

Data Use in Quality Improvement: Practical and “Social” Considerations

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GREATER NEW YORK HOSPITAL ASSOCIATION & UNITED HOSPITAL FUND

CLINICAL QUALITY FELLOWSHIP PROGRAM

Disclosure Slide



- Dr. Rohit Bhalla has no conflicts to disclose.

Objectives



- Discuss “real life” issues
- Assess pros and cons of data utilization approaches
- Translate technical to actionable
- What we won't cover...

Logistic function, odds ratio, and logit [\[edit\]](#)

An explanation of logistic regression begins with an explanation of the logistic function, which always takes on values between zero and one.^[7]

$$F(t) = \frac{e^t}{e^t + 1} = \frac{1}{1 + e^{-t}},$$

and viewing t as a linear function of an explanatory variable x (or of a linear combination of explanatory variables), the logistic function can be written as:

$$\pi(x) = \frac{e^{\beta_0 + \beta_1 x}}{e^{\beta_0 + \beta_1 x} + 1} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}.$$

This will be interpreted as the probability of the dependent variable equalling a “success” or “case” rather than a failure or non-case. We also define the inverse of the logistic function, the logit:

$$g(x) = \ln \frac{\pi(x)}{1 - \pi(x)} = \beta_0 + \beta_1 x,$$

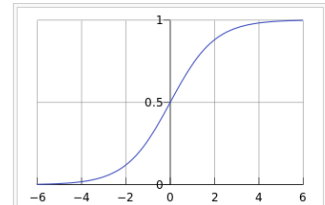



Figure 1. The logistic function, with $\beta_0 + \beta_1 x$ on the horizontal axis and $\pi(x)$ on the vertical axis

Do You Need Data To Take Action?



New York orders thousands of manually operated pump ventilators as coronavirus cases surge: 'This is the alternative'



Gov. Andrew Cuomo demonstrates how a "bag valve mask" works at a press conference Saturday, March 28. Governor's office, press conference.

Coronavirus patients in New York will have to resort to using bag valve masks if the Empire State doesn't have enough ventilators, Gov. Andrew Cuomo said in a press conference on Saturday.

The state anticipates it will need **140,000 hospital beds and 30,000 ventilators** at its "highest point of need" - that is, when coronavirus infections are projected to hit their apex in 14 to 21 days, Cuomo said.

Failure to obtain these ventilators means that patients will need to have air pumped manually into their lungs with a bag valve mask, he said.

Source: [cnbc.com. https://www.cnbc.com/2020/03/28/coronavirus-new-york-orders-thousands-of-manually-operated-pump-ventilators.html](https://www.cnbc.com/2020/03/28/coronavirus-new-york-orders-thousands-of-manually-operated-pump-ventilators.html). March 28, 2020.

CNN.com./HEALTH

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Victim of botched transplant declared dead

Hospital: 'We very much regret these tragic circumstances'

Sunday, February 23, 2003 Posted: 1:36 PM EST (1836 GMT)

DURHAM, North Carolina (CNN) -- Doctors at Duke University Hospital declared Jessica Santillan dead at 1:25 p.m. Saturday and removed her from a respirator soon after. The 17-year-old girl had two heart and lung transplants this month, the first of which used organs with the wrong blood type.



"As of approximately 5 p.m., she is no longer on a respirator," a hospital spokeswoman told CNN. Santillan was declared dead by doctors after a series of tests determined she had no brain function, the hospital said in a statement.

"All of us at Duke University Hospital are deeply saddened by this," said Dr. William Fulkerson, chief executive of the hospital. "We want Jessica's family and supporters to know that we share their loss and their grief. We very much regret these tragic circumstances."

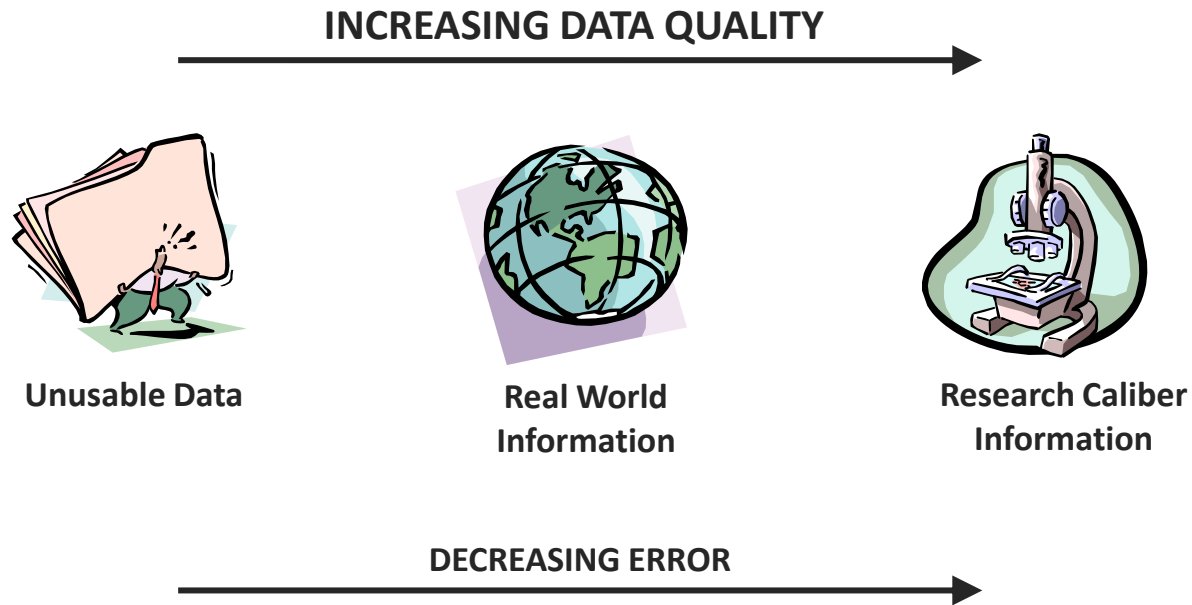
Family spokesman Mack Mahoney visits Jessica Santillan, 17, in the hospital after her second transplant operation.

Story Tools
SAVE THIS E-MAIL THIS
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Duke University

Source: [CNN.com/health. http://www.cnn.com/2003/HEALTH/02/22/transplant.error/](http://www.cnn.com/2003/HEALTH/02/22/transplant.error/). February 23, 2003.

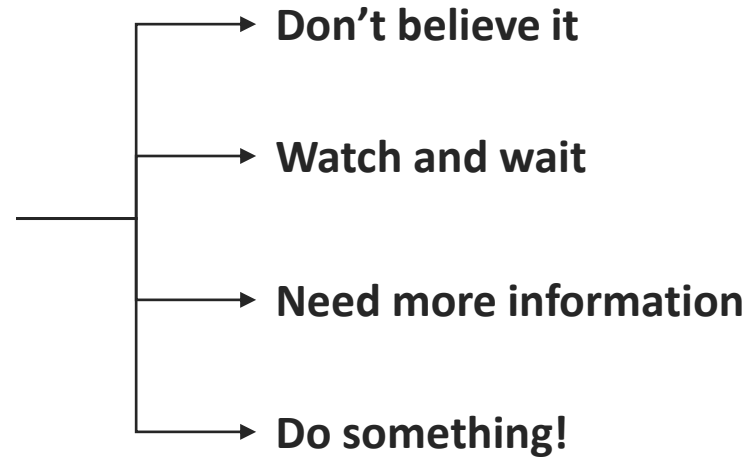
Continuum of Data Quality



When Confronted with Data...



You...



Who Collects the Data?



You

Not you

He/she reports to you

He/she does not

Authority

Influence

Data Substrates

E.g., Operating Room Time Outs



Substrate

Administrative:

Number of coded wrong site surgeries

Hybrid:

Number of coded wrong site surgeries + occurrence reports

Medical records:

Percent of charts with time outs documented

Surveys:

Percent of surgeons reporting they always complete time outs

Observation studies:

Percent of OR cases where observer notes correct time out

Qualitative:

Focus group of OR Nurses

Etc.

What Data Collection Instrument Will You Use?



HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

INSTRUCTIONS

This survey asks for your opinions about patient safety issues, medical error, and event reporting in your hospital and will take about 10 to 15 minutes to complete.

If you do not wish to answer a question, or if a question does not apply to you, you may leave your answer blank.

- An **event** is defined as any type of error, mistake, incident, accident, or deviation, regardless of whether or not it results in patient harm.
- **“Patient safety”** is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of health care delivery.

SECTION A: Your Work Area/Unit

In this survey, think of your “unit” as the work area, department, or clinical area of the hospital where you spend **most of your work time or provide most of your clinical services**.

What is your primary work area or unit in this hospital? Mark **ONE** answer by filling in the circle.

a. Many different hospital units/No specific unit

<input type="checkbox"/> b. Medicine (nonsurgical)	<input type="checkbox"/> g. Intensive care unit (any type)	<input type="checkbox"/> l. Radiology
<input type="checkbox"/> c. Surgery	<input type="checkbox"/> h. Psychiatric/mental health	<input type="checkbox"/> m. Anesthesiology
<input type="checkbox"/> d. Obstetrics	<input type="checkbox"/> i. Rehabilitation	<input type="checkbox"/> n. Other, please specify: <input style="width: 80px;" type="text"/>
<input type="checkbox"/> e. Pediatrics	<input type="checkbox"/> j. Pharmacy	
<input type="checkbox"/> f. Emergency department	<input type="checkbox"/> k. Laboratory	

Please indicate your agreement or disagreement with the following statements about your work area/unit. Mark your answer by filling in the circle.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
	1	2	3	4	5
Think about your hospital work area/unit...					
1. People support one another in this unit.....	1	2	3	4	5
2. We have enough staff to handle the workload.....	1	2	3	4	5
3. When a lot of work needs to be done quickly, we work together as a team to get the work done.....	1	2	3	4	5
4. In this unit, people treat each other with respect.....	1	2	3	4	5
5. Staff in this unit work longer hours than is best for patient care.....	1	2	3	4	5
6. We are actively doing things to improve patient safety.....	1	2	3	4	5
7. We use more agency/temporary staff than is best for patient care.....	1	2	3	4	5
8. Staff feel like their mistakes are held against them.....	1	2	3	4	5
9. Mistakes have led to positive changes here.....	1	2	3	4	5
10. It is just by chance that more serious mistakes don't happen around here.....	1	2	3	4	5
11. When one area in this unit gets really busy, others help out.....	1	2	3	4	5
12. When an event is reported, it feels like the person is being written up, not the problem.....	1	2	3	4	5

1

← Background

← Definitions

← Instructions

← Stratification variables

← Categorical response options

AHRQ Hospital Patient Safety Culture Survey

Current Version 2.0 available at,
<https://www.ahrq.gov/sites/default/files/wysiwyg/sops/surveys/hospital/SOPS-Hospital-Survey-2.0-5-26-2021.pdf>

Useful Features of “Small” IT



Microsoft® Excel

- Data entry control
- Pivot tables
- Reporting
- Graphing
- Statistical functions

Microsoft® Power Point

- Flow diagrams
- Table templates

What Measures Will You Use?



- They exist
 - Literature
 - National Quality Forum endorsed: e.g., Quality Positioning System™.
<http://www.qualityforum.org/QPS>
 - *Database maintained, not updated after March 2023*
 - *No longer the consensus standards organization for CMS*
 - Professional organizations: e.g., Society of Thoracic Surgeons
 - Niche/proprietary entities: e.g., National Perinatal Information Center
 - Others
- They do not

Benchmarks



- What is the goal?
 - Perfection
 - Near perfection
- Where does it come from?
- Who sets it?

Presenting the Message

You are the Messenger

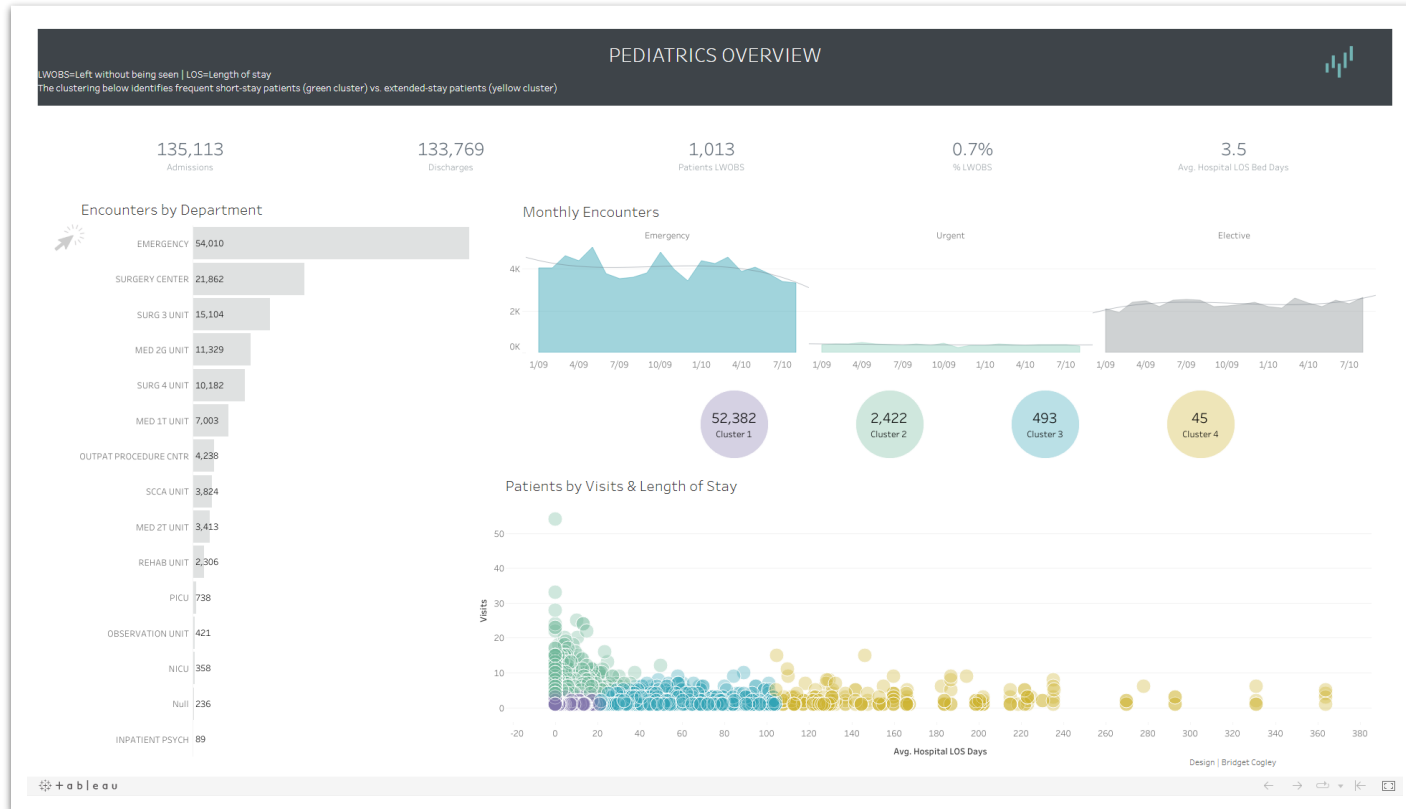


- What you will say...
 - What is your message?
 - Who is the audience?
 - What are their sensibilities?

- What they will say...
 - Is this bad or good?
 - Shouldn't we be at 0?
 - How do we compare to others?
 - What do you plan to do about this?

DATA APPEARANCES MATTER...

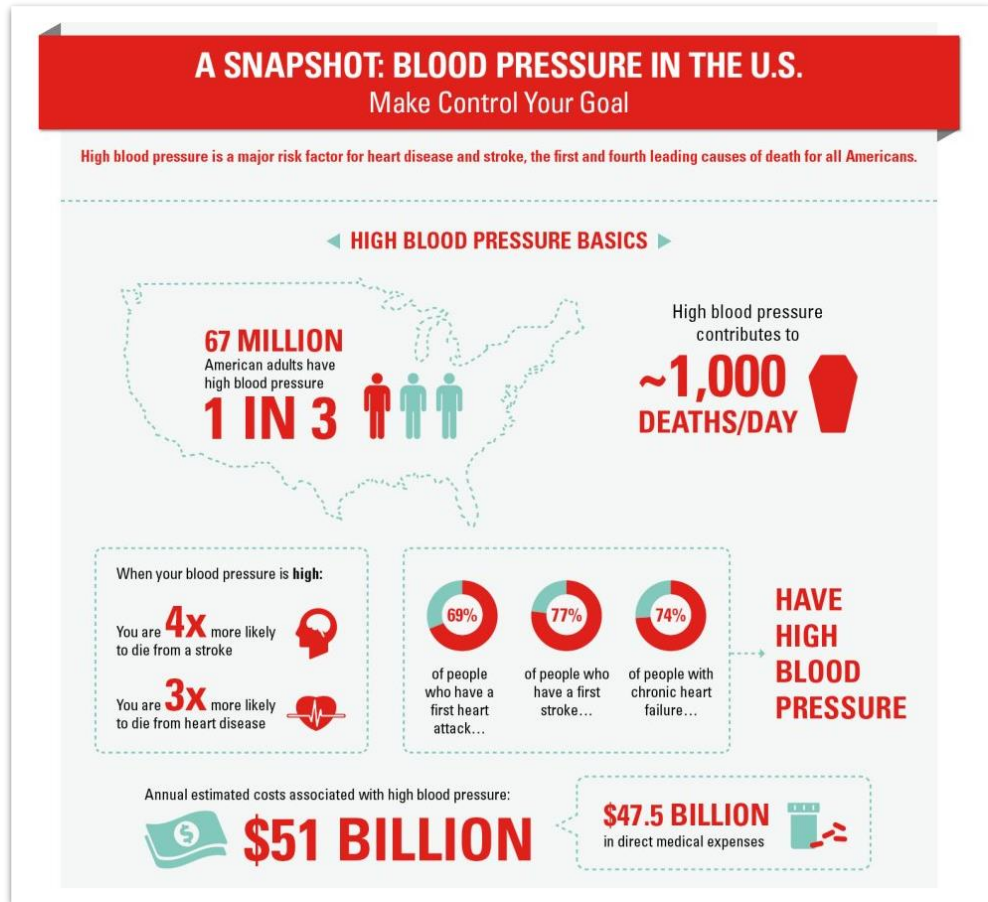
Colorful vs. Meaningful



Infographics

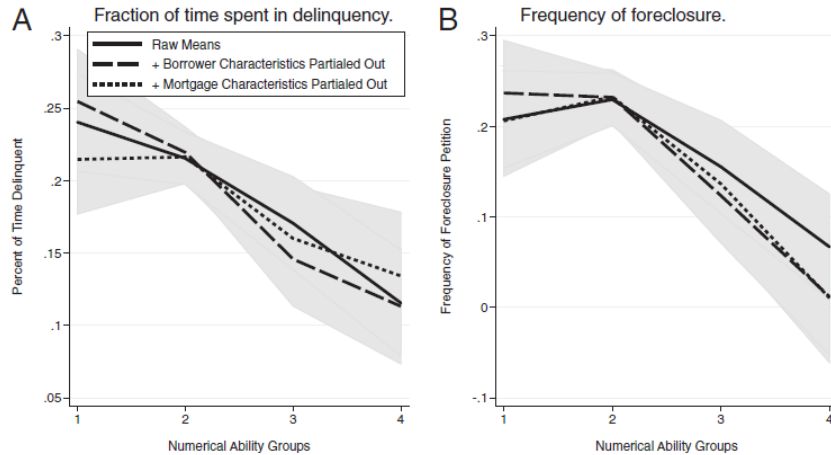
Centers for Disease Control and Prevention. Make Control Your Goal Infographic.

<https://www.cdc.gov/bloodpressure/infographic.htm>. Accessed, February 10, 2023



KEEP IT SIMPLE...

Data Literacy Has Consequences

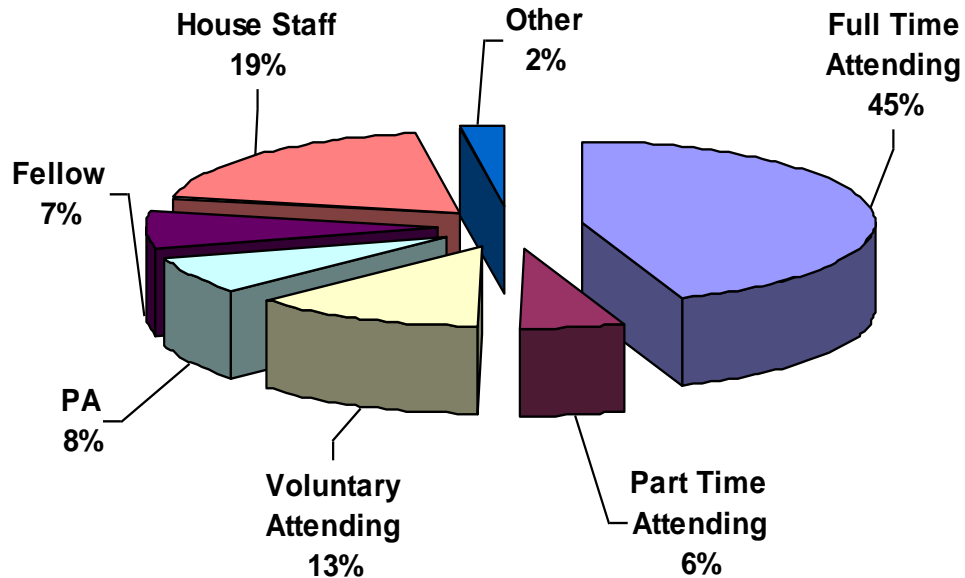


- Numerical ability predicts mortgage default
- Financial literacy question examples:
 - “If 5 people all have the winning numbers in the lottery and the prize is \$2 million, how much will each of them get?”
 - Let's say you have \$200 in a savings account. The account earns ten per cent interest per year. How much will you have in the account at the end of two years?”
- Gerardi K, et al. Proceedings of the National Academy of Sciences. 2013;110(28):11267–11271

Simple Data is OK



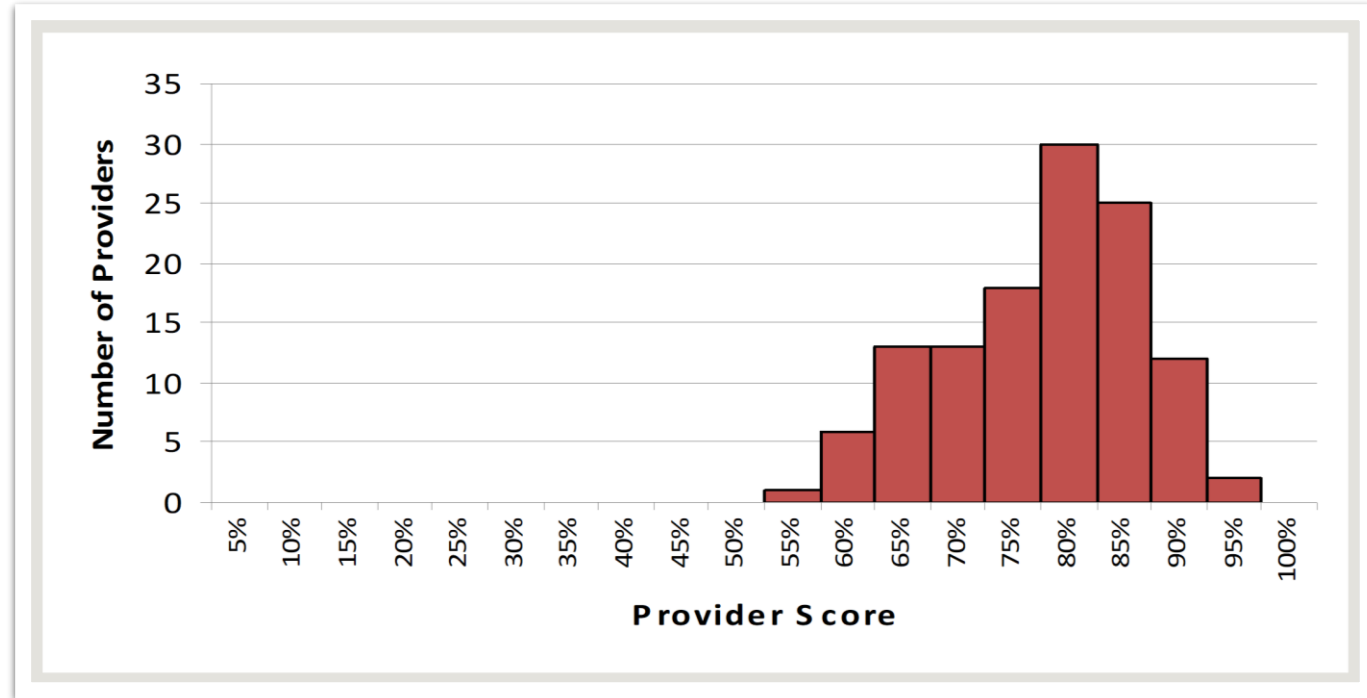
Respondents by Position (N=1,438)



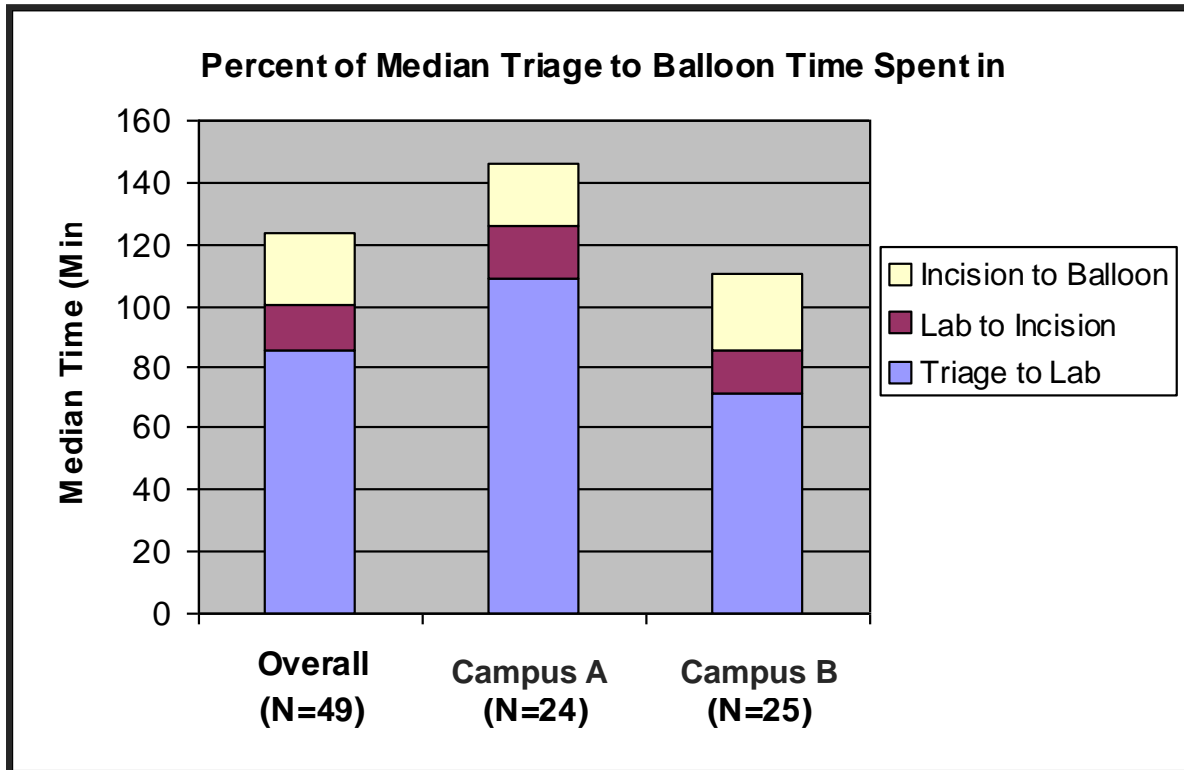
“Raw” Data can be Useful

Total number of providers = 120

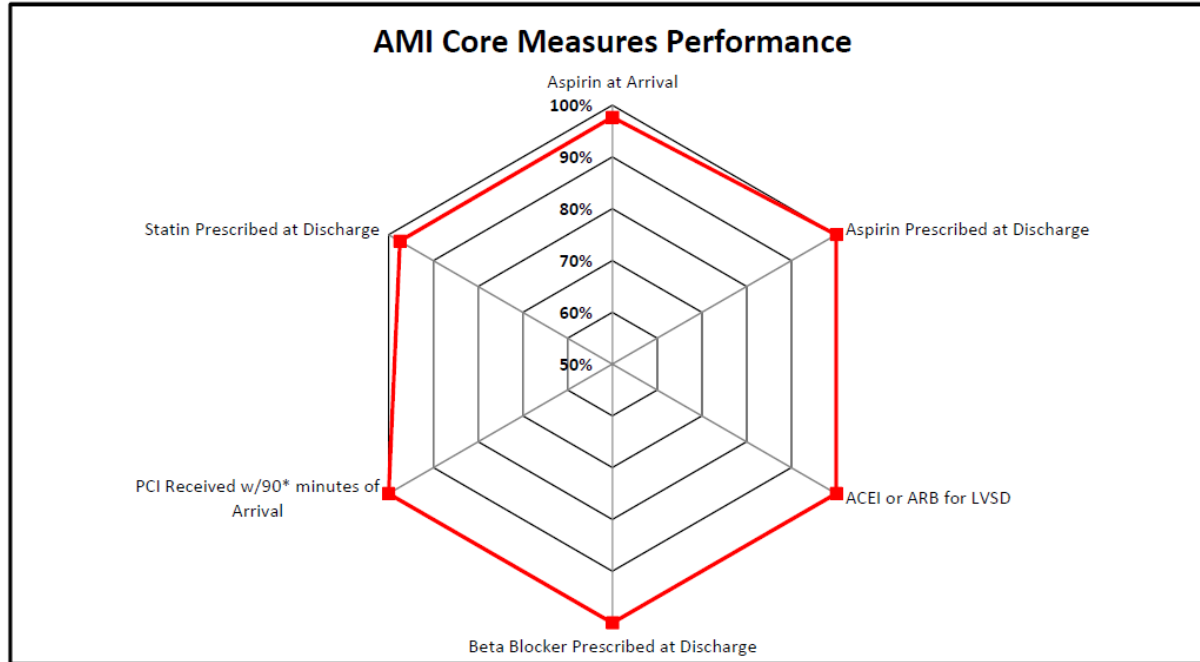
- **Mean provider score: 76%**
- **Median provider score: 78%**
- **Standard deviation: 9%**
- **Provider score range: 54% - 91%**



Data Drives Group Dynamics

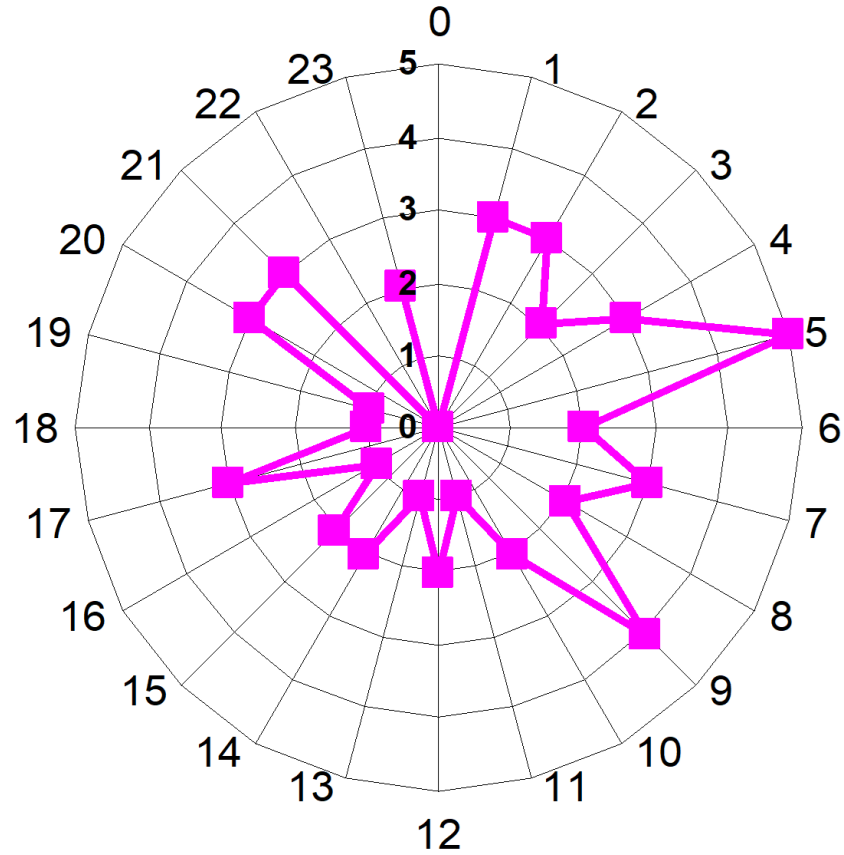


Data and “Simplification”



Source: Organizational Clinical Effectiveness Group, Stamford Health

Falls by Hour of Day



A BRIEF CASE STUDY

“SINCE THE SPRING OF 2023, WE’VE PLACED A GREAT EMPHASIS ON INTERDISCIPLINARY TEAMWORK, STANDARDIZED CARE PROCESSES, AND RE-EDUCATED PHYSICIANS ON BEST PRACTICES. AS A RESULT, OUR CESAREAN RATES HAVE DROPPED SIGNIFICANTLY.”

Is this true?

Cesarean Delivery Rates*



Year	Month	C-Rate	Year	Month	C-Rate
2022	Jan	32.3%	2023	Jan	35.6%
	Feb	33.4%		Feb	34.4%
	Mar	31.7%		Mar	34.7%
	Apr	30.8%		Apr	35.1%
	May	33.5%		May	31.9%
	Jun	34.8%		Jun	30.7%
	Jul	35.7%		Jul	32.3%
	Aug	33.7%		Aug	31.4%
	Sep	33.2%		Sep	31.9%
	Oct	32.8%		Oct	32.0%
	Nov	32.2%		Nov	32.2%
	Dec	31.9%		Dec	31.7%

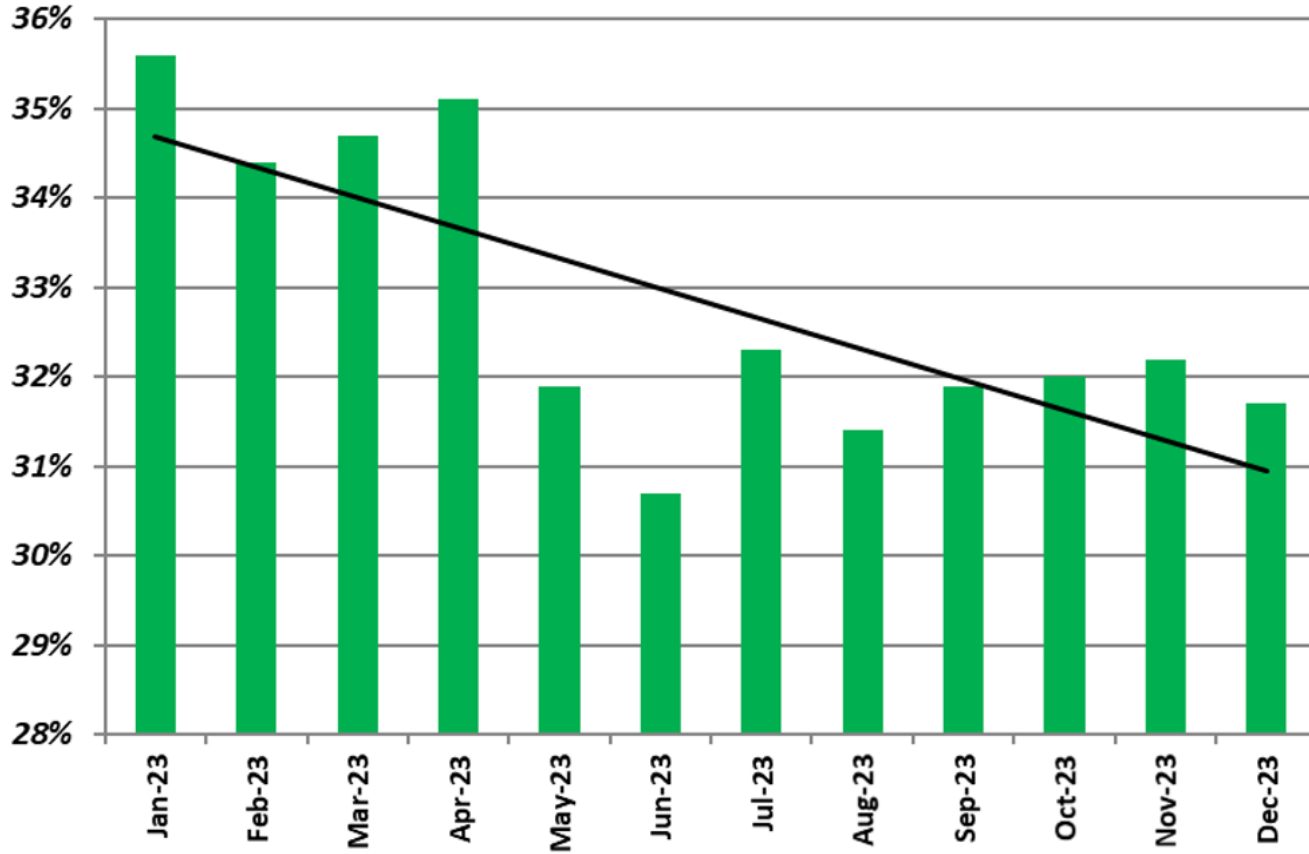
*Fictitious data

Cesarean Delivery Rates

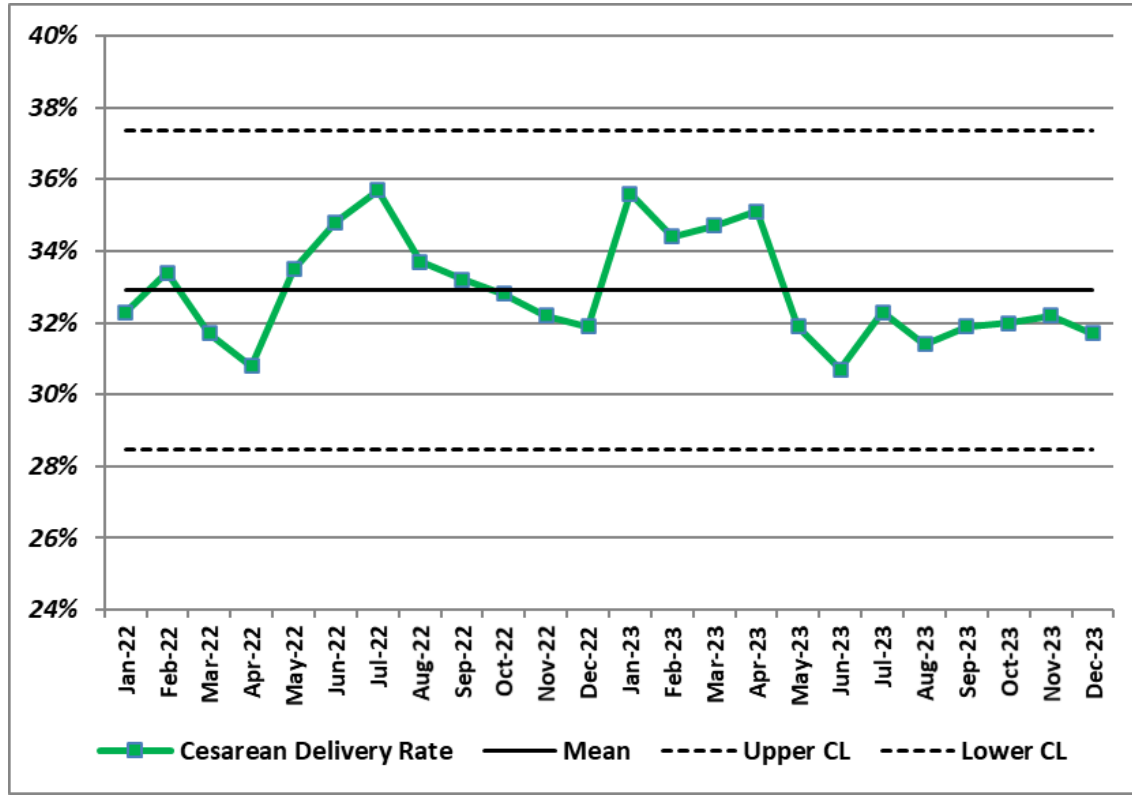


Year	Month	C-Rate	Year	Month	C-Rate
2022	Jan	32.3%	2023	Jan	35.6%
	Feb	33.4%		Feb	34.4%
	Mar	31.7%		Mar	34.7%
	Apr	30.8%		Apr	35.1%
	May	33.5%		May	31.9%
	Jun	34.8%		Jun	30.7%
	Jul	35.7%		Jul	32.3%
	Aug	33.7%		Aug	31.4%
	Sep	33.2%		Sep	31.9%
	Oct	32.8%		Oct	32.0%
	Nov	32.2%		Nov	32.2%
	Dec	31.9%		Dec	31.7%

Cesarean Delivery Rate, 2023



“Control Chart”



Summary Considerations



□ Data sources

- Drive divergent conclusions
- Suboptimal data can be better than nothing

□ Numbers

- Large N not always needed for action
- Adequate subgroup n can be a big “saver”

□ Results

- You shape the take home message
- Statistics not always helpful

□ Display

- Influences perception
- Keep it simple
- Beware of the red / yellow / green tyranny

DATA USE IS A CONTINUOUS LEARNING PROCESS
