
Picking the Right Chart

By Blair Warman Nickle

PRESENTED TO

**THE NORTH CAROLINA ASSOCIATION FOR
HEALTHCARE QUALITY**

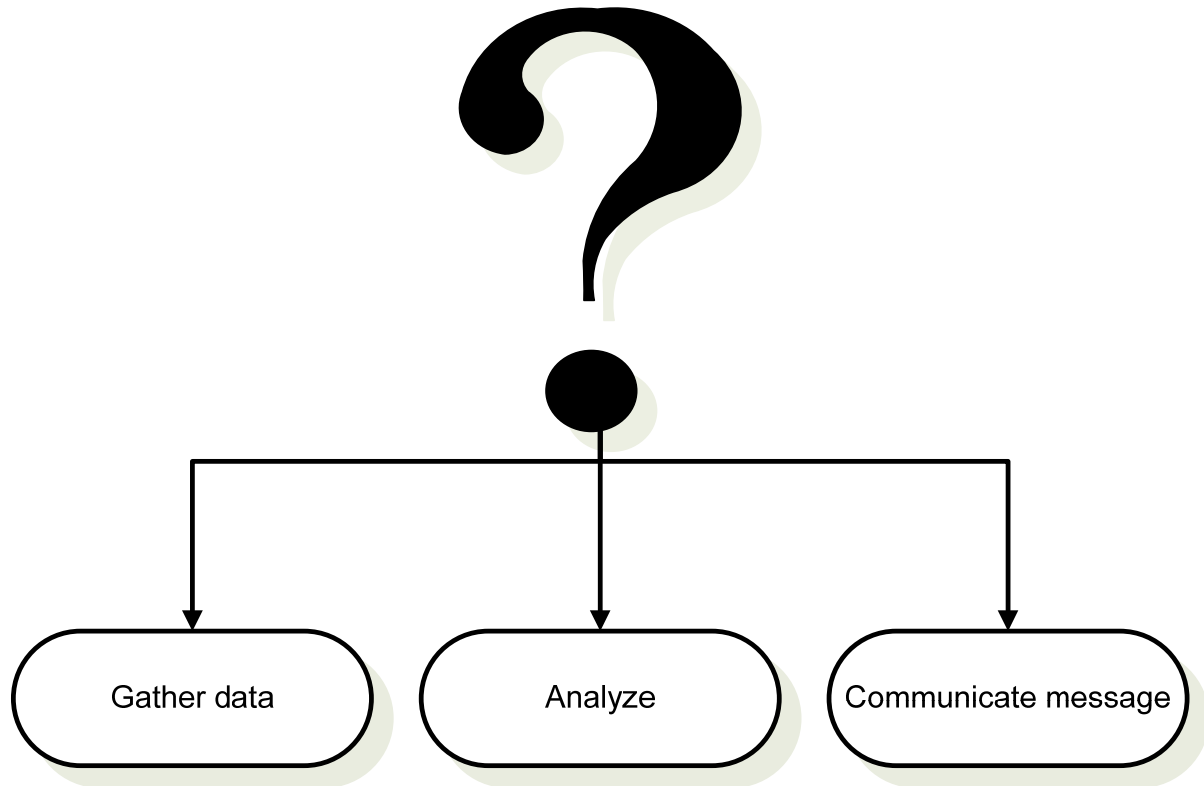
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WORKSHOP OBJECTIVES

At the completion of this workshop, participants will be able to:

1. Construct a useful question that will help define the approach to data analysis.
2. Describe the difference between logic tools and data tools.
3. Select the appropriate numeric data tool for the data at hand and the question being asked.
4. Select the appropriate control chart for data over time.

WHAT'S THE QUESTION?



CHARACTERISTICS OF A GOOD QUESTION

1. Sharp
2. Concise
3. Trick question – sometimes it's more than 1

HOW 'BOUT THIS?

A. How are things going in the ED?

B. Did that change we made to the broccoli make any difference?

C. How is each physician doing with regard to the with national performance benchmarks?

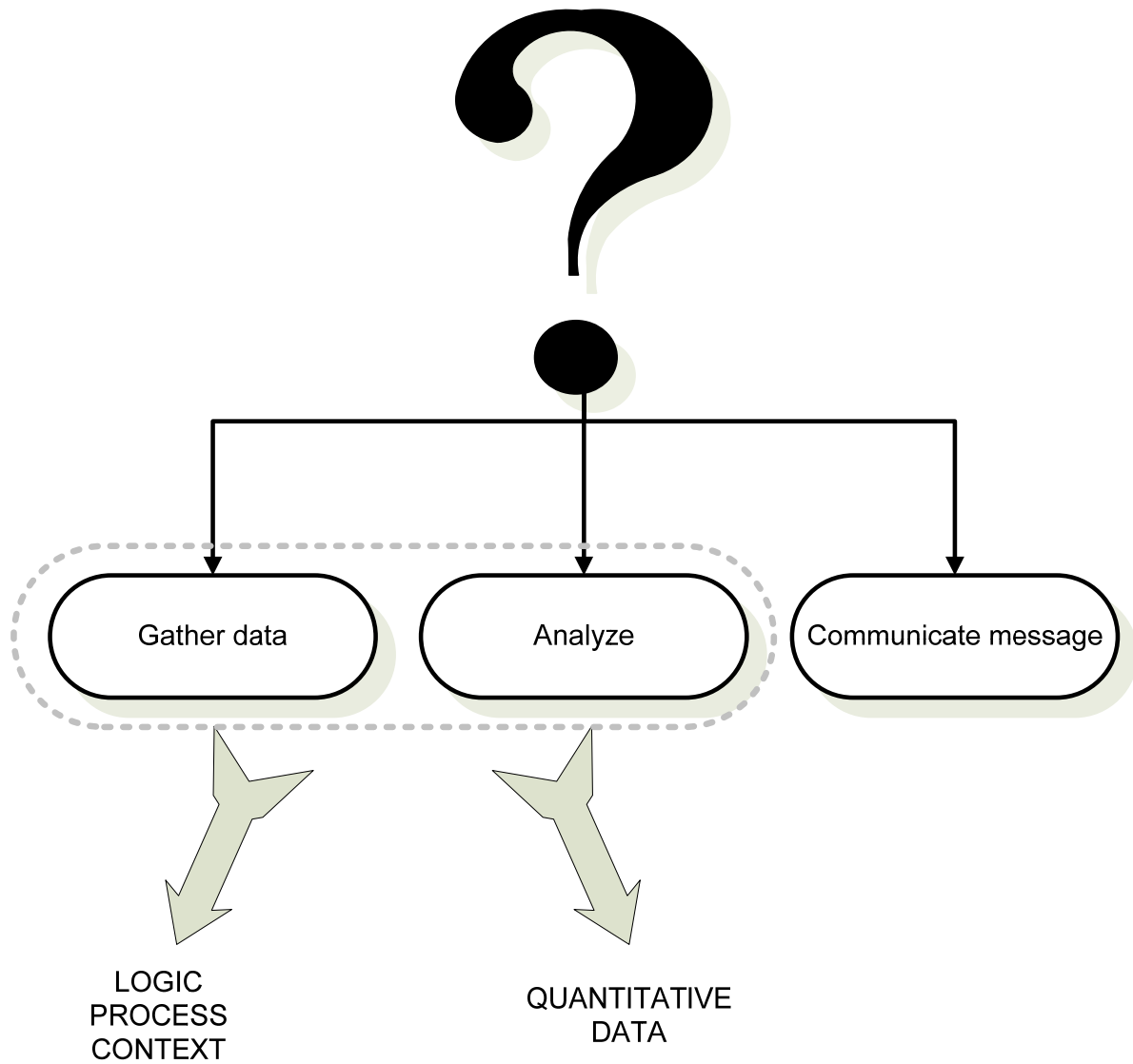
THREE QUESTIONS MODEL FOR IMPROVEMENT¹

1. What are we trying to accomplish?
2. How will we know a change is an improvement?
3. What changes could we make that we believe will result in improvement?

Plan - Do - Study - Act

¹ Taken from the work of By Gerald J. Langley, Ronald D. Moen, Kevin M. Nolan, Thomas W. Nolan, Clifford L. Norman, and Lloyd P. Provost as published in *The Improvement Guide*

THE FIRST BIG SPLIT



A LITTLE EXPERIMENT

How many data charts can you think to make out of this set of data?

		Physical	Sick Visit	Allergy Shots	Other Shots	BP Check
Clinic A	Jan	52	85	33	35	43
	Feb	67	78	35	42	55
	Mar	62	65	67	29	37
	Apr	57	64	79	18	44
	May	88	71	69	21	48
	June	92	52	56	17	32
Clinic B	Jan	145	178	112	47	67
	Feb	152	195	101	39	85
	Mar	132	163	96	32	68
	Apr	170	156	145	29	53
	May	156	161	156	31	59
	June	192	112	167	16	57

TYPES OF COMPARISON

- Component comparison
- Item comparison
- Time series comparison
- Frequency distribution comparison
- Correlation comparison

COMPONENT COMPARISON

Definition:

Chart types and tips:

ITEM COMPARISON

Definition:

Chart types and tips:

TIME SERIES COMPARISON

Definition:

Chart types and tips:

FREQUENCY DISTRIBUTION COMPARISON

Definition:

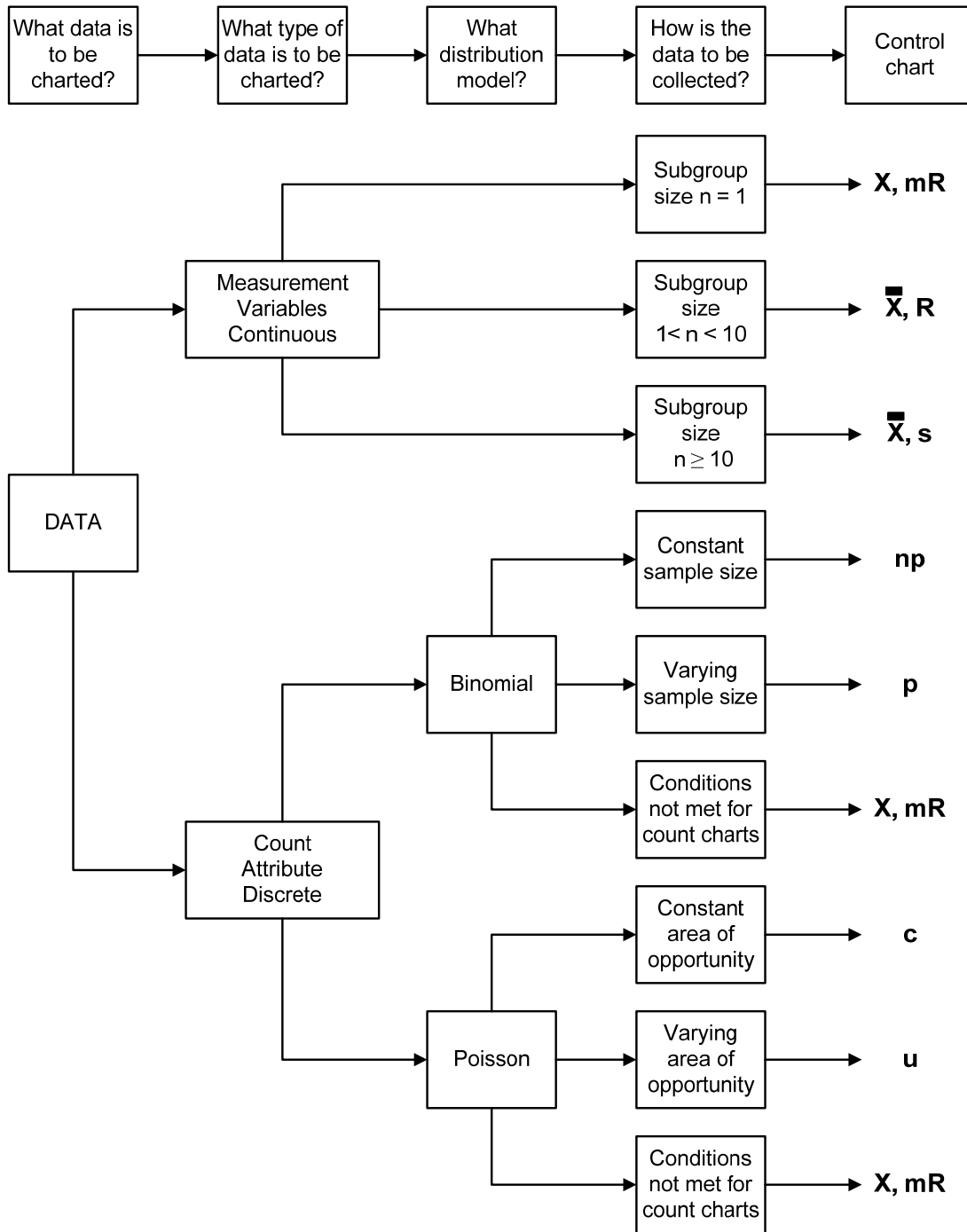
Chart types and tips:

CORRELATION COMPARISON

Definition:

Chart types and tips:

CONTROL CHART SELECTION TREE



Subgroup size: The # of measures averaged together to get a data point.

Sample size: The # of items drawn to examine for each data point in a binomial count.

Area of opportunity: The # of items drawn to examine for each data point in a Poisson count.

COUNT VERSUS MEASUREMENT

TYPE	DESCRIPTION	EXAMPLES
Measurement <ul style="list-style-type: none">• Variable• Analog• Continuous	Data which yield a measurement or number for each observation or unit. Measurement data can be subdivided, often infinitely.	Time Weight Money Temperature Likert scale data
Count <ul style="list-style-type: none">• Attribute• Digital• Discrete	Data which consist of counts of observations or incidents falling into categories.	Number of errors Number of injuries Number of employees

NOTE: Rates or percentages must be analyzed to determine if they are count or measurement. If the numerator is a count, the rate or percentage is treated as count data. If the numerator is a measure, the rate or percentage is treated as measurement data.

COUNT VERSUS MEASUREMENT EXERCISE

	Indicator	Msmt	Count	Binomial	Poisson
1.	Time to deliver room service tray				
2.	Medication errors				
3.	Staff turnover rate				
4.	Overtime hours per pay period				
5.	Overtime cost per pay period				
6.	# of employees working OT per pay period				
7.	C-section rate				
8.	Patient temperature				
9.	Appropriate surgical antibiotic discontinuance				
10.	% of positions filled internally				
11.	Average number candidates per job posting				
12.	Average employee satisfaction rating (1-5 scale)				
13.	Employee injuries per month				
14.	LOS for CABG patients				
15.	Miles per gallon gas				
16.	Dollars spent on education per employee				
17.	Compliance with surgical pause				
18.	Inaccurate dietary trays delivered per day				

BINOMIAL VERSUS POISSON DISTRIBUTIONS FOR COUNT DATA

BINOMIAL	POISSON
<ul style="list-style-type: none">• A count of items with the attribute or characteristic.• Each item in a sample is classified as possessing or not possessing an attribute (<i>it is or it isn't; it has or it hasn't; it does or it doesn't</i>).• The entire item is counted as 1 unit with the attribute or without the attribute. An item can be counted more than once as the attribute can happen only once to a item in the sample.• One can look at a sample and definitively say how many times this attribute occurred and how many times it did not occur.• When expressed as a fraction, the numerator (# of item with the attribute) can never be larger than the denominator (# of items sampled).	<ul style="list-style-type: none">• A count of the characteristics or attributes that happen to an item or group of items.• The unit or units are examined for occurrences (flaws, defects, special events) that can happen more than once to each unit.• The specific flaws, defects, special events, or occurrences are counted. These occurrences can happen more than once to an item.• One can know how many times the characteristic or attribute happened to the item or group of items. One cannot say how many times the characteristic or attribute did not happen.• When expressed as a rate, the numerator (dividend) can be larger than the denominator.

CONTROL CHART SELECTION EXERCISE

Instructions

Each case below describes a situation in which data can be collected and plotted on a control chart. Select the most appropriate chart to display that data based on the Control Charts Selection Guide. Document your rationale for your decision as varying assumptions may lead to varying control charts.

Example:

Dietary wants to reduce or eliminate the number of inaccuracies in inpatient trays. Staff members decide to track the number of inaccuracies reported each day. Inaccuracies include such things as missing items or incorrect items on trays. Volumes of trays delivered vary greatly from day to day.

Indicator: Inaccuracies on inpatient trays		
Measurement	<input type="checkbox"/> Individual measure	
	<input type="checkbox"/> Average	<input type="checkbox"/> Average of 2-9 values <input type="checkbox"/> Average of > or = 10 values
Count	<input type="checkbox"/> Binomial	<input type="checkbox"/> Constant sample size <input type="checkbox"/> Varying sample size
	<input checked="" type="checkbox"/> Poisson	<input type="checkbox"/> Constant area of opportunity <input checked="" type="checkbox"/> Varying area of opportunity
Recommended chart and qualifying comments: If all trays in a day are examined, a u chart. If a constant sample from day to day is used, an c chart.		

Picking the Right Chart

1. A facility tracks the number of missing patient items (teeth, glasses, clothing, etc.) weekly. The number of patients remains relatively constant over time.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

2. Turnaround time for radiology reports is being tracked. This is a high volume process.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

3. An endoscopy area is tracking compliance with surgical pauses. They perform both upper and lower GI procedures, sometimes on the same patient at the same visit.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

4. The time to fill open positions is being tracked by the HR department.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

Picking the Right Chart

5. The lab is tracking its monthly overtime cost.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

6. A hospital is tracking compliance with the requirement to provide smoking cessation counseling to CHF patients.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

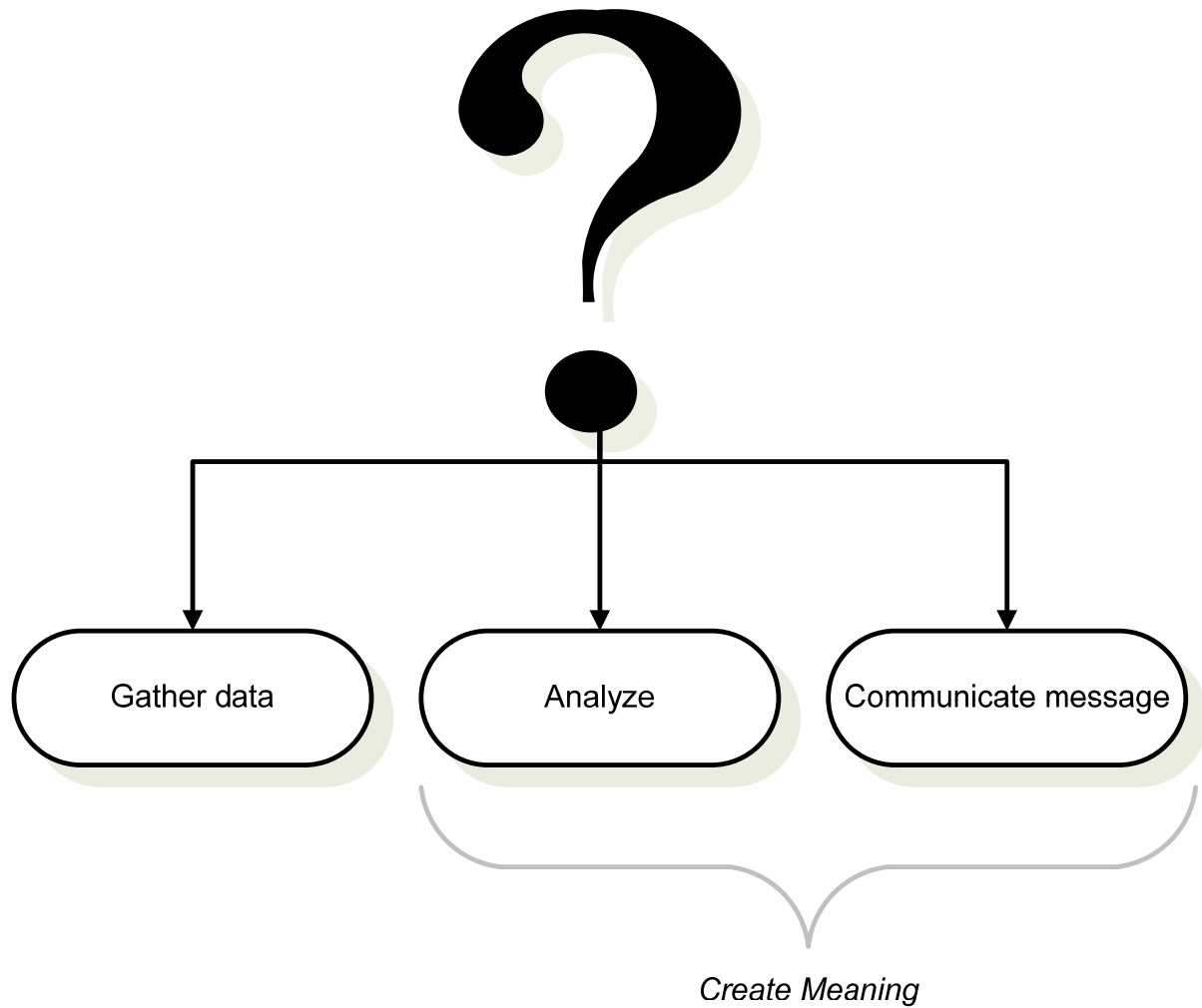
7. The number of unapproved abbreviations on inpatient charts is tracked.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

8. The delinquent medical record rate is calculated as the number of records not completed within 30 days of discharge counted on the last day of the month. This number is placed over a denominator that is the average monthly discharges from the previous 12 months.

Indicator:		
___ Measurement	___ Individual measure	
	___ Average	___ Average of 2-9 values ___ Average of > or = 10 values
___ Count	___ Binomial	___ Constant sample size ___ Varying sample size
	___ Poisson	___ Constant area of opportunity ___ Varying area of opportunity
Recommended chart and qualifying comments:		

THE PURPOSE OF CHARTS



A FEW PARTING PRINCIPLES

Be clear on the purpose - the question being addressed.

“If you don’t know where you’re going you’ll probably end up somewhere else.”

David Campbell

Reduce cuteness, non-data related design components, chart junk and computer debris from your charts.

“A puny data set cannot be rescued by a graphic, no matter how clever or fancy.”

Edward R. Tufte in *The Visual Display of Quantitative Information*

Do not quote data out of context.

“Lies, damn lies, and statistics.”

Mark Twain, Benjamin Disraeli, and a variety of other folks

Maintain consistency in scaling, timeframes, and data buckets.

“All that glistens is not gold.”

William Shakespeare in *The Merchant of Venice*

Use clear, detailed, and thorough labeling to eliminate distortion, obfuscation, and ambiguity.

“You can’t handle the truth!”

Jack Nicholson as Colonel Jessep in *A Few Good Men*

BLAIR WARMAN NICKLE

For over 20 years, Ms. Nickle has striven for the improvement of healthcare through her work with hospitals, physician group practices, peer review organizations, clinics, and managed care organizations across the United States, Canada, and Mexico. Her special areas of expertise include performance measurement, customer service and satisfaction, statistical methods, information systems design, project management, strategic planning, and training and development. A sample of her clients includes Novant Health, Emory University Health Care System and Clinics, The Weill Cornell Medical College, Mexico City Shriners Hospital, Maimonides Medical Center, Bon Secours Health System, VHA Georgia, Cincinnati Children's Hospital, Providence Health System of Oregon, LSU Medical Centers, Henry Ford Health System, George Washington Hospital, AMERIGROUP Corporation, University of Miami Medical Group, and a variety of HCA hospitals and corporate business units.

Ms. Nickle is currently the Senior Vice President for Healthcare Management Directions, a hospital development company. She leads HMD in the areas of quality, patient and family satisfaction, and employee commitment. Her role there is to facilitate the integration of knowledge-based best clinical and operational practices. In addition, her areas of responsibility include strategic planning, employee training and development, and the creation of methods for standardizing operations.

Prior to joining HMD, Ms. Nickle was Vice President and Senior Consultant for Executive Learning, Inc., a performance improvement and customer service firm specializing in the healthcare industry. Her role included not only the delivery of consulting and training services in these specialties, but she also served as the Director of Product Development for the firm. Extensively trained in the area of adult learning and instructional strategies, Ms. Nickle was the lead instructional designer for training courses in facilitation skills, control charts, leadership, and improvement tools for physicians. She also wrote and produced several series of videotapes on customer service, improvement tools and the application of improvement to physician practice.

Before dedicating her career to the healthcare industry, Ms. Nickle worked in the also highly regulated utility industry, serving as the Manager of Corporate Management Development for the Tennessee Valley Authority. She holds a Bachelor of Arts degree in German and English from Emory & Henry College, a Master of Science in Library and Information Science degree from the University of Tennessee and a Master of Business Administration degree from the University of Tennessee.

blair.nickle@TheSmartHospital.com
615-312-3023