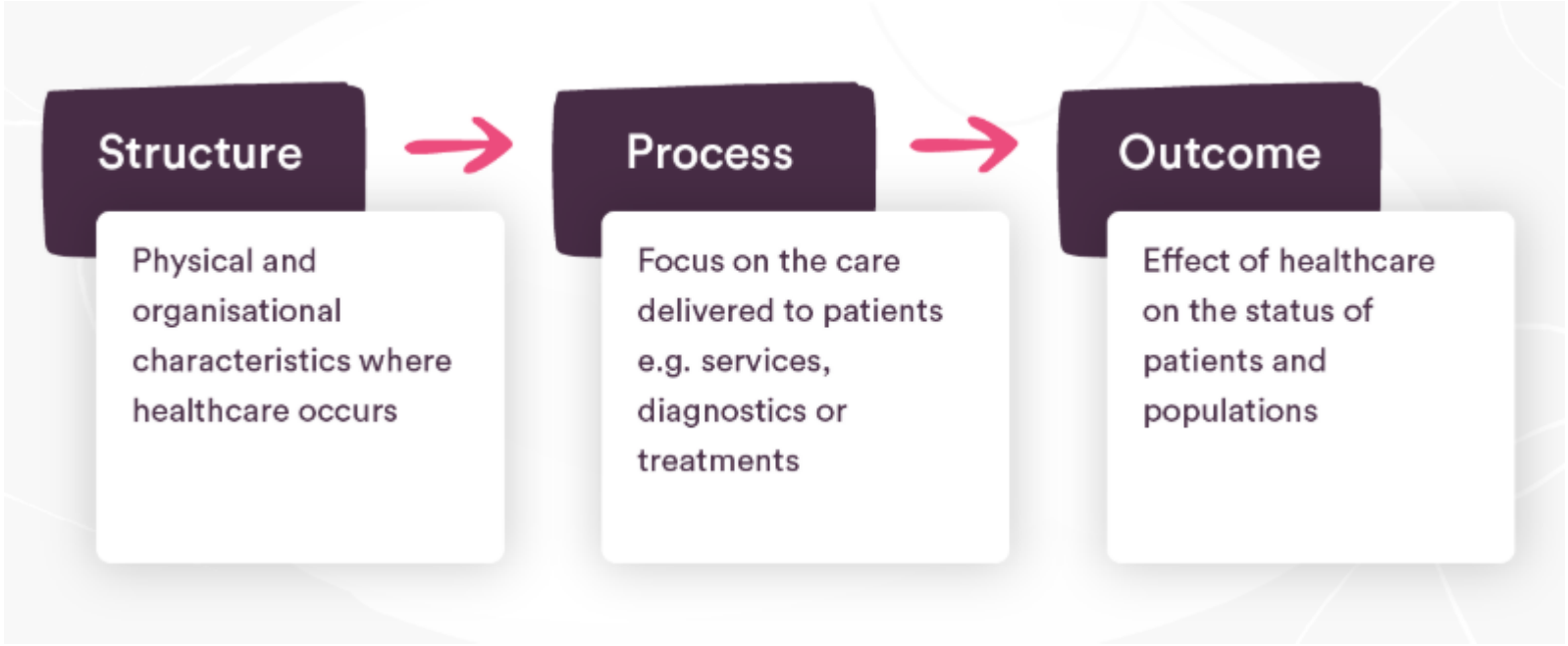

Balancing measures

Not initially included as part of the Donabedian model, but a valuable addition. Balancing measures seek to assess the unintended consequences of change.

Donabedian, Avedis. *The Milbank memorial fund quarterly* 44.3 (1966): 166-206.

Choosing Measures that Matter

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This Issue Views 36,297 | Citations 209 | Altmetric 388

Viewpoint

April 5, 2016

Era 3 for Medicine and Health Care

Donald M. Berwick, MD, MPP[1]

» Author Affiliations

JAMA. 2016;315(13):1329-1330. doi:10.1001/jama.2016.1509

- Era 1 : Past : Physician autonomy- variation in care – No QM
- **Era 2 : Current = excessive measurement, much is useless, mandated.**
- **Era 3 : Development of health /healthcare Quality Metrics :**

  commit to reducing by 50% in 3 years and by 75% in 6 years

  the volume and total cost of measurement:

  measure only what matters, mainly for learning and improving.

A New Era

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POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics
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A New Era in Quality Measurement: The Development and Application of Quality Measures

Terry Adirim, MD, MPH, FAAP, Kelley Meade, MD, FAAP, Kamila Mistry, PhD, MPH, COUNCIL ON QUALITY IMPROVEMENT AND PATIENT SAFETY, COMMITTEE ON PRACTICE AND AMBULATORY MANAGEMENT

PEDIATRICS Volume 139, number 1, January 2017

- **Promote the dissemination, implementation, and use of existing validated, tested and endorsed pediatric QM**
- QM: should be reportable by either ICD-10 or CPT codes: reduce measure burden to healthcare systems/clinicians
  - Consider clinical data from EHR, not just administrative data sets
- Standardization of QM: harmonize and align measures used in national/state programs
- Include QM that capture patient-centered perspectives: PROM

Metric Development: Practical How-To

- **Define PURPOSE and CONTEXT** :
  - Intended use – statement brief and specific
  - Clinical field – condition – setting – accountable entity – population

- **Assemble local subject matter expertise:**
  - Multi-stakeholders
  - Consider qualitative methods, such as consensus

- **Clearly define each metric:**
  - Evidence review – existing metrics / data sources
  - Define cohorts (denominator) and intervention/outcome(numerator)
  - Cost measures: charges v. direct cost
  - Risk adjustment: when possible

- **Consider metric automation:**
  - Less burden, frees staff up to help with QI

- **Consider core set of QMs for all pathways**
  - And choose an additional metric(s) to meet specific pathway objectives

Use a standardized operational definition for each metric

Measuring Wisely Principles

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- Don’t reinvent the wheel
- Measure what matters = how important is it
- Parsimony - consider measure burden
- Harmonization of quality measurement
- Transparency

Don’t Reinvent the Wheel

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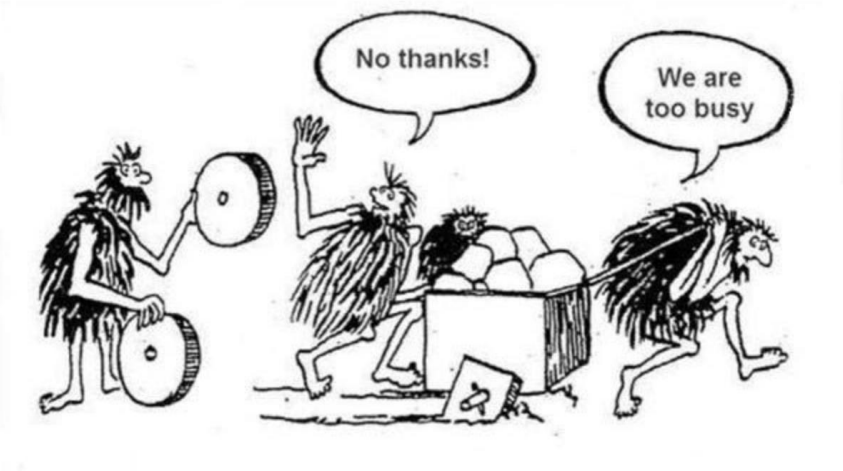
Use what already exists:

- Evidence-based metrics, validated, tested, endorsed

- Published in National QI projects
  Examples :
  - AHRQ- PQMP
  - PRIMES
  - HEDIS – NCQA
  - NQF- endorsed
  - AAP- VIP – PRIS : ICAP, BARC, IMPROVE, ASTHMA, SIB, etc..

- Construct QM from EB - CPG and Choosing Wisely recs



Existing QM for Respiratory Conditions for Hospitalized Children (2009-2020)

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- Existing standard - Clinical Report Cards (**CHA- PHIS**) - 4 Report Cards – multiple quality measures
- Pediatric Respiratory Measurement System (**PRIMES**) - 76 measures
- CMS- Medicaid - Child Core Set 2020 (**CMS**) - 1 measure (Asthma)
- Pediatric Quality Measurement Program (**AHRQ - PQMP**) - 8 measures (Asthma)
- Value in Inpatient Pediatrics Network (**VIP – AAP**) - 4 Collaborative QI Projects – multiple QM
- Other multi-center / single-institutions (**QI research**) - multiple QM - recurrent
- Choosing Wisely Campaign – Pediatrics (**CWC**) - 8 - 9 recommendations

** Unpublished data. Reyes, et al. NCHS.2020*

Choosing Wisely Campaign and Quality Measures

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- 2013: PHM (SHM) five (5) recommendations.
- 2021 : 140/621 pediatric –specific, and growing…
- General pediatrics, sub-specialties, hospital-based care.
- Best evidence :
  Update on Pediatric Overuse series: 2016-2019, 2021, 2023
- Challenge: measure compliance with best practices


Journal of Hospital Medicine

Original Research

Choosing wisely in pediatric hospital medicine: Five opportunities for improved healthcare value

Ricardo A. Quinonez MD, Matthew D. Garber MD, Alan R. Schroeder MD, Brian K. Alverson MD, Wendy Nickel MPH, Jenna Goldstein MA, Jeffrey S. Bennett MD, Bryan R. Fine MD, MPH, Timothy H. Hartzog MD, Heather S. McLean MD, Vineeta Mittal MD, Rita M. Pappas MD, Jack M. Percelay MD, MPH, Shannon C. Phillips MD, MPH, Mark Shen MD, Shawn L. Ralston MD

First published: 19 August 2013 | https://doi.org/10.1002/jhm.2064 | VIEW METRICS


AAP Publications

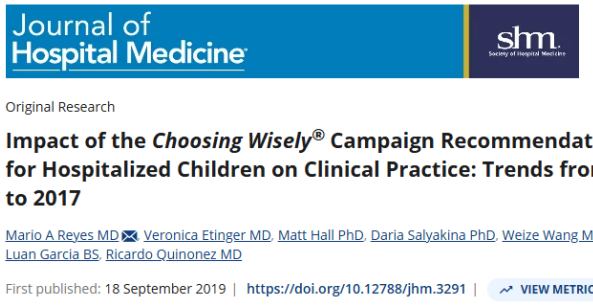
Hospital Pediatrics

Content | Authors/Reviewers | Collections | Blogs

Volume 7, Issue 11
November 2017

RESEARCH ARTICLES | NOVEMBER 01 2017

Choosing Wisely Campaign: Report Card and Achievable Benchmarks of Care for Children's Hospitals


Journal of Hospital Medicine

Original Research

Impact of the *Choosing Wisely*® Campaign Recommendations for Hospitalized Children on Clinical Practice: Trends from 2008 to 2017

Mario A Reyes MD, Veronica Etinger MD, Matt Hall PhD, Daria Salyakina PhD, Weize Wang MPH, Luan Garcia BS, Ricardo Quinonez MD

First published: 18 September 2019 | https://doi.org/10.12788/jhm.3291 | VIEW METRICS

Coon, Eric R., et al. "2017 update on pediatric medical overuse: a review." *JAMA pediatrics* 172.5 (2018): 482-486.

Measures What Matters

- **Importance** (context dependent)
  - Relevant
- **Actionability** – for learning, improvement
  - Real time - trends- dispersion
  - Benchmarking: internal and external
  - Identify best and worst performers
  - Identify opportunities for QI
- **Link metrics to objective of pathways**

Parsimony: Consider Measure Burden

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- Cost of measurement: time, resources
  - Whole cohort v. sample cohort
- Avoid metric overload
- Feasibility: automation
- Administrative data v. EHR data v. manual chart review
- AI/sML/predictive models

"Intemperate measurement is as unwise and irresponsible as is intemperate health care"

Credit: Pixel-Shot / Adobe Stock

Harmonization of Quality Measurement

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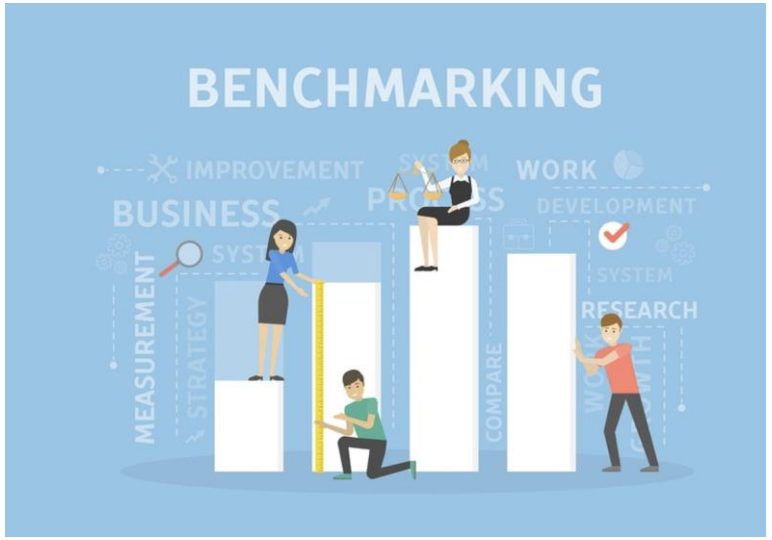
- Standardization of metric definition across settings
  - *Use risk adjustment methodology to compare similar populations*
- Allows for:
  - Benchmarking
  - Larger scale examination of current state
  - Identification of QI opportunities/priorities
- Pathways 4 Kids initiative to establish national definitions for pediatric respiratory illness



Metric Transparency

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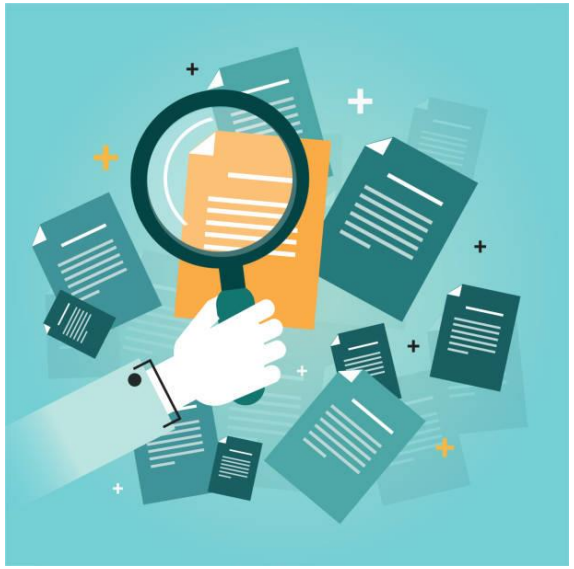
- Data literacy – democratization
- Source
- Stakeholders involved
- Metric operational definition (=measure specification)
  - Glossaries
  - Limitations
- The value of infographics



istockphoto.com

Examples of Operational Definition & Data Glossary

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CT Children's Operational Definitions – Croup Pathway

Connecticut Children's

Formula details:

- Numerator: Number of patients with the pathway order set
- Denominator: Number of patients meeting inclusion criteria and are admitted

- **Data presented as**: Percent
- **Data Visualization:** Run chart

Targets: □ Warning _____ □ Threshold_____ □ Target_____ □ Stretch_____ If no target listed, then track to trend baseline data

Abstraction Instructions: Data captured through pathway query. Chart abstraction is not necessary for this metric.

Measure Name/Title: ED arrival to administration of first dexamethasone

Measure Description: The metric is defined as the average time between ED arrival and administration of first dexamethasone in minutes.

Type of Metric: □ **Process** _____ □ Outcome_____ □ Structural_____

Rationale: Rapid administration of dexamethasone improves symptoms and decreases ED LOS.

Data Stratification: Not applicable

Formula details:

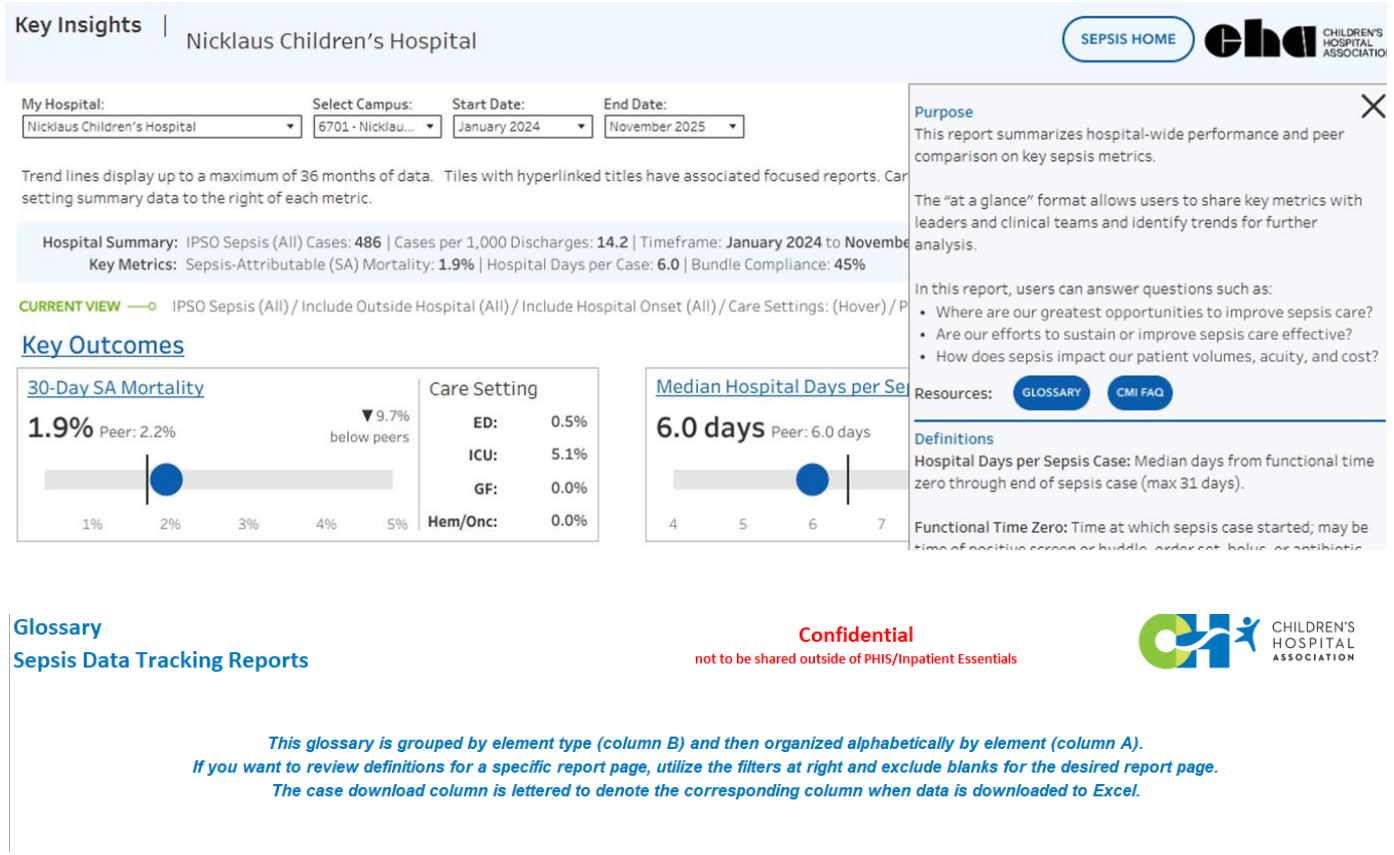
- Numerator: Time between ED arrival and administration of first dexamethasone (minutes) *(Include only if first dose given in the ED and the number of minutes between ED arrival and ED first dose is ≤ 200 minutes)*
- Denominator: NA

- **Data presented as**: Average (mean)
- **Data Visualization:** Line Chart

Targets: □ Warning _____ □ Threshold_____ □ Target_____ □ Stretch_____ If no target listed, then track to trend baseline data

Abstraction Instructions: Data captured through pathway query. Chart abstraction is not necessary for this metric.

CHA-PHIS – Sepsis Data Tracking Report -2026



Glossary
Sepsis Data Tracking Reports

Confidential
not to be shared outside of PHIS/Inpatient Essentials

CHILDREN'S HOSPITAL ASSOCIATION

This glossary is grouped by element type (column B) and then organized alphabetically by element (column A).
If you want to review definitions for a specific report page, utilize the filters at right and exclude blanks for the desired report page.
The case download column is lettered to denote the corresponding column when data is downloaded to Excel.

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Understanding the Importance of Infographics

Infographics Definition

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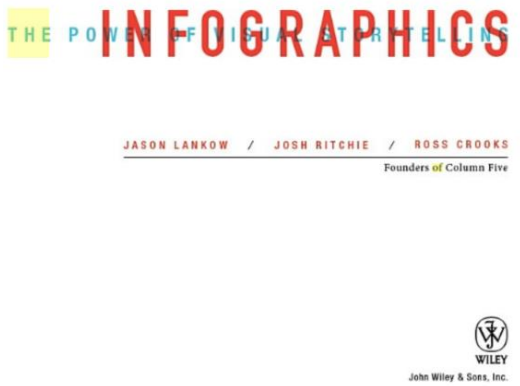
- A visual communication tool for depicting information graphically
- Using visual elements to communicate data, concepts
- Summarize information clearly, concisely to a targeted audience
- Goal: use the power of the human visual system to gain insights, understand information quickly and efficiently



Lankow, Jason, Josh Ritchie, and Ross Crooks. *Infographics: The power of visual storytelling*. John Wiley & Sons, 2012.

A Brief History

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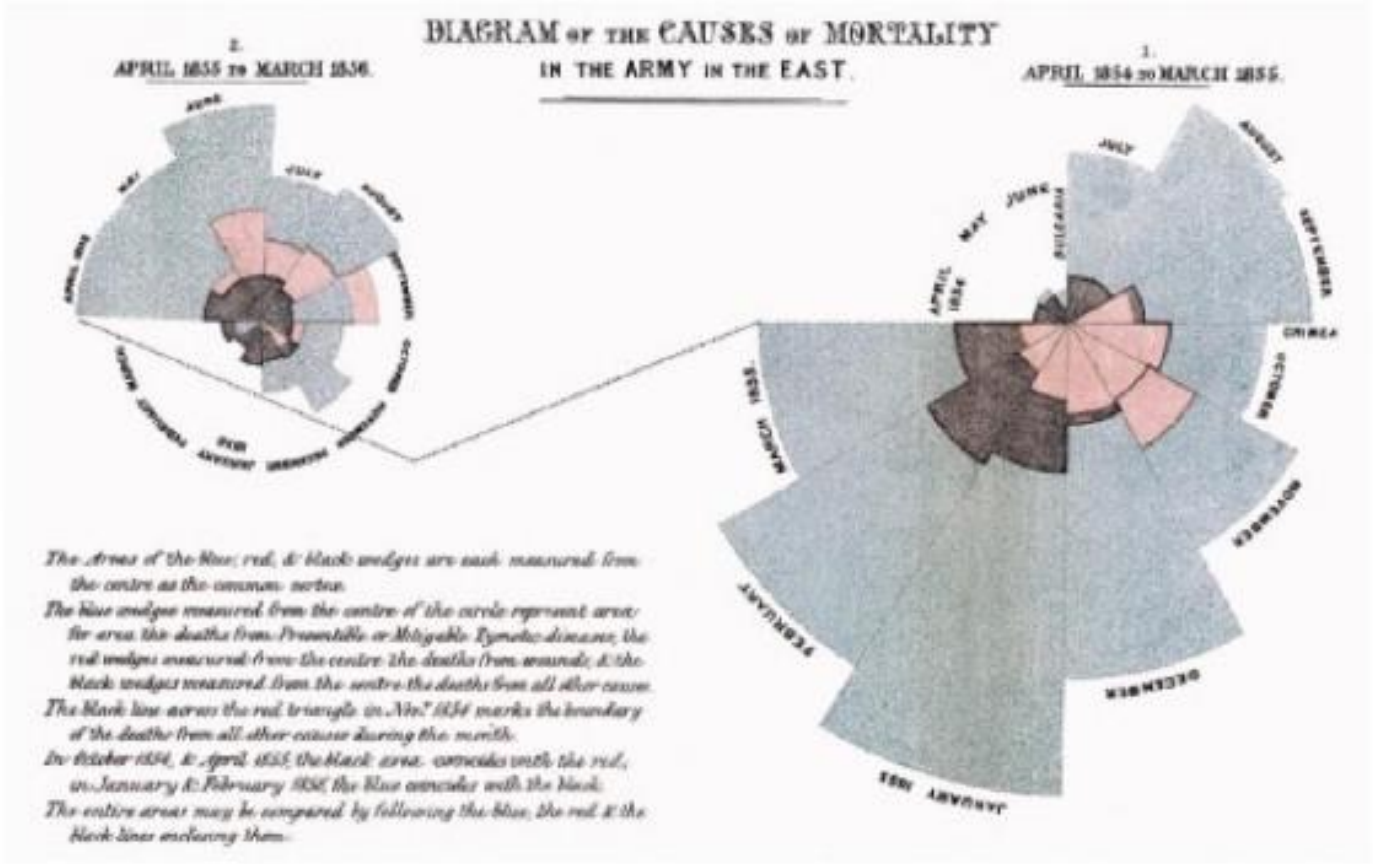
Florence Nightengale.



‘If you can’t explain it simply, you don’t understand it well enough’.
- Albert Einstein

Infographics Tips

- **Define Objectives and Target Audience:**
  - What to communicate (content) and goals
  - Tailor complexity/literacy to users

- **Prioritize Clarity and Simplicity:**
  - Use clear layouts
  - Minimal text
  - Visual cues (like colors) to highlight key metrics/trends

- **Compelling Title:**
  - Grab – sustain attention, 'action-oriented'

- **Contextualize Data:**
  - Provide relevant comparisons, explanations to support accurate interpretation and decision-making

- **Ensure Transparency:**
  - Sufficient detail so infographics can stand alone but not overwhelm viewer

- **Iterative Design and Feedback:**
  - Engage end-users in the design process to refine infographics for maximum impact and comprehension

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Medical Teacher

Taylor & Francis

ISSN: 0142-159X (Print) 1466-187X (Online) Journal homepage: www.tandfonline.com/journals/imte20

Twelve tips to make successful medical infographics

Sergio Hernandez-Sanchez, Victor Moreno-Perez, Jonatan Garcia-Campos, Javier Marco-Lledó, Eva Maria Navarrete-Muñoz & Carlos Lozano-Quijada

"Capturing the key message of a well-made infographic should take only a few seconds. However, the process of design takes much more time and effort"

Infographics Pitfalls

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- **Poor accessibility for diverse audiences**
  - Have a data Democratization strategy and plan
- **Oversimplification and missing context**:
  - Omit critical details: definition of study population, dates, methodology, limitations
- **Ambiguity and misrepresentation of data :**
  - Poorly designed visuals—unclear legends- ambiguous scales - lack of glossary.
  - Proper tool to display data : snapshots vs. trends (SPC/Shuhart charts)
- **Cognitive overload**:
  - Complex or cluttered infographics can overwhelm users.
  - Bar charts and tables are generally better understood than radar or spider graphs.
- **Lack of transparency**:
  - Disclose limitations – use of glossaries.
  - Can foster superficial understanding, reduce critical appraisal.

CEP - Infographic Tools

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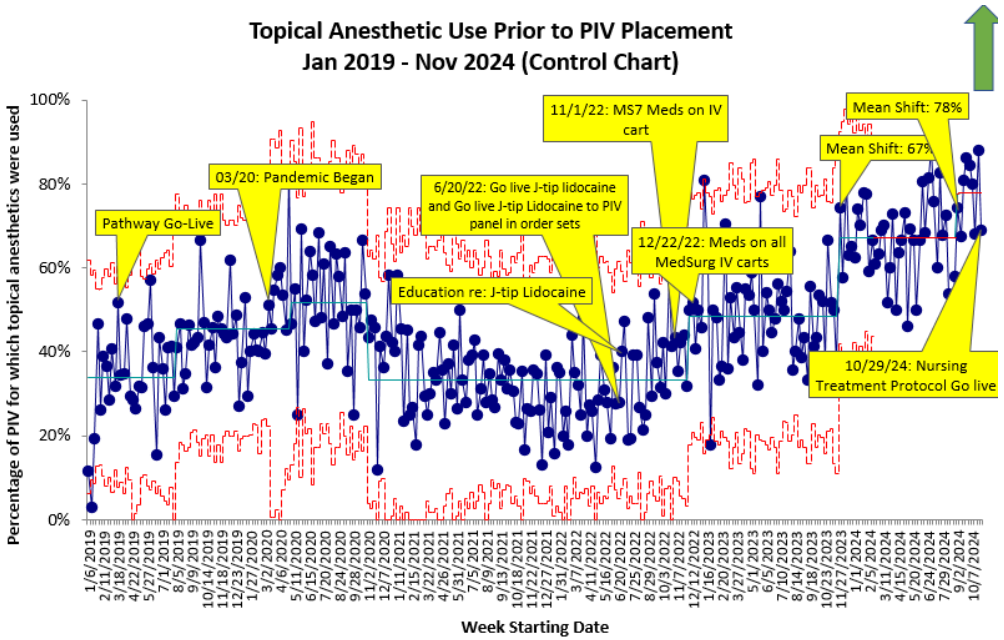

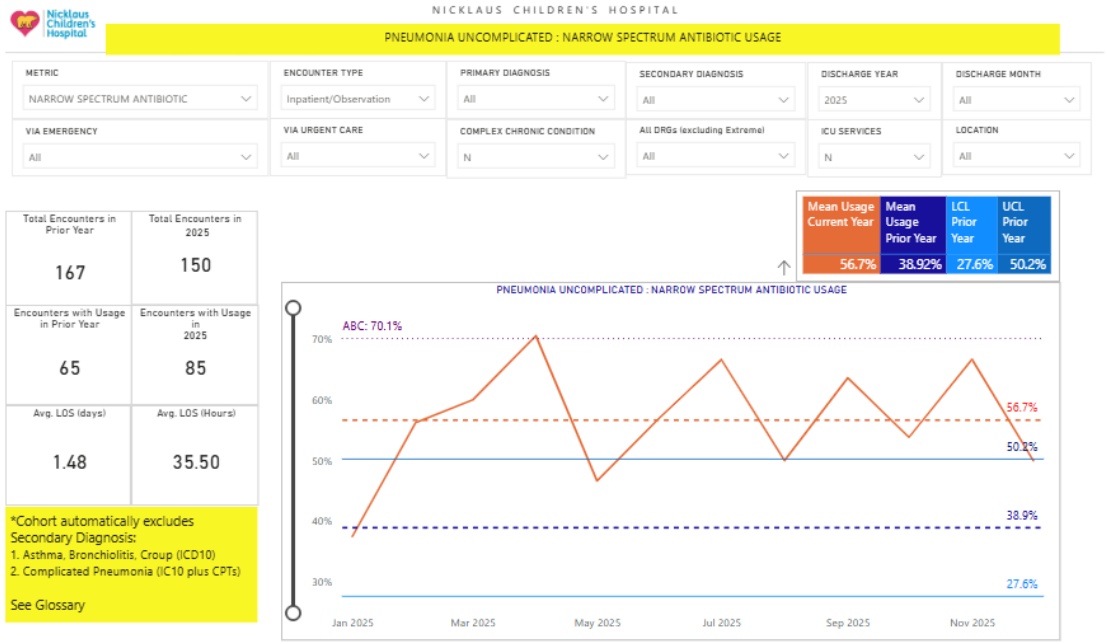

Respiratory Illness Dashboard
Nicklais Children's Hospital

PHIS- Low-Value Care Dashboard

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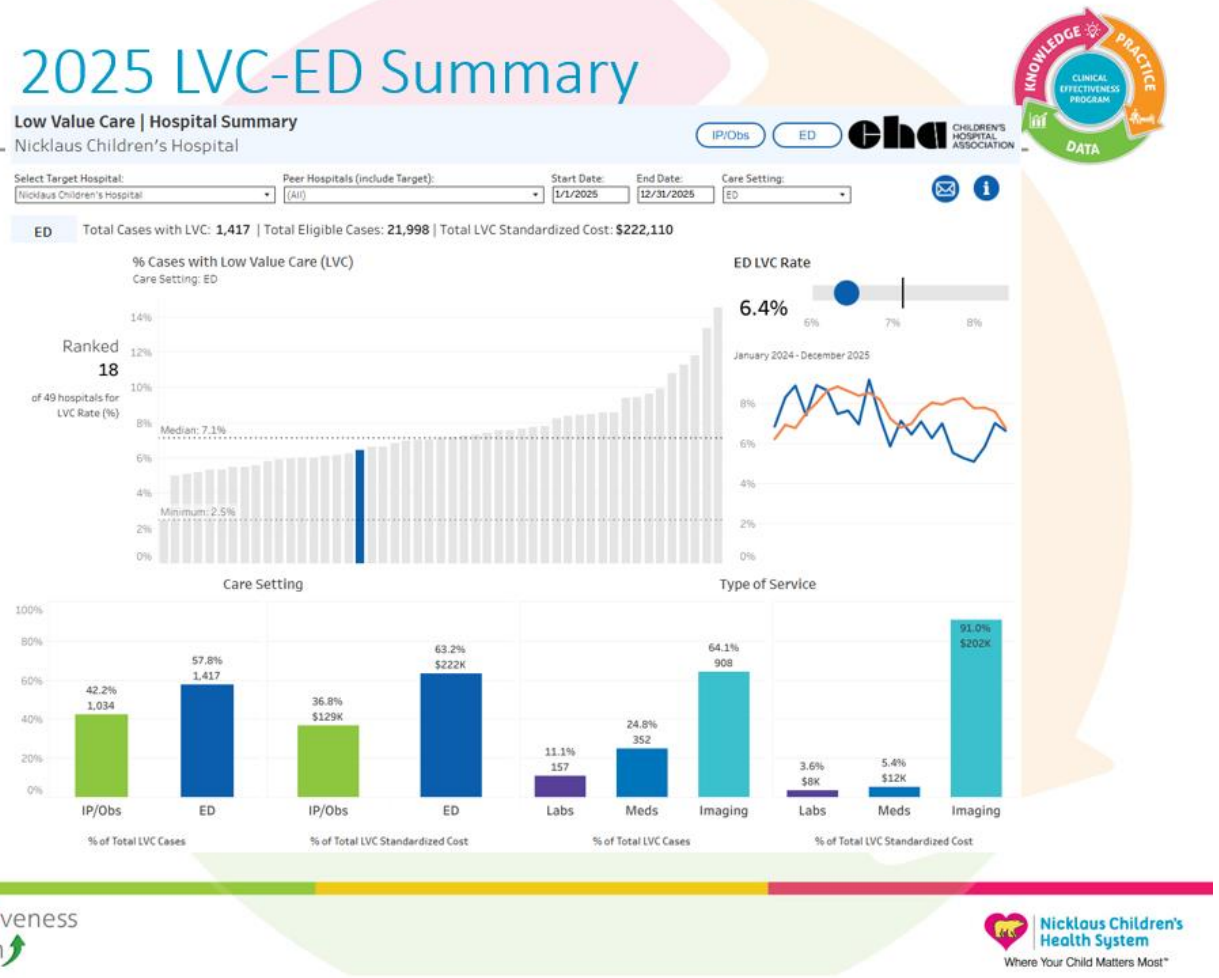

Clinical Effectiveness Program

Nicklaus Children's Health System
Where Your Child Matters Most™

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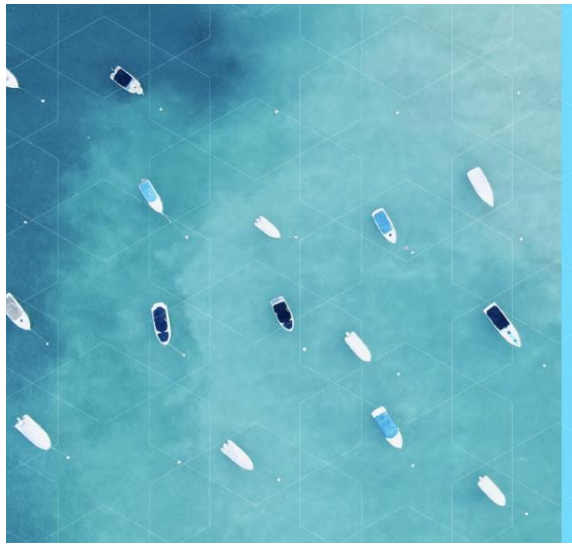

Nothing succeeds like success. Get a little success, and then just get a little more.

~

Maya Angelou

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Strategies for Using Pathway Data to Drive Improvement

Actionable Data

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Relevant, timely, and clear information that directly guides concrete decisions and changes to enhance processes, outcomes and effectiveness, enabling continuous monitoring and targeted interventions

The 'LEARNING HEALTH SYSTEM' Model (AHRQ)

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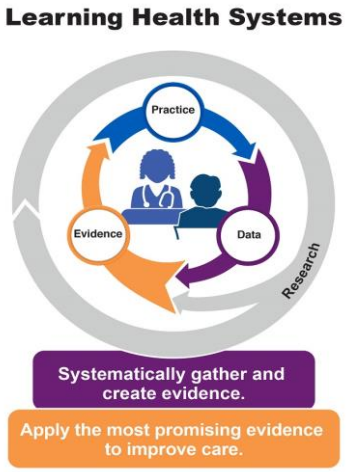

Learning Health Systems—Attributes

- Leaders committed to a culture of **continuous** learning and improvement
- Systematically gather and apply evidence in real-time to guide care
- Employ IT methods to share new evidence with clinicians to improve decision-making
- Promote the inclusion of patients as vital members of the learning team
- **Capture and analyze data and care experiences to improve care**
- **Continually assess outcomes refine processes and training to create a feedback cycle for learning and improvement**

https://www.ahrq.gov/learning-health-systems/index.html

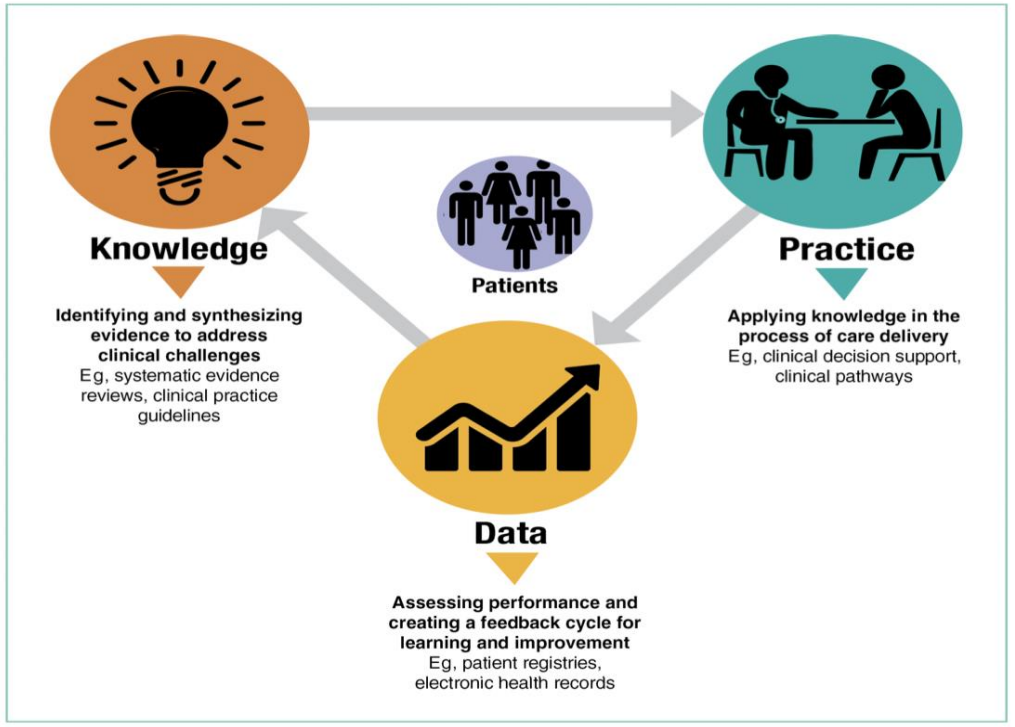

FIG 1. Knowledge to Practice to Data Cycle to Strengthen the Value of Patient Care

Adapted from: https://www.ahrq.gov/professionals/systems/learning-health-systems/index.html

Process for Regular Review

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- Schedule
- Must be an expectation
  - Metric visualization is key
- Consider multidisciplinary input
- Allows for prioritization – where to put resources
- Include pathway, order sets, and metrics

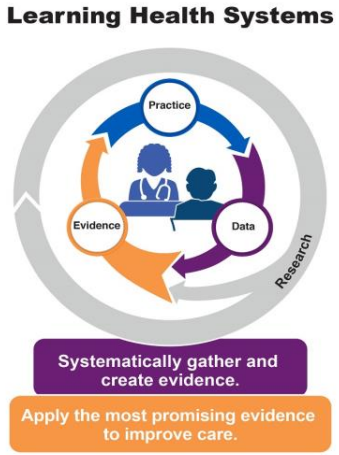

FIG 1. Knowledge to Practice to Data Cycle to Strengthen the Value of Patient Care

Adapted from: https://www.ahrq.gov/professionals/systems/learning-health-systems/index.html

Borsky, A. E., Flores, E. J., Berliner, et al (2019). *Journal of hospital medicine*, *14*(5), 311–314.

Process for Improvement

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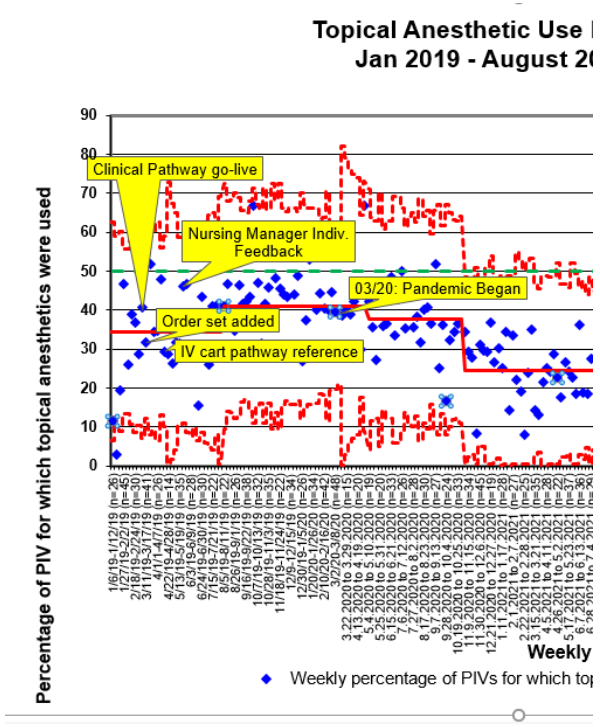
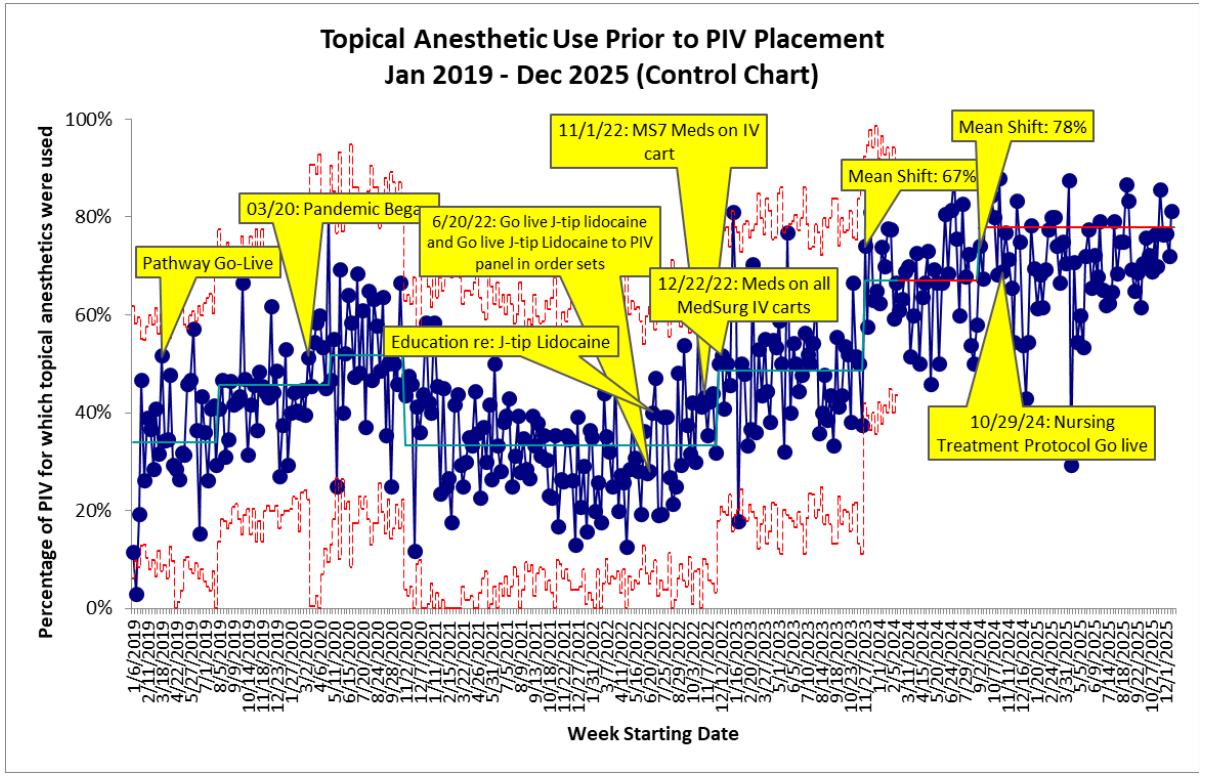
- Direct line to performance improvement professionals
- Resources for QI (hybrid and In-person courses)





Process for Improvement

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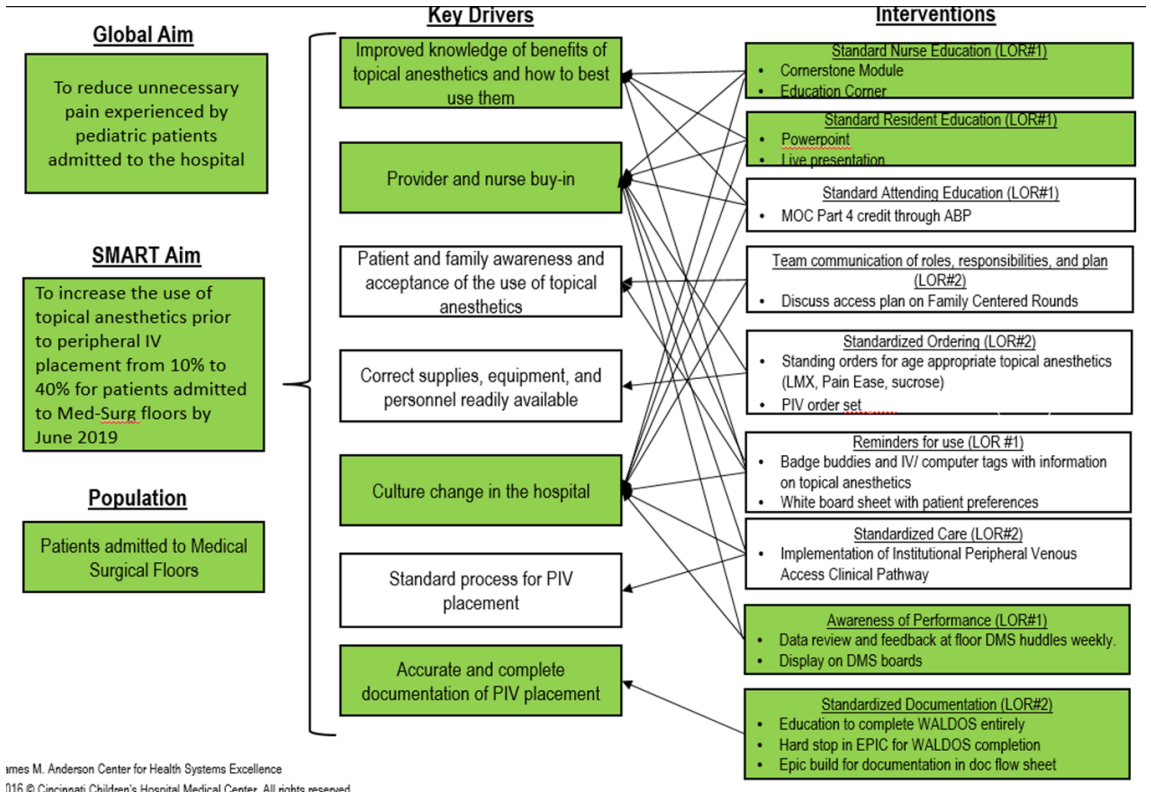
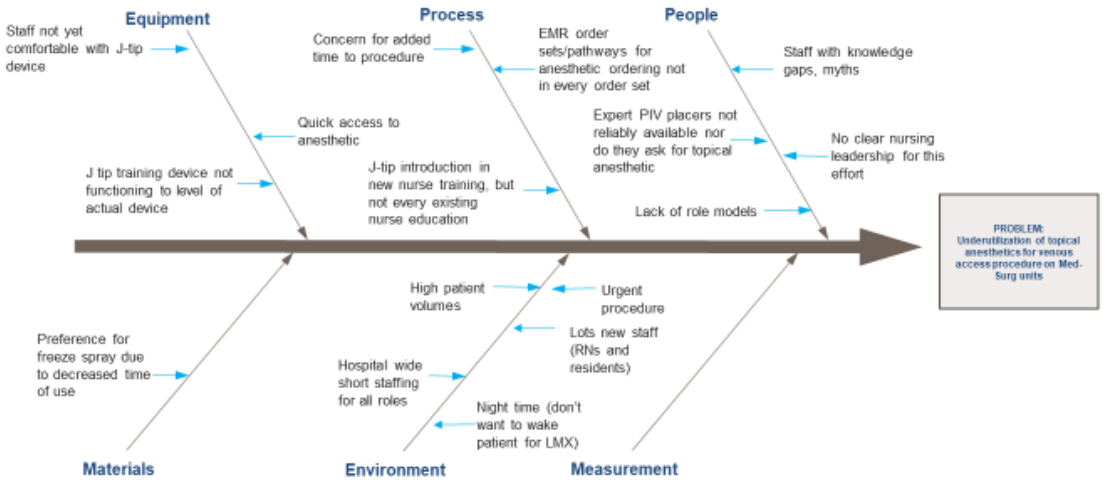


Event Analysis - Fishbone

- Identify the factors that contributed to the event.
- A "fishbone" or "Ichikawa" cause and effect diagram can be a helpful visual representation of your analysis, highlighting the various factors that contributed to the adverse event.



Process for Improvement

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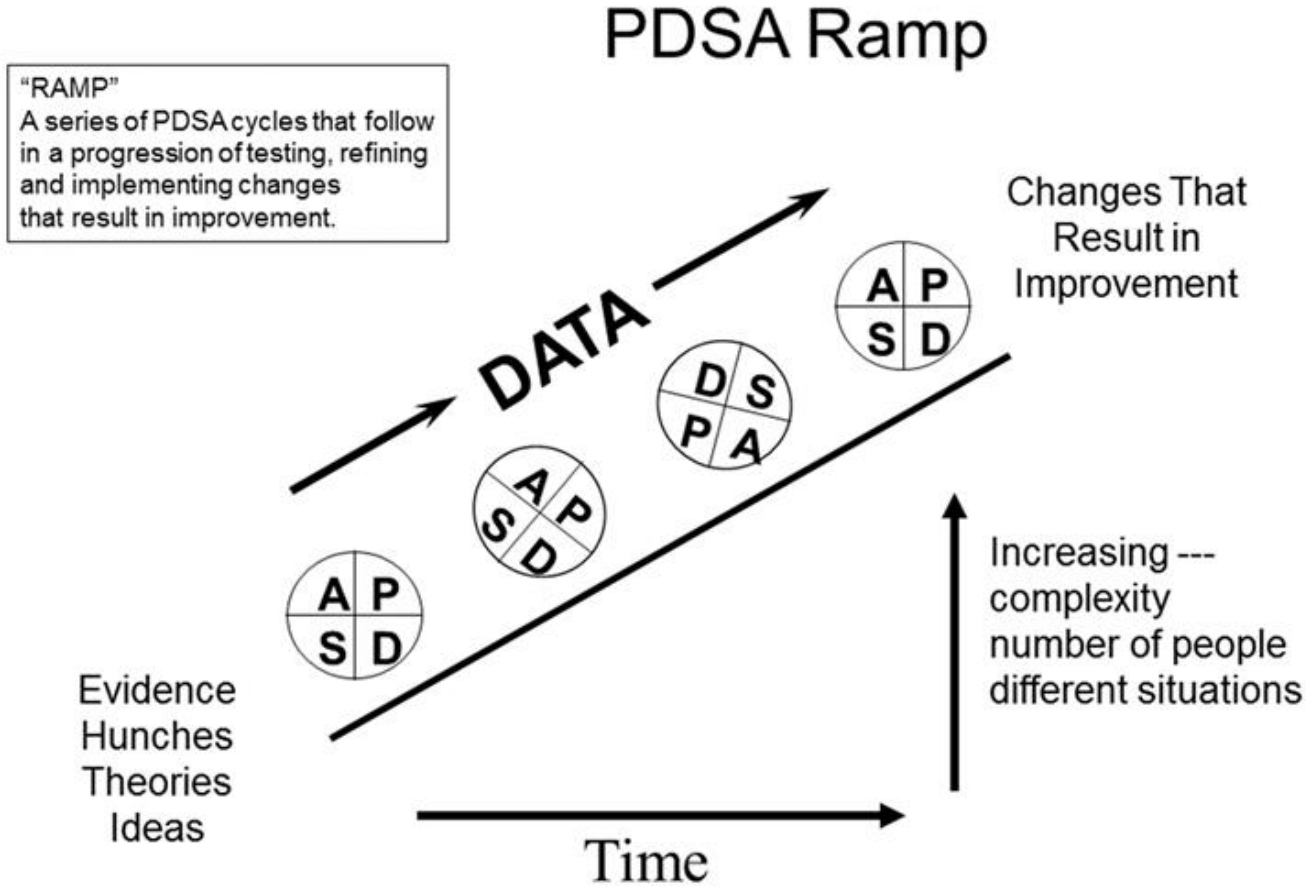

Sharing the Data with End-users

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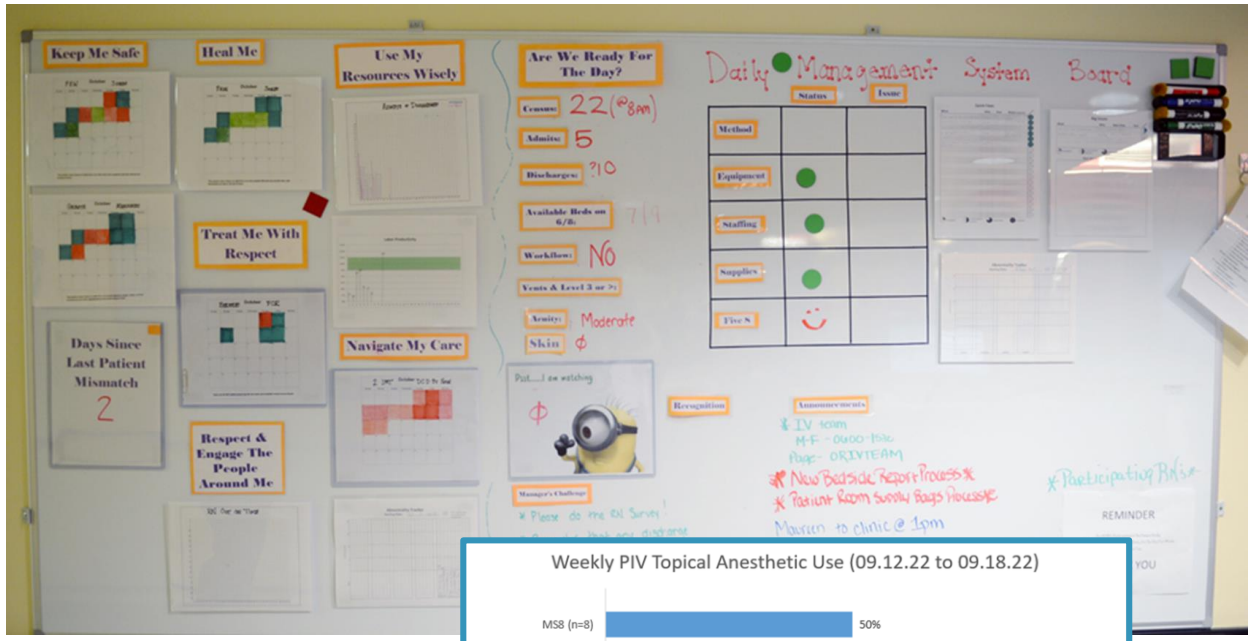
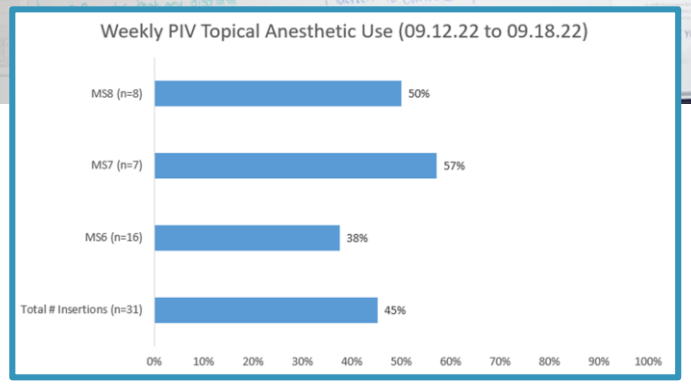
- Division meetings, DMS Boards, Dashboards, etc…
- Tie to bonuses
- Lure of publications/opportunities for scholarly work
- MOC part 4 credit





Decreasing Pain in Hospitalized Patients by Increasing Topical Anesthetic Use for Peripheral IVs

Emilee C. Lewis, MD; Stephanie Komkov, MS†; Jenny Rickles, MPH†; Mary Saccoccio, RN, BSN†; Margaret Thomesen, RN, BSN†; Lauren Turcotte, BS, CCLS†; William T. Zempsky, MD, MPH†‡; Ilana Waynik, MD†§*

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UCONN HUSKIES

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QUESTIONS?

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Metric Stories

Venous Access Pathway: Improvement in Evidenced-Based Care

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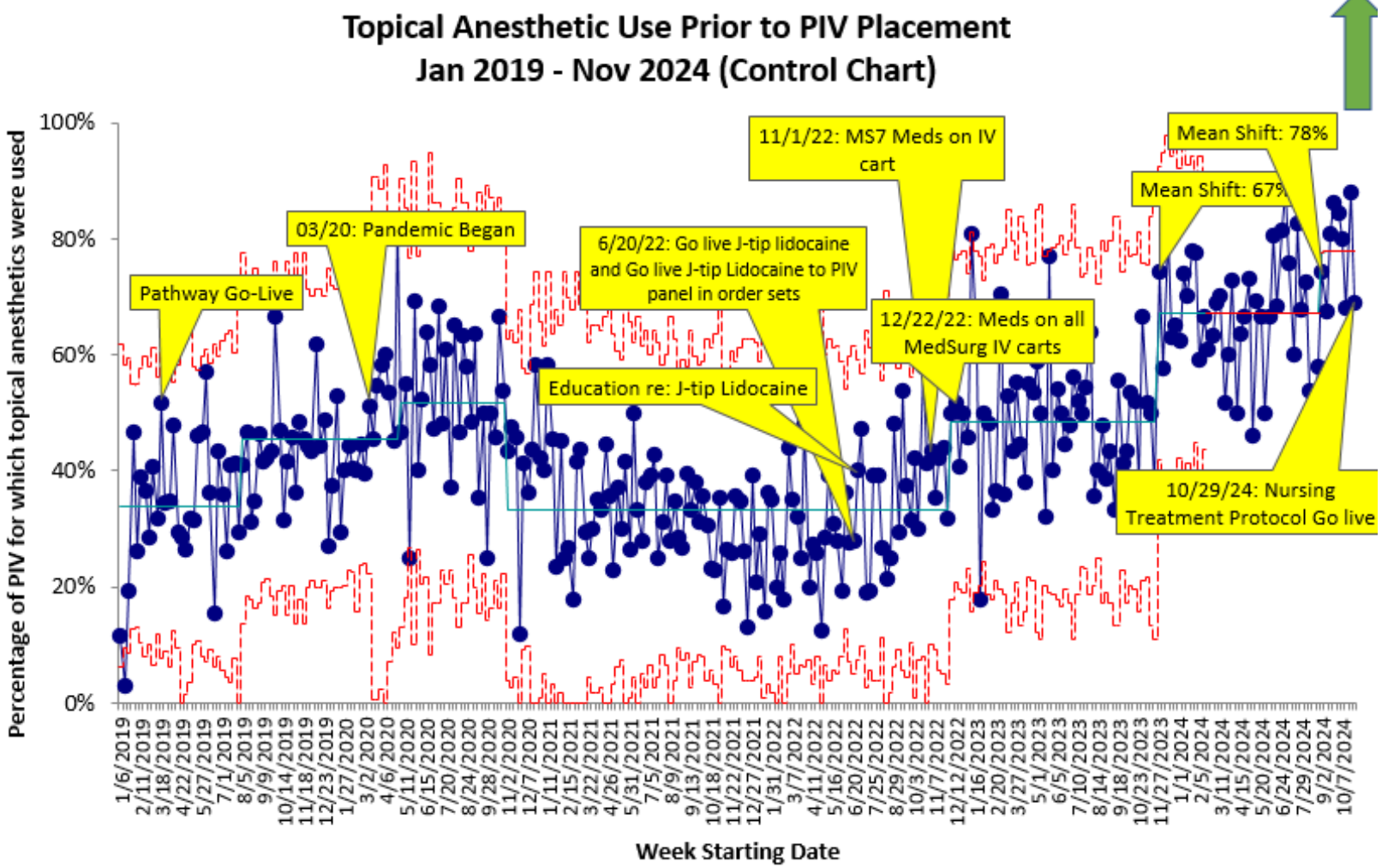

Community Acquired Pneumonia Pathway: Improvement in Antimicrobial Stewardship

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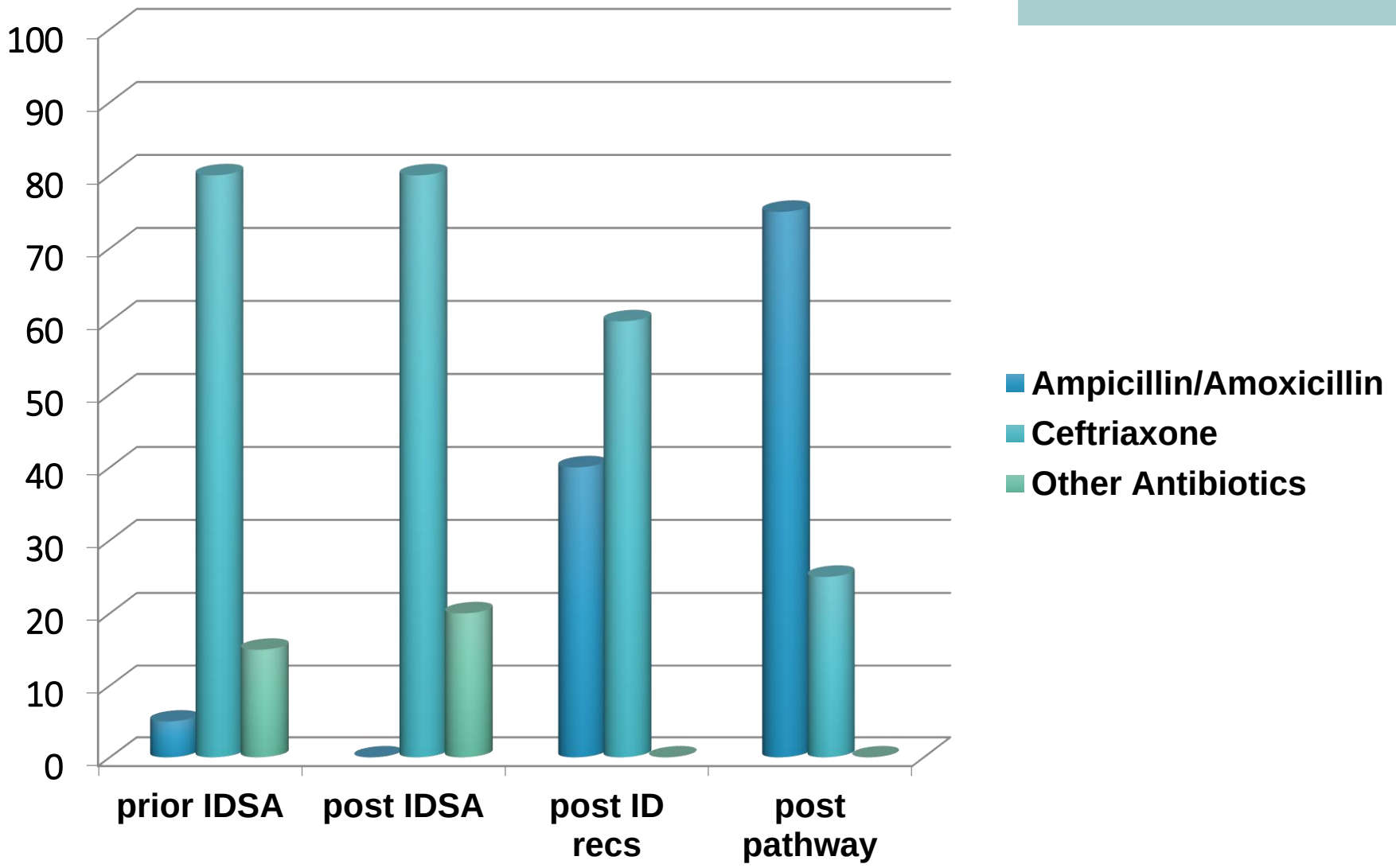

Croup Pathway:
Improvement in Med Delivery and LOS

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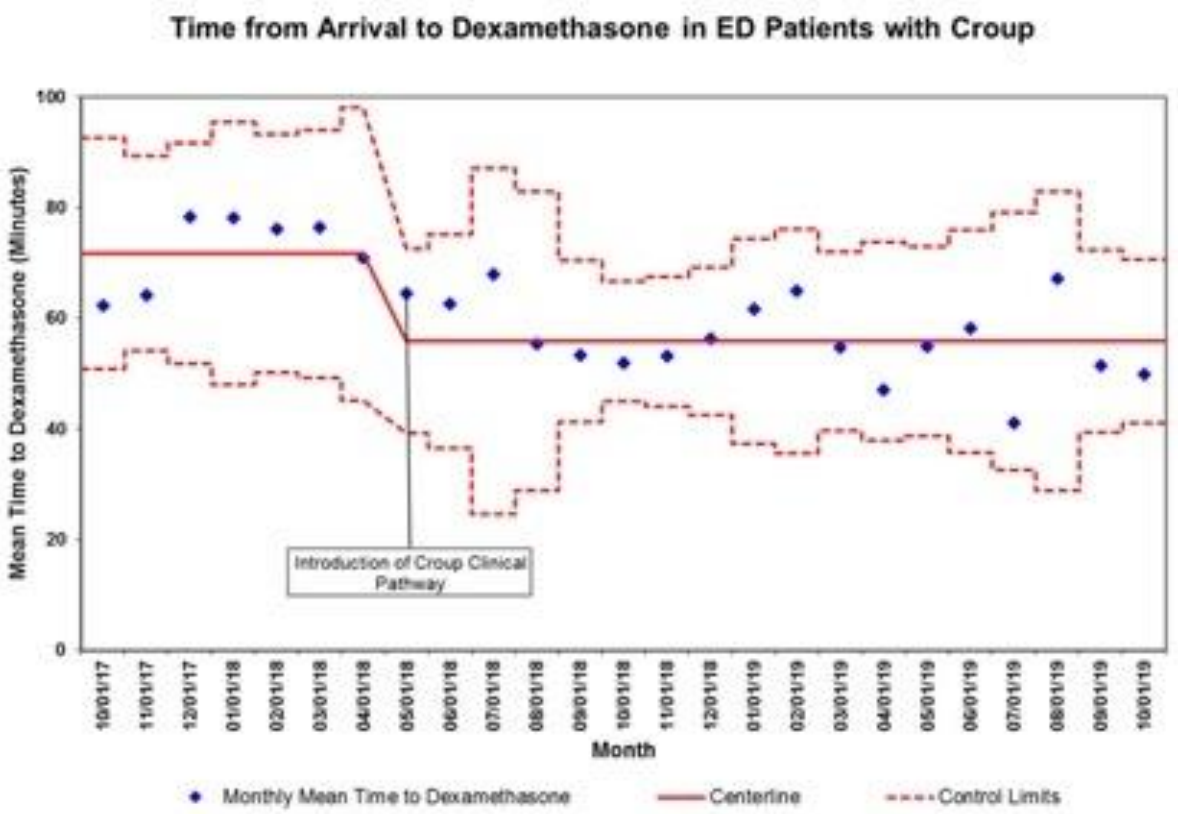

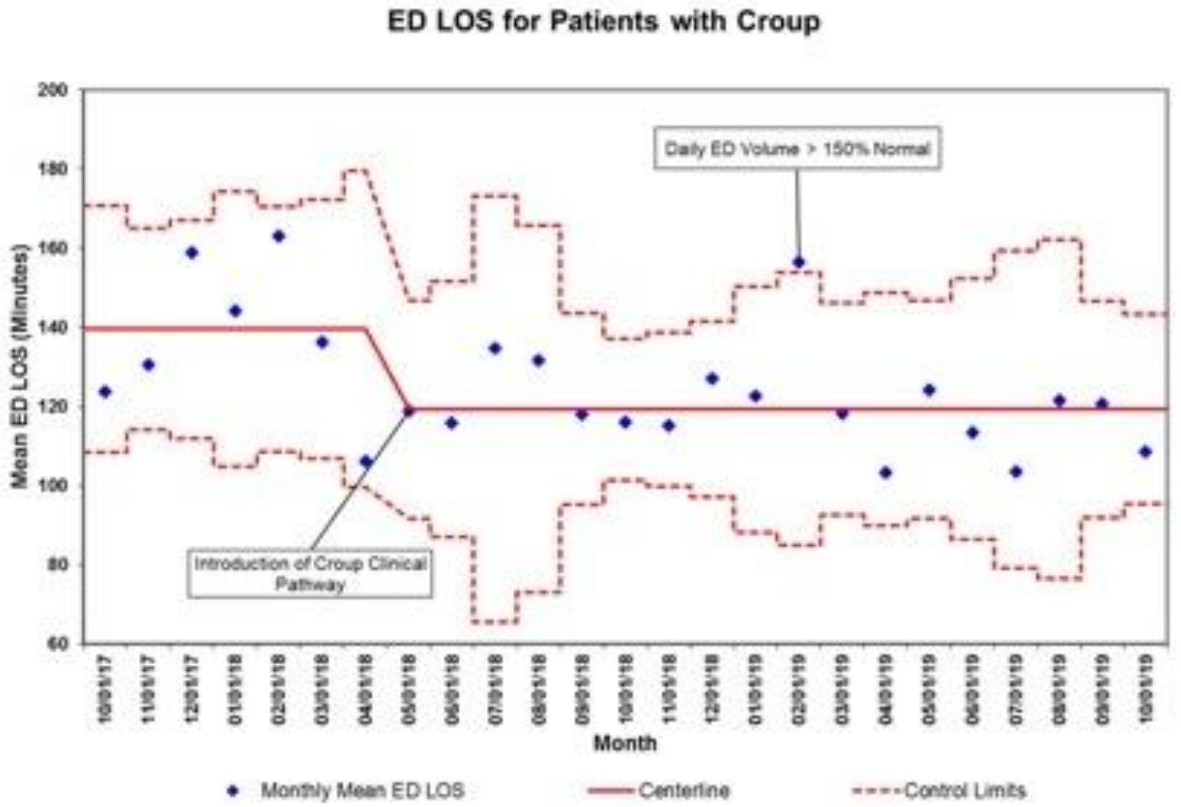

Croup Pathway:
Decrease in Unnecessary Testing and Treatments

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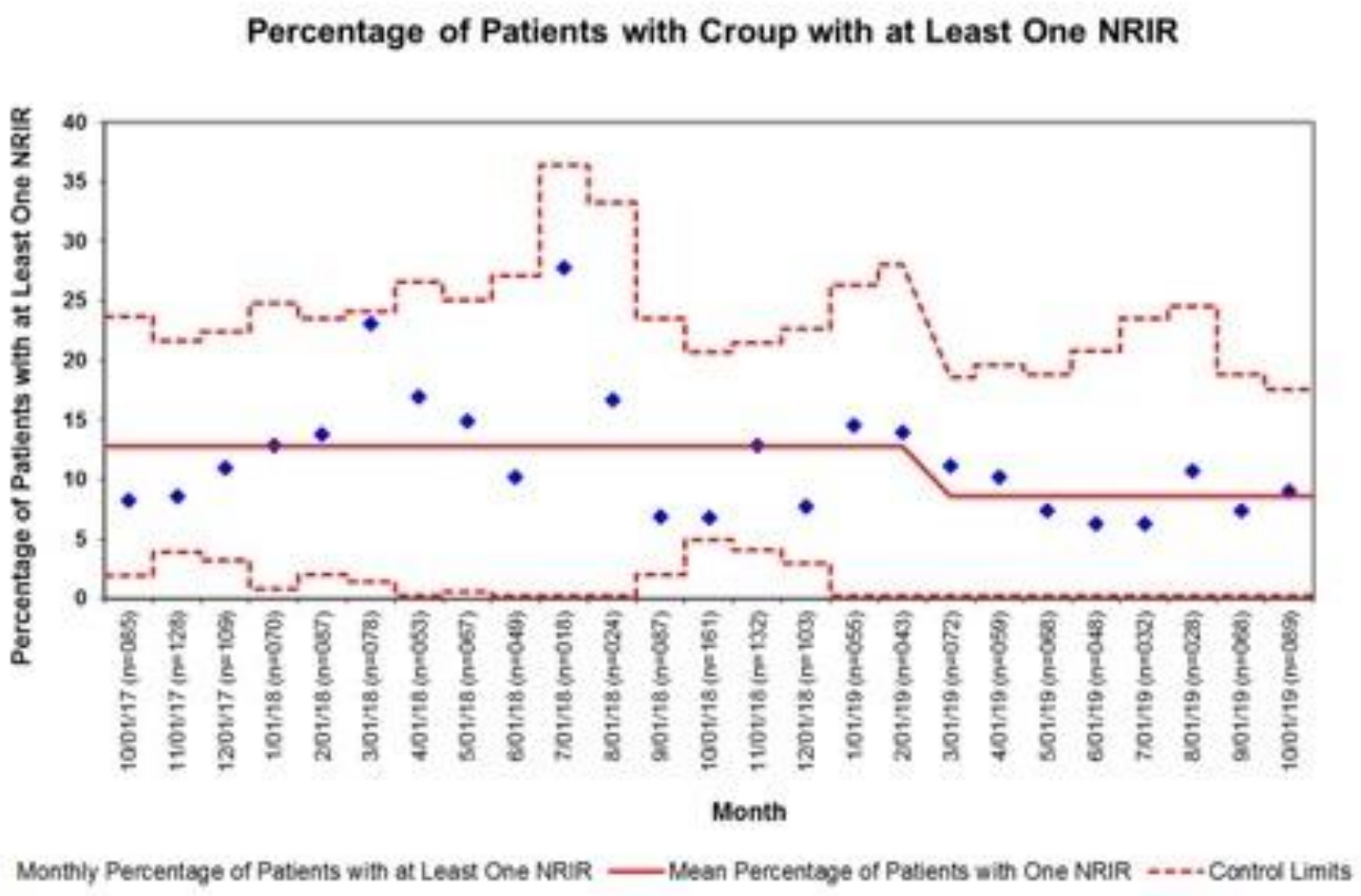

Fever 29-60 day old Pathway:
Decrease in Unnecessary Testing and Treatments

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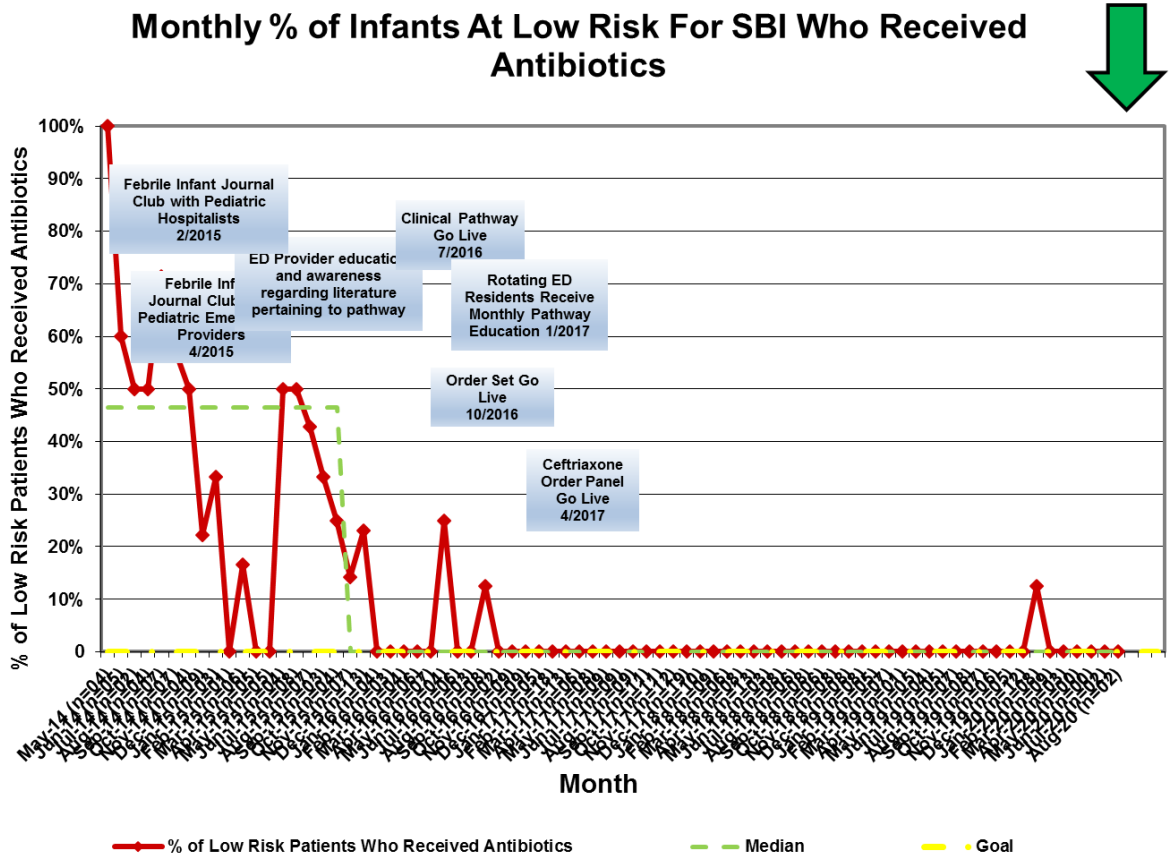

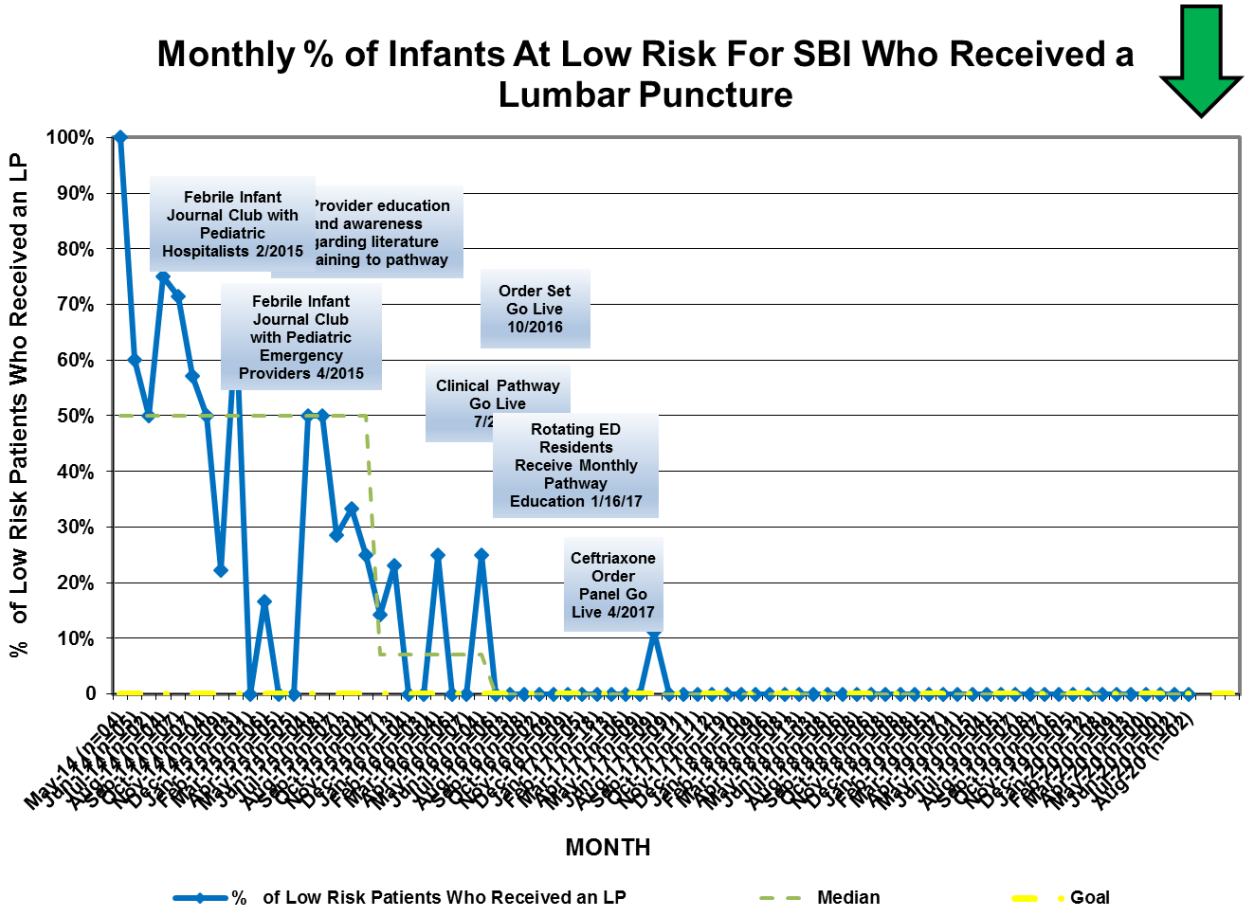

Fever 29-60 day old Pathway: Decrease in Unnecessary Hospitalizations

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Percentage of low risk infants admitted to hospital