

2022 AIM Data Support Community of Learning

Friday, July 08, 2022, 3:00PM-4:30PM, EST



Welcome

- You are muted upon entry to the call
- > You will have the ability to unmute yourself during Q&A times
- We encourage participants to remain muted in an effort to reduce background noise
- ➤ If you are experiencing technical difficulties, please chat an AIM staff member or email aimdatasupport@acog.org

This presentation will be recorded

Both Slides and Presentations will be available and sent via email.



Agenda

Time	Topic	Facilitator/Speaker
3:00PM-3:10PM	Welcome and Introductions	Inderveer Saini
3:10PM-4:00PM	Presentation: Monitoring & Reporting Data from QI Initiatives	Brant Oliver, PhD, MS, MPH , FNP- BC, PMHNP-BC Daisy Goodman, DNP, MPH, CNM, CARN-AP
4:00PM-4:15PM	Group Discussion and Q&A Session	All
4:15PM-4:20PM	Report-Outs: Oklahoma	Barbara O' Brien; Denise Cole
4:20PM-4:25PM	Report-Outs: Wisconsin	Eileen Zeiger
4:25PM-4:30PM	Upcoming Data COL Updates & Closing	Inderveer Saini



AIM Data Team



Inderveer Saini AIM Data Specialist



Isabel Taylor AIM Data Program Supervisor

David Laflamme AIM Epidemiology Consultant



Please reach out to us with any questions related to the AIM Data Support COL at aimdatasupport@acog.org.

The Dartmouth Institute for Health Policy and Clinical Practice



Brant Oliver, PhD, MS, MPH, FNP-BC, PMHNP-BC Associate Professor



Daisy Goodman, DNP, MPH, CARN-AP, APRN, CNM Assistant Professor



Monitoring & Reporting Data from QI Initiatives



Practical Use of Statistical Process Control Charts

Daisy Goodman, DNP, MPH, CNM, CARN-AP

Brant Oliver, PhD, MS, MPH, FNP-BC, PMHNP-BC



About the faculty

- Brant Oliver, PhD, MS, MPH, FNP-BC, PMHNP-BC, is Associate Professor at the Dartmouth Institute and Geisel School of Medicine at Dartmouth, Associate Chief Quality Officer for Patient Experience at Dartmouth-Hitchcock in New Hampshire, and national core faculty and curriculum lead for improvement measurement for the VA National Quality Scholars fellowship program (VAQS). He directs the Chronic Health Improvement Research program (CHIRP) at Dartmouth and is PI of multicenter improvement and implementation research collaborates for complex, chronic, costly (3C) conditions including multiple sclerosis. He has worked as a methodologist, investigator, CoI or PI on large scale initiatives with the Cystic Fibrosis Foundation, Crohn's & Colitis Foundation, the Multiple Sclerosis Association of America, and CVS, including international work in Canada, UK, Sweden, and Australia.
- Daisy Goodman, DNP, MPH, CNM, CARN-AP, is an Assistant Professor of Obstetrics and Gynecology and Community and Family Medicine at the Geisel School of Medicine at Dartmouth, a practicing nurse midwife and researcher. Goodman completed a fellowship with the VA Quality Scholars Program in 2015, and taught healthcare improvement methods at the Dartmouth Institute from 2015-2021. She co-leads New Hampshire's AIM program and directs two HRSA funded initiatives to improve access to high quality reproductive healthcare for people with SUD.



Disclosures

- Dr. Oliver has received research grant funding for investigator-initiated research in multiple sclerosis population health improvement from Biogen and EMD Serono and serves in a limited consulting role for Kaplan at Point of Care for development of continuing medical education programs in shared decision making for chronic illness populations.
- Dr. Goodman has no financial disclosures. She serves as clinical lead for New Hampshire's AIM program.



Acknowledgments

- The Dartmouth Institute for Health Policy & Clinical Practice (TDI) MPH program: PH117 and PH126 faculty
- Department of Veterans Affairs National Quality Scholars Program (VAQS): Methods & Analysis faculty





Learning Objectives

After attending this session, participants will be able to:

- Interpret a statistical process control chart (SPC)
 - □ Select appropriate SPC charts based on data characteristics
 - Create and interpret SPC charts for continuous and proportions data
 - Apply SPC interpretation to clinical improvement scenarios to inform intelligent action.
- 2. Describe considerations for tailoring a visualization to a specific audience
- 3. Give an example of using a report to inform and motivate change



Agenda

Part I- Intro to SPC & Variable SPC

Part II- Attribute SPC

Part III- Fixing & Splitting Limits

Using SPC data to inform and motivate change

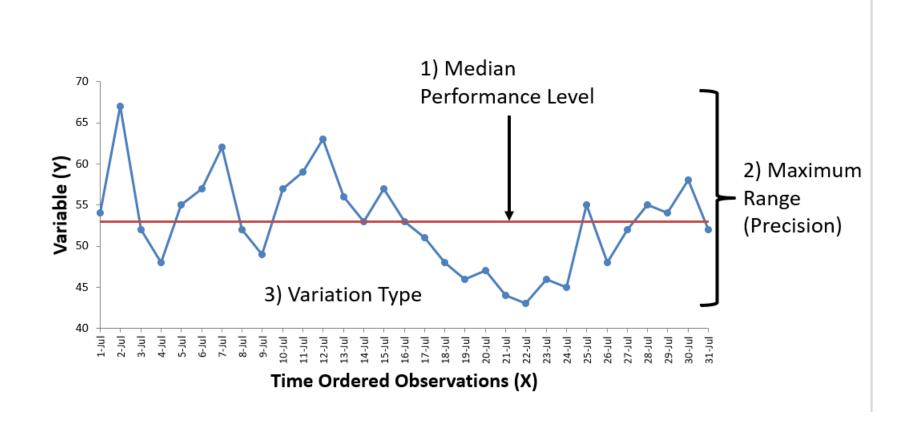


Part 1:

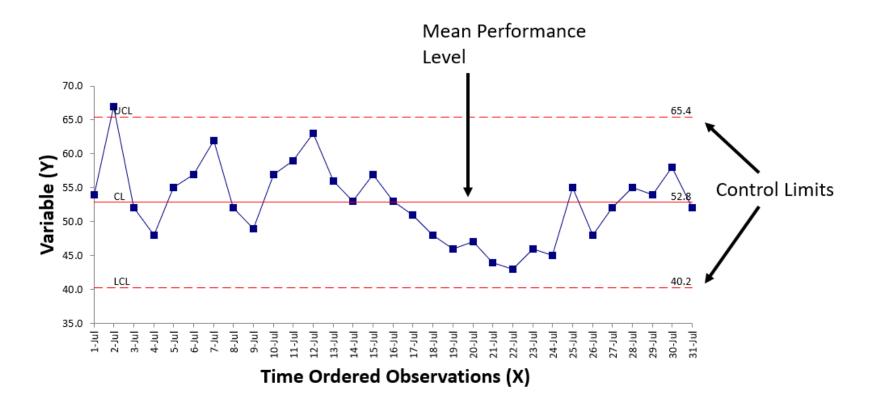
Introduction to SPC and Variable Data SPC: XmR Charts



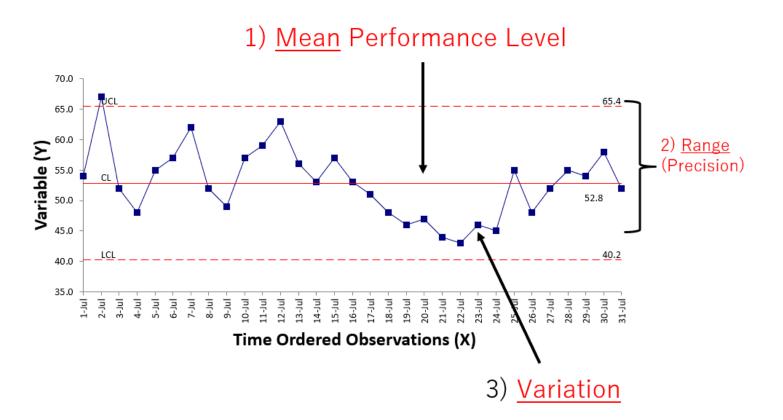
Run Chart Review: "The 3 Elements"



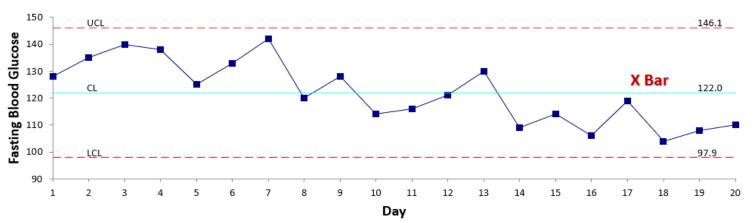
Statistical Process Control (SPC)Basics



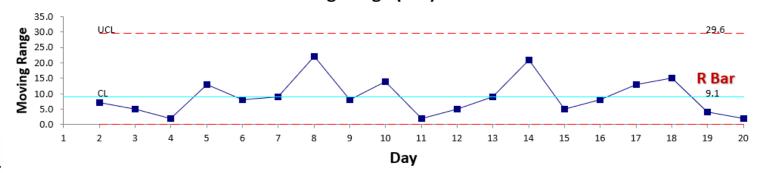
SPC Analysis: The "Big Three"



X Chart

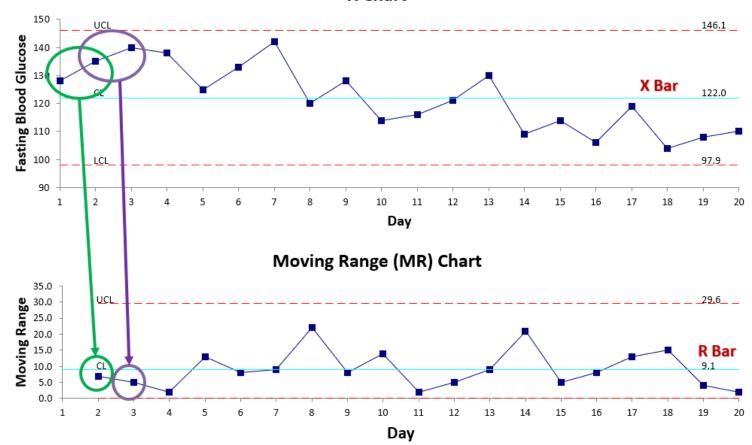


Moving Range (MR) Chart



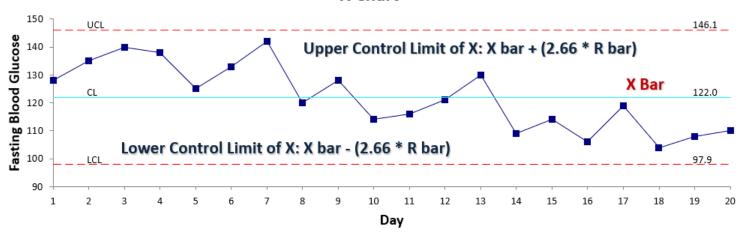




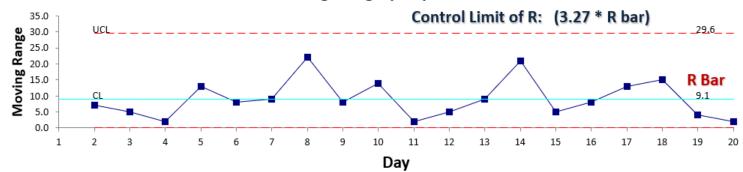




X Chart



Moving Range (MR) Chart



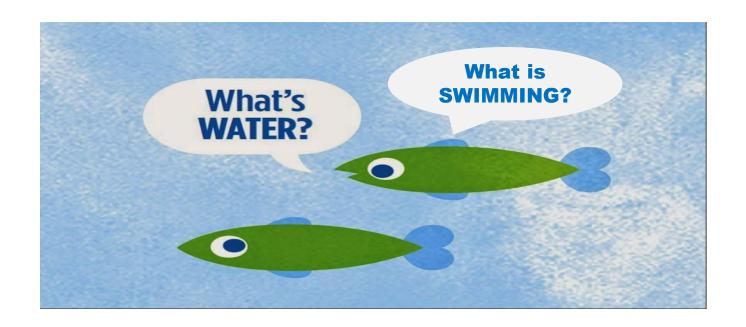


SPC for Variable Data

	XmR ("I Chart")	X Bar S
Observations per time point	N=1	N >10 (or N>1)
Points	Individual values	Subgroup averages
Center Line (CL) in "upper chart"	Average of all individua values	Average of all subgroup averages
Upper Control Limit	CL + 2.66 * (average moving range)	CL+ A ₃ * (average standard deviation)
Lower Control Limit	CL- 2.66 * (average moving range)	CL- A ₃ * (average standard deviation)
Center line in "lower chart"	Average moving range (absolute value)	Average standard deviation
"Lower chart" control limits	Upper only	Upper and lower



Exploring Context





Impact of Context on Performance and Outcomes

Sometimes interventions to improve care work ...and sometimes they don't



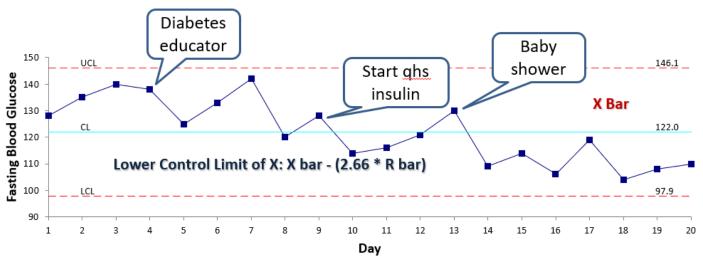


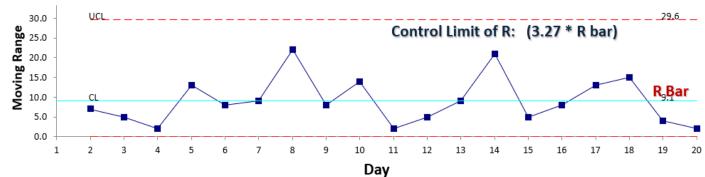






Glucometer Readings (GDMA2)







Types of Variation

(Random)

Variation caused by chance causes, by random variation in the system, resulting from many small factors.

Example: Variation in work commute due to traffic lights, pedestrian traffic, parking issues.

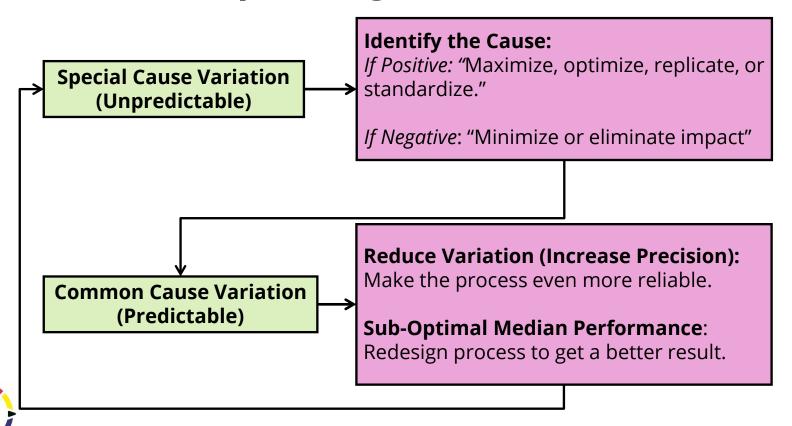
Special Cause (Non-Random)

Variation caused by special circumstances or assignable causes not inherent to the system.

Example: Variation in work commute impacted by flat tire, road closure, heavy frost/ice.



Responding to Variation



IHI Special Cause Detection Rules: Run Chart vs. SPC

Run Chart

Shift – 6 or more consecutive points all above or all below the median

<u>Trend</u> - 5 or more consecutive points all going up or all going down

Runs – too many or too few runs

Statistical Process Control

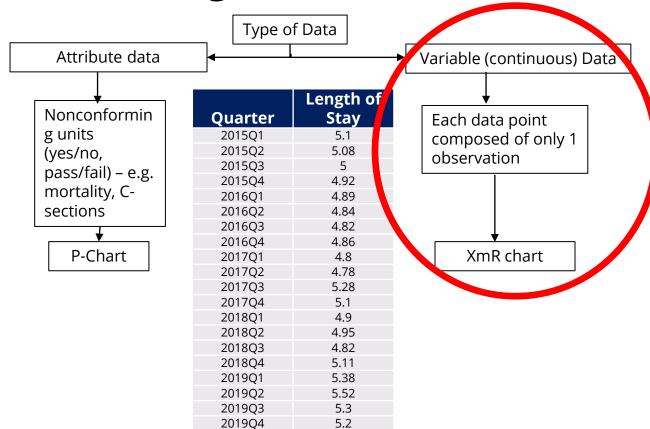
Shift – 8 or more consecutive points all above or below the mean

<u>Trend</u> – 6 or more consecutive points all going up or all going down

<u>Control Limits</u> – 1 point outside the upper or lower control limits



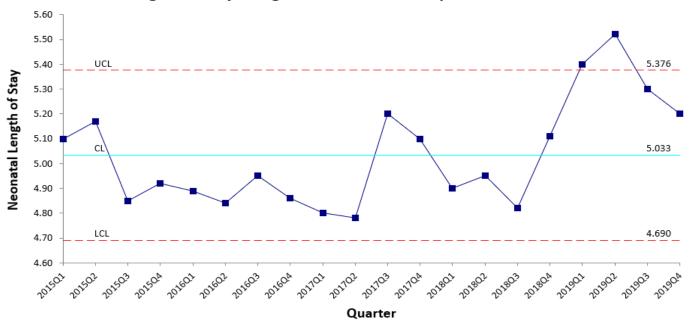
Choosing a Control Chart





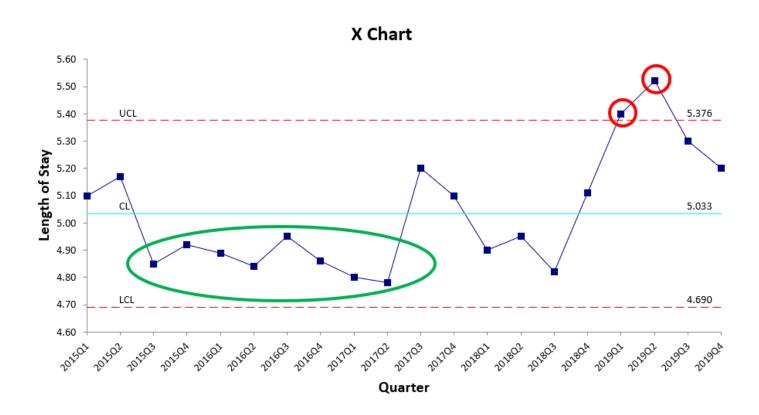
Poll: How many special cause signals are there?

Length of Stay: Diagnosis of Neonatal Opioid Withdrawal





Three Special Cause Signals

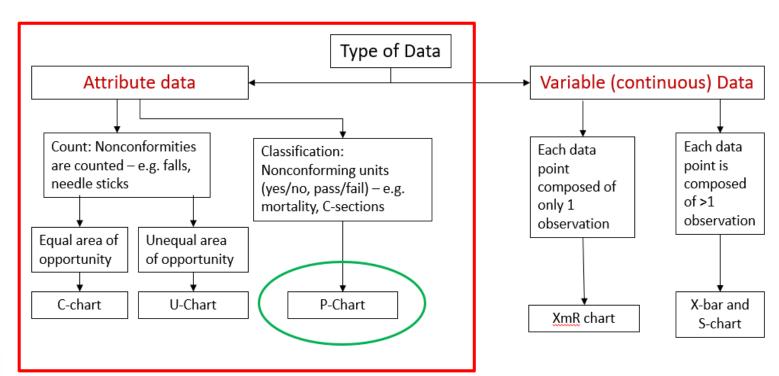




Part 2 Attribute Data SPC: p Charts



Choosing a SPC Chart





Example of common perinatal metrics and possible chart types

XmR

Number of deliveries per month Number of unit safety drills each quarter Number of staff completing competency training each year Number of C-sections performed each week

P chart

C-section per total births
% of patients screened for SUD
% of patients who had a
postpartum visit
% of patients with pre-eclampsia
who experienced SMM
% of staff completing competency
training

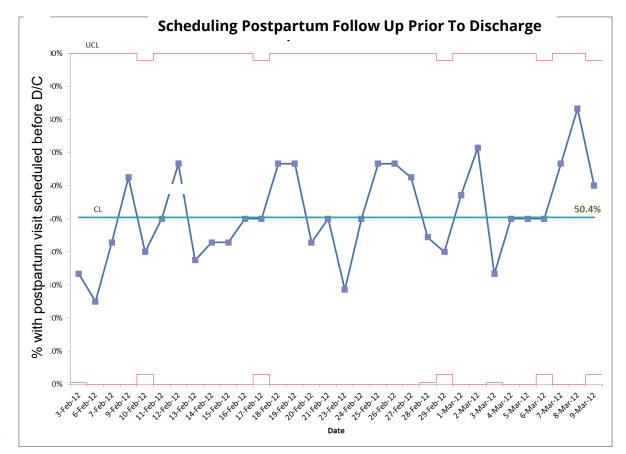
p (proportions) chart assumptions

- ☐ Binomial: Each unit can be classified into only two categories (yes/no).
- ☐ The occurrence of either of the attributes is independent of the attributes of other units.
- ☐ It is impossible for the numerator to exceed the denominator (proportion cannot exceed 100%).



p chart

	Number of	
	patients who	
	did not have a	
	postpartum	
l	visit	Total patients
Date	scheduled	discharged
3-Feb-12	3	9
6-Feb-12	2	8
7-Feb-12	3	7
9-Feb-12	5	8
10-Feb-12	4	10
11-Feb-12	4	8
12-Feb-12	4	6
13-Feb-12	3	8
14-Feb-12	3	7
15-Feb-12	3	7
16-Feb-12	3	6
17-Feb-12	5	10
18-Feb-12	4	6
19-Feb-12	4	6
20-Feb-12	3	7
21-Feb-12	3	6
23-Feb-12	2	7
24-Feb-12	4	8
25-Feb-12	4	6
26-Feb-12	4	6
27-Feb-12	5	8
28-Feb-12	4	9
29-Feb-12	4	10
1-Mar-12	4	7
2-Mar-12	5	7
3-Mar-12	3	9
4-Mar-12	3	6
5-Mar-12	3	6
6-Mar-12	5	10
7-Mar-12	4	6
8-Mar-12	5	6
9-Mar-12	6	10

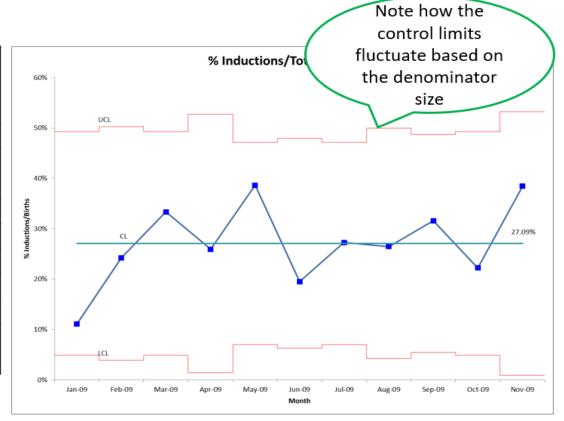




Min-Max/Range: 6-10/4

p chart

		Monthly Vaginal
Month	Induction	Births
Jan-09	4	36
Feb-09	8	33
Mar-09	12	36
Apr-09	7	27
May-09	17	44
Jun-09	8	41
Jul-09	12	44
Aug-09	9	34
Sep-09	12	38
Oct-09	8	36
Nov-09	10	26





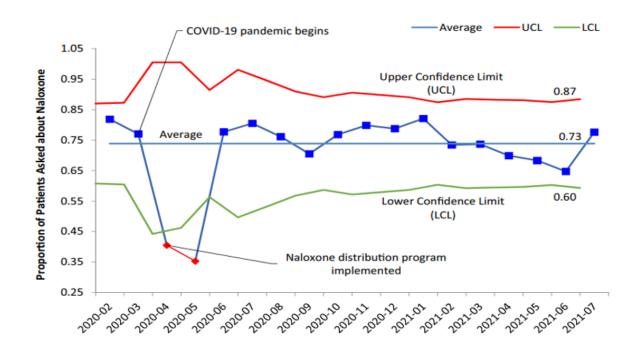
Min-Max/Range: 26-44/18

IHI Special Cause Rules for SPC: Same for p Charts as for XmR Charts

- □Shift 8 or more consecutive points all above or below the mean
- □<u>Trend</u> 6 or more consecutive points all going up or all going down
- □Control Limits 1 point outside the upper or lower control limits



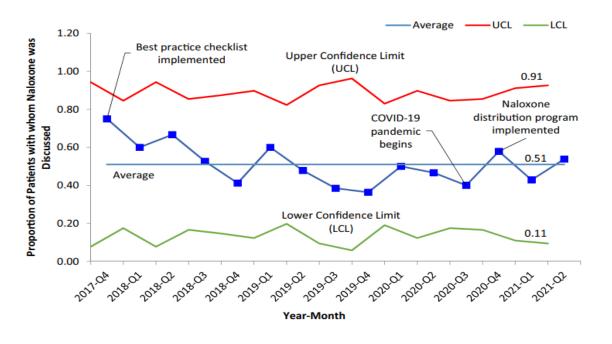
Asking about Naloxone at First Prenatal Visit





Duska, MK, Goodman. Implementation of a prenatal naloxone distribution program to decrease maternal mortality from opioid overdose. *Maternal Child Health Journal* 2021.

Providing Naloxone Access to Pregnant People with OUD





Duska, MK, Goodman. Implementation of a prenatal naloxone distribution program to decrease maternal mortality from opioid overdose. *Maternal Child Health Journal* 2021.

Part 3: Fixing & Splitting Control Limits



Fixing and Splitting Limits Algorithm

Start with a standard "un-split" SPC analysis

- 1. Do I have a stable baseline?
- 2. Do I have a known exposure?
- 3. Do I need to maximize sensitivity to detect special cause variation compared to a set baseline?

- 1. Is there sustained special cause variation present?
- Is there context knowledge suggesting presence of >1 process?
- 3. Do I want/need to prioritize the assessment of new system characteristics and sustainability?



Fix Limits

Split Limits

Fixed Limit Analysis

- ☐ Sets ("fixes") the center line at an established baseline (pre-exposure) level.
- Requires a baseline that is in statistical control and known chronology of baseline and exposure (intervention) periods.
- Increases sensitivity to detect special cause variation post-exposure compared to baseline.



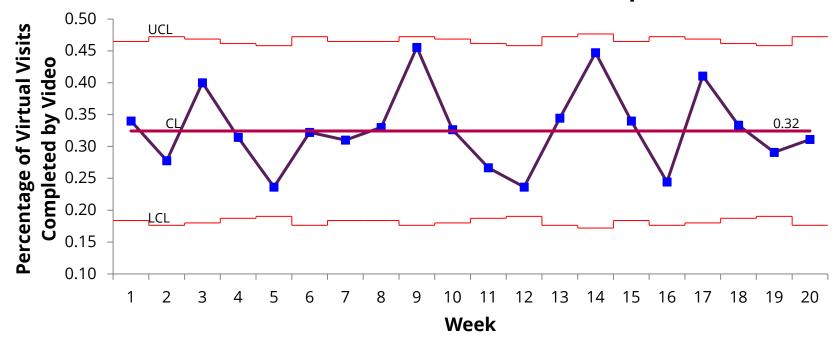
SPC Criteria for a "stable baseline"

At least 12-15 observations (acceptable Type II error) - ideal to have 20 points (Provost text recommendation, less Type II error)

Process is in statistical control (common cause variation)

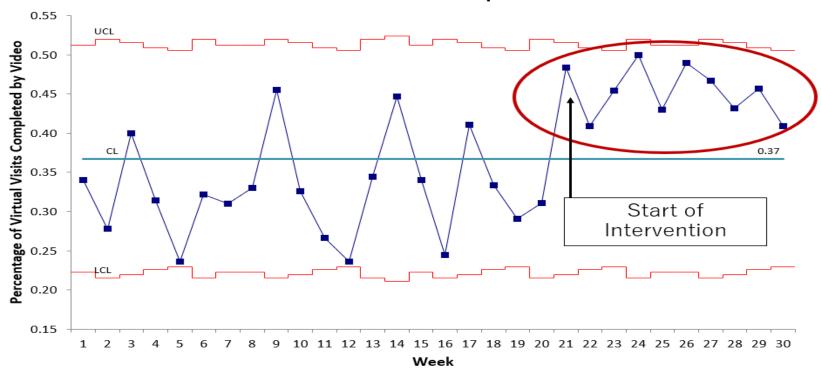


Baseline Video Visits-Virtual Visits p Chart



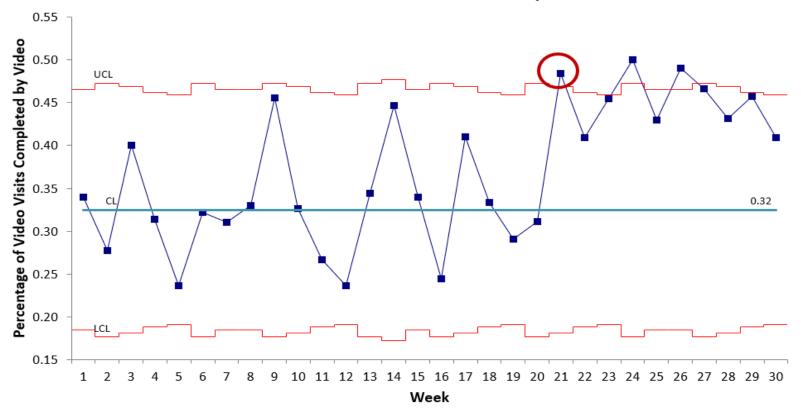


Video Visits-Virtual Visits p Chart



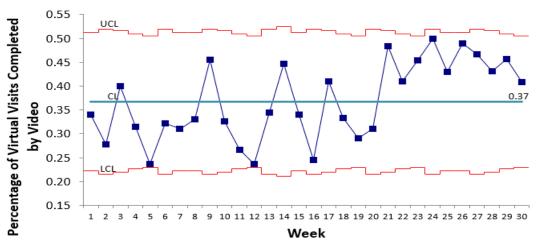


Fixed Limits Video Visits-Virtual Visits p Chart



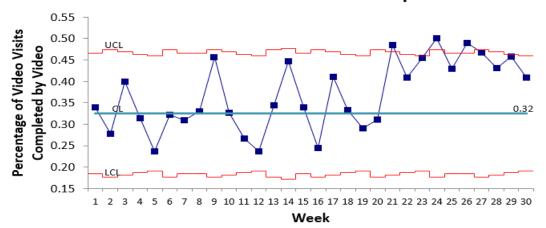


Video Visits-Virtual Visits p Chart



Special Cause Signal: Day 29

Fixed Limits Video Visits-Virtual Visits p Chart



Special Cause Signal: Day 21



Split Limits Analysis

- ☐ Splits the analysis (process) into two (or more) separate analyses (processes).
- Each process has its own interpretation and variation characteristics.
- ☐ Uses: To assess the characteristics of a new process post observed special cause variation, to compare pre-/post, to assess for stability and sustainability of new process/improvement.

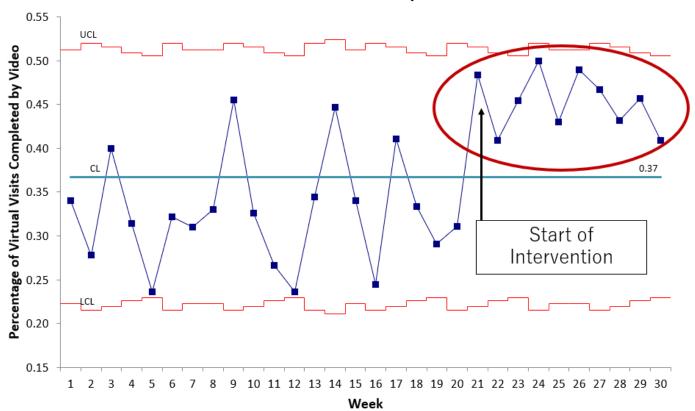


When do you split?

- □ *Empirical rationale* is observed via sustained special cause variation (shifts, trends).
- Pragmatic rationale based on context understanding suggesting multiple processes.



Video Visits-Virtual Visits p Chart





Split Limits Video Visits-Virtual Visits p Chart

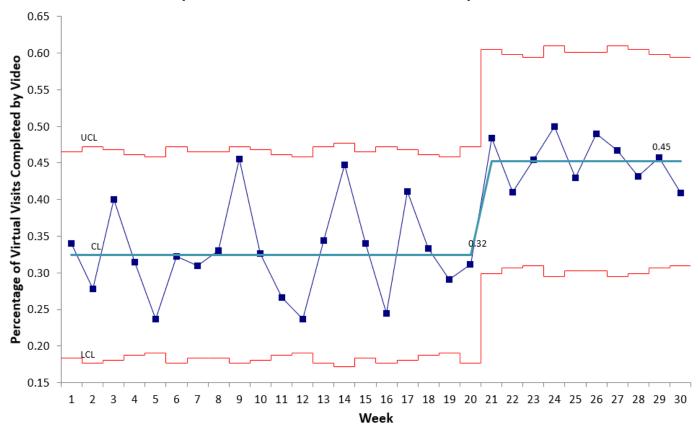
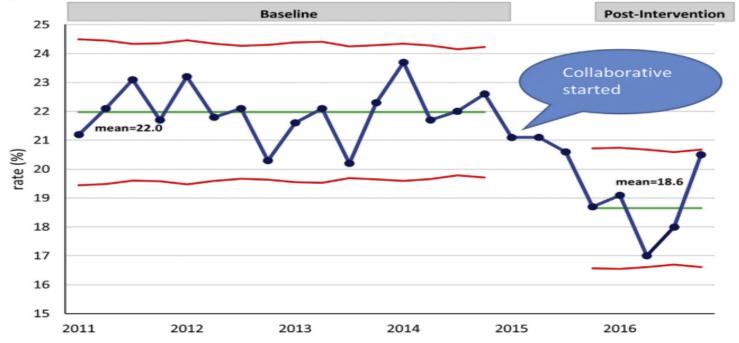




FIGURE 1

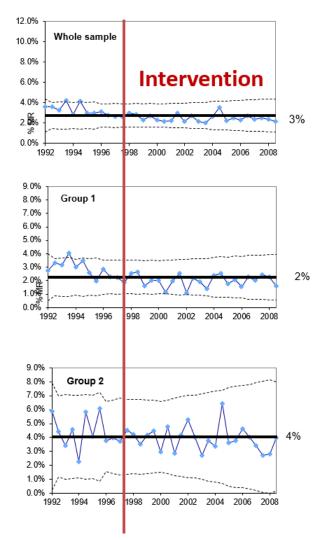
Control chart of quarterly rates for SMM, 2011-2016

A Severe maternal morbidity





Main EK, Chang S-C, Dhurjati R, et al. Reduction in racial disparities in severe maternal morbidity from hemorrhage in a large-scale quality improvement collaborative. *Am J Obstet Gynecol* 2020;223:123.e1-14.



Stratification reveals difference in outcomes of intervention by group



Summary

SPC is a powerful tool for analyzing the success of maternal health interventions

- ☐ Can be utilized to track implementation success as well as outcomes
- Annotation can be helpful to understand barriers and facilitators of change

Variables and approach can be tailored to a specific audience

Visualizing change (or lack of change) over time is an important motivator for implementation



Questions?





Resources

VAQS Methods & Analysis SPC Videos (open-access via You Tube):

Intro to SPC	_
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- Attribute data SPC
- Variable data SPC
- Fixing & Splitting Control Limits
- Rare Events SPC

Articles: Perla et al.(run charts); Bennyan (SPC); Thor et al. (SPC)

Textbook: <u>Provost & Murray, Healthcare Data Guide</u>

Educational Opportunities: <u>VAQS fellowship</u>, <u>The Dartmouth Institute</u>

VAQS Special Interest Group: ECHO type format, contact Dr. Oliver if interested in visiting or presenting a case!

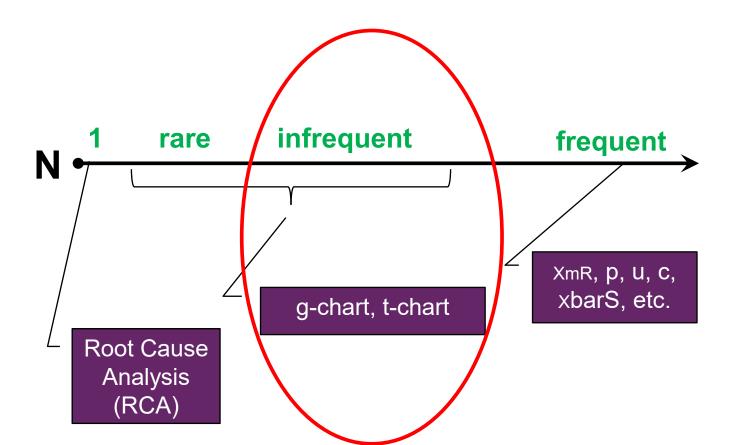
Questions: daisy.j.goodman@dartmouth.edu; brant.j.oliver@dartmouth.edu



Supplemental slides: Rare events



Rare Events Analysis





Rare Events SPC

- *g Chart*: "occurrences (units) between events" e.g.- "how many procedures between adverse events?"
- *t Chart*: "time between events" e.g. "how many patient days between falls?"



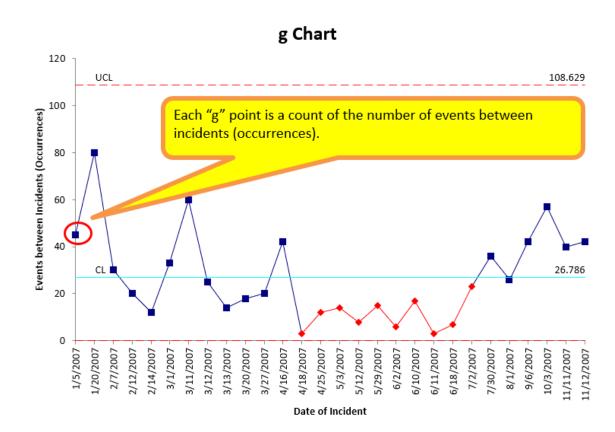
When to use Rare Events SPC

- When standard SPC analyses (e.g., XmR, p, etc.) look funky (not enough frequency)...
 - too many zero values (very low event rate)
 - "sawtooth" patterns
- When you are most interested in "spans between events rather than event frequencies or proportions"



g Chart Basics

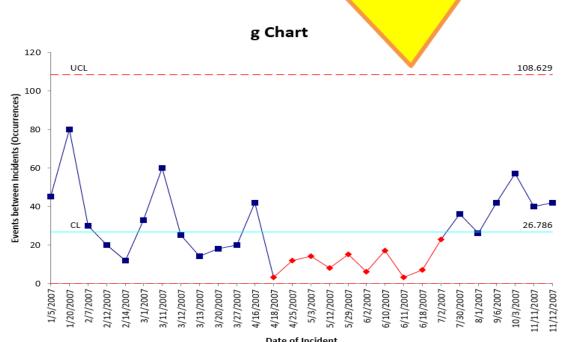
Events				
Date of	(units) since			
incident	last incident			
1/5/2007	45			
1/20/2007	80			
2/7/2007	30			
2/12/2007	20			
2/14/2007	12			
3/1/2007	33			
3/11/2007	60			
3/12/2007	25			
3/13/2007	14			
3/20/2007	18			
3/27/2007	20			
4/16/2007	42			
4/18/2007	3			
4/25/2007	12			
5/3/2007	14			
5/12/2007	8			
5/29/2007	15			
6/2/2007	6			
6/10/2007	17			
6/11/2007	3			
6/18/2007	7			
7/2/2007	23			
7/30/2007	36			
8/1/2007	26			
9/6/2007	42			
10/3/2007	57			
11/11/2007	40			
11/12/2007	42			





	Events (unit
Date of	since last
incident	incident
1/5/2007	45
1/20/2007	80
2/7/2007	30
2/12/2007	20
2/14/2007	12
3/1/2007	33
3/11/2007	60
3/12/2007	25
3/13/2007	14
3/20/2007	18
3/27/2007	20
4/16/2007	42
4/18/2007	3
4/25/2007	12
5/3/2007	14
5/12/2007	8
5/29/2007	15
6/2/2007	6
6/10/2007	17
6/11/2007	3
6/18/2007	7
7/2/2007	23
7/30/2007	36
8/1/2007	26
9/6/2007	42
10/3/2007	57
11/11/2007	40
11/12/2007	42

g Charts only have an upper control limit (as there cannot be negative numbers of events or units between incidences). The upper control limit is approximately 4 times the average of all g values or 5.7 times the center line (CL). This is to protect against outlier effects in infrequent event rate samples, i.e. protect against inflated Type I error and tampering risk...





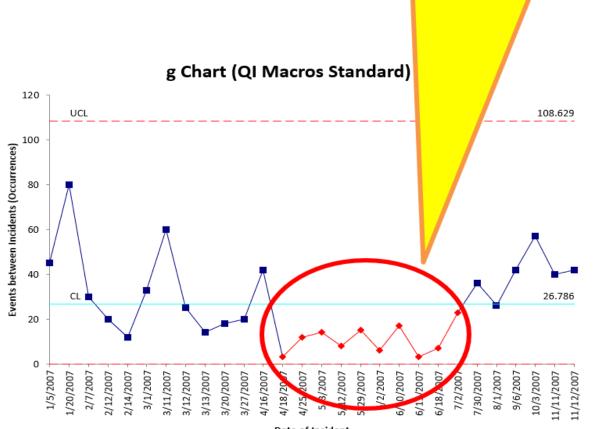
7/7/2022

Date of Incident

0

Events (units) Date of since last incident incident 1/5/2007 45 1/20/2007 80 2/7/2007 30 2/12/2007 20 2/14/2007 12 3/1/2007 33 60 3/11/2007 3/12/2007 25 14 3/13/2007 3/20/2007 18 20 3/27/2007 42 4/16/2007 4/18/2007 3 4/25/2007 12 5/3/2007 14 5/12/2007 8 5/29/2007 15 6/2/2007 6 6/10/2007 17 3 6/11/2007 6/18/2007 7/2/2007 23 36 7/30/2007 8/1/2007 26 9/6/2007 42 10/3/2007 57 11/11/2007 40 42 11/12/2007

The typical special cause signals (shifts, trends, points outside of the control limits) can be used for g charts.

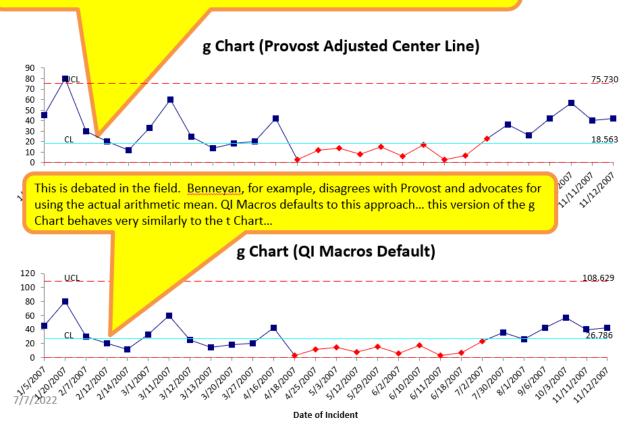




7/7/2022

Date of Incident

Because g Charts assume a geometric distribution, Provost argues that the center line should be adjusted to reflect the theoretical median of a geometric distribution >> CL = 0.693 * average of all g values, using a 0.693 adjustment (the theoretical median of a geometric distribution). This affects the control limit calculation substantially...





t Chart Basics

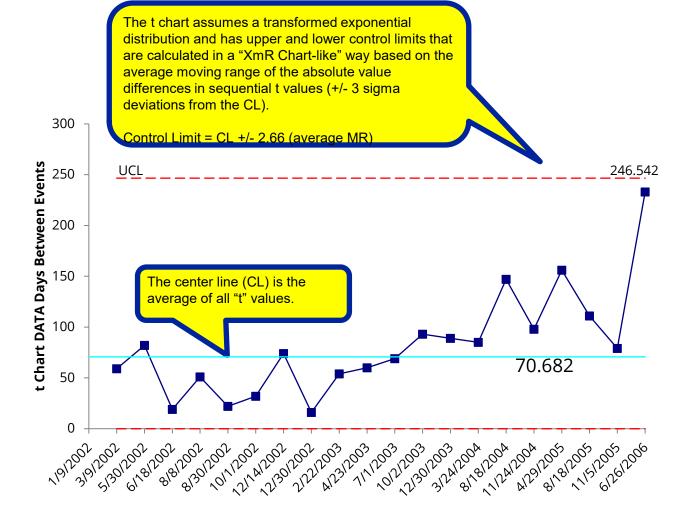
Event or	Data of Furnit	Days Between	
	Date of Event	Events	٠,
1	1/9/2002		· '
2	3/9/2002		59
3	5/30/2002		82
4	6/18/2002		19
5	8/8/2002		51
6	8/30/2002		22
7	10/1/2002		32
8	12/14/2002		74
9	12/30/2002		16
10	2/22/2003		54
11	4/23/2003		60
12	7/1/2003		69
13	10/2/2003		93
14	12/30/2003		89
15	3/24/2004		85
			147
16	8/18/2004		
17	11/24/2004		98
18	4/29/2005		156
19	8/18/2005		111
20	11/5/2005		79
21	6/26/2006		233



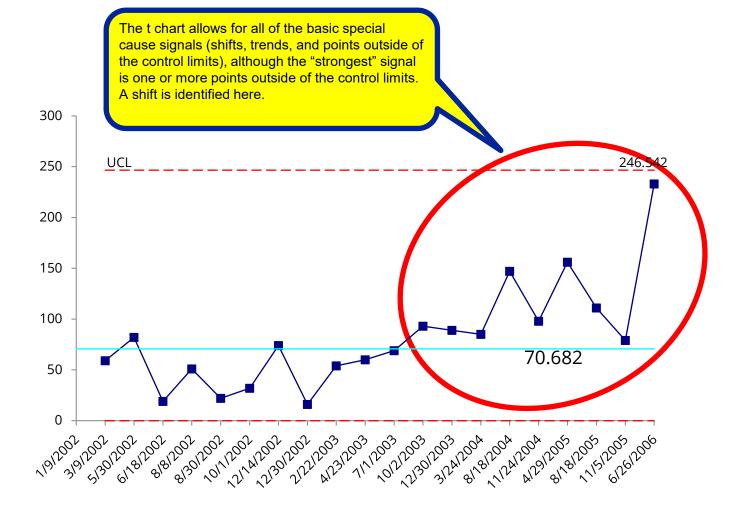
Month and Year

246.542

70.682









Signs that the event rate that is <u>too frequent</u> for a rare events SPC analysis...

- ☐ A <u>rapidly decreasing</u> time to event or occurrences to event interval.
- ☐ <u>"In the Basement"</u> -- Interval approaching zero.
- ☐ Remember that event rate (frequency) increases as the interval (time to event or occurrence to event) decreases...



Report-Outs: Oklahoma

- Barbara O'Brien



Second Report-Out



OKLAHOMA PERINATAL QUALITY

IMPROVEMENT COLLABORATIVE

Denise Cole, MS, RNC-NIC, Program Manager

OPQIC ... Creating a culture of excellence, safety and equity in perinatal care

- Oklahoma = 45 birthing hospitals, 49,000 annual births
- Collaborative of hospital teams, physicians, nurses, patients, public health and community stakeholders. Established 2014
- 5 paid staff 4.25 FTE
- opqic.org launched in 2015
- Primary areas of focus:
 - Reduce early elective deliveries (sustainment)
 - Improve outcomes of OB Hemorrhage & Severe Hypertension (sustainment)
 - Amplify AWHONN's Post-birth Warning Signs education (sustainment)
 - Improve reliability & timeliness of newborn screening
 - Improve outcomes in Maternal OUD & NAS







How we are collecting

- Patient-level data from hospital
 - Outcome and process measures
- Quarterly surveys sent to hospitals
 - Process and structure measures
- State-level data from our state health department
 - Statewide outcome data



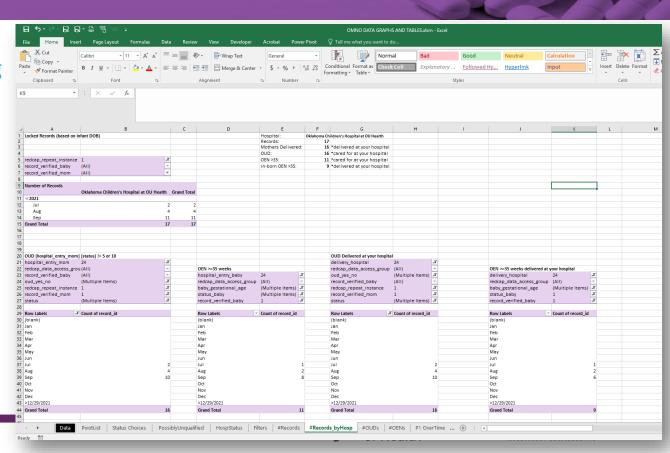




Quarterly Hospital and Aggregate Reports

Developed "by hand" using Microsoft Excel and Microsoft Word







OMNO Data Report

Q3 2021: July - Sept 2021

This is a report of records submitted as part of the Okishoma Mothers and Newborns Affected by Opioids (OMNO) initiative representing mothers and infants with a date of delivery/birth from July 1 – September 30, 2021. In total, 101 records were reported by 12 participating hospitals. Each 'record' represents a mother and her infant(s). Table 1 provides a breakdown of the number of records. See Appendix A for more information about inclusion criteria, data collection and definitions.

Many of the measures reported are in alignment with the <u>Data Collection Plan</u> from the Alliance for Innovation in Maternal Health (AlM). When appropriate, the AlM measures are identified with their ID. The AlM measures typically use the denominator of "women with OUD during pregnancy" or "opioid-exposed newborns ≥ 35 weeks gestation" (OEN) as defined in the plan.

Table 1: Number of Records Entered Collaborative-Wide for Q3 2021

•	uble 1. Number of Records Entered Condocrative Wide for Q5 2021					
	Total Records 101					
	Women with OUD During Pregnancy ³	97				
	Opioid-Exposed Newborns ≥ 35 Weeks (OEN) ⁵	87				

The following information is included in this report:

Demographic Information - Records by ZIP Code, Race/Ethnicity, and Insurance Status

Toxicology results of mothers and infants

Care of Women with OUD in Pregnancy:

- Universal Screening for OUD at prenatal care sites
- . Percent of women with OUD during pregnancy who receive MAT or behavioral health treatment
- . Percent of pregnant women with OUD screened for STI during pregnancy
- · Percent of mothers with OUD receiving prenatal pediatric consult

Care of Opioid-Exposed Newborns:

- Percent of OEN who had NAS symptoms
- Average length of stay for newborns with Neonatal Abstinence Syndrome (NAS)
- Percent of OEN who roomed together with mother during at least 50% of hospitalization
- Percent of OEN receiving mother's milk at newborn discharge
- · Percent of OENs requiring pharmacologic therapy
- · Number of days of pharmacological treatment for babies with NAS
- Percentage of OEN with DHS contacted
- Percent of OEN who go home to biological mother or taken into DHS custody
- Percent of OEN with appropriate follow up at discharge (Early intervention)



OKLAHOMA

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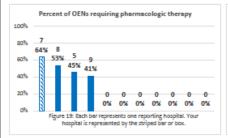
State Department

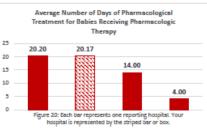
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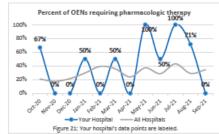
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Pharmacologic Therapy (AIM 001, 002)

A hospitals provided pharmacologic therapy to OENs experiencing withdrawal during Q3 2021. Overall, 30 (34%) of the 67 OENs collaborative-wide received pharmacology therapy during Q3 2021. The average length of treatment for those newborns was 13.5 days. Data points may be missing from Figure 22 if your hospital did not provide pharmacologic therapy in a given month.









Adapting Data Collection

- Data collection via REDCap ongoing for 6 quarters
 - O Some of the data have recently been adapted, removed, or new questions added in response to hospitals' needs
- Using data to improve QI
 - Measure what matters
 - Identify gaps in care processes
 - Inform purpose and context





Our Goals with COL

- Use our data to transform QI
 - The best way to capture data and the best way to present data
- Development and launch of collaborative data dashboard
 - o Tableau?
 - o Life QI?
- We would like to learn more about options you have used successfully





Report-Outs: Wisconsin

-Eileen Zeiger



Upcoming Data COL Events and Due Dates



Office Hours with Brant and Daisy

- > For one-on-one technical assistance, please signup for office hours.
 - > Share your questions in advance.
 - Date and Time: July 15, 2022, from 3:00PM-4:30PM (EST)
- Registration closes: July 14, 2022 @12:00PM
- Registration Link: https://us02web.zoom.us/meeting/register/tZAtde-trDsiGdMEW-jo_libj9JpKBQ4_Od5



Upcoming Educational Offerings

Topic	Educational Offering Data and	Guest Speaker/Faculty member
	Time	
Evaluation Methods:	Session: August 2, 2022	
What Do You Do with	(2:00PM-3:30PM) (EST)	Marianne McPherson, PhD, MS
the Data You Collected?		Senior Director, Institute for Healthcare
	Office Hour: August 08, 2022 (1:30PM-3:00PM) (EST)	Improvement

The registration links for all the upcoming sessions and office hours has been posted on the <u>AIM Data Resources Webpage</u>.



Any Questions?

aimdatasupport@acog.org

After the meeting ends, please take a moment to fill out a brief survey to share your experience.

