

Quality & Patient Safety Fellowship

DATA ANALYSIS, INTERPRETATION, AND INTEGRATION

1



Analyze and interpret performance data using run charts, variation concepts, and basic data-display tools to identify meaningful patterns and opportunities for improvement.



Apply foundational root-cause tools to understand the underlying reasons behind performance issues.



Use prioritization methods to determine which improvement efforts will have the greatest impact in small and rural hospital settings.

Objectives

2

Data Types & Sources

3

Why We Collect Data



Improvement

- Used for Learning

Reporting

- Used to Evaluate



4

Using Big Data and Little Data for Quality

BIG DATA

- Large, aggregated datasets used to spot patterns and trends across many hospitals
- Often comes from national or state-level reporting systems
- Helpful for benchmarking and understanding how your facility compares to peers

LITTLE DATA

- Small, local data collected inside your hospital
- Used for day-to-day improvement work
- Helps staff understand what's happening in real time in their own processes

5

Sources of Little Data

Meetings,
Huddles &
Debriefings

Hallway
conversations

Staff
Interviews

Patient
Interviews

Observations

Local
news/chatter

6

Outcome, Process & Balancing Measures



Outcome | *What result do we want?*

- Lower is better
- Examples: mortality rate, infection rate



Process | *Are we doing the right steps?*

- Higher is better
- Examples: hand hygiene compliance, surgical time-outs



Balancing | *Did fixing one problem create a new one?*

- Example: patient fall rates compare to restraint usage

Outcome = ultimate goal | **Process** = steps to get there | **Balancing** = check for side effects.

7

Collection Considerations

Who collects
the data

Interrater
Reliability

8

How to Interpret & Communicate Data

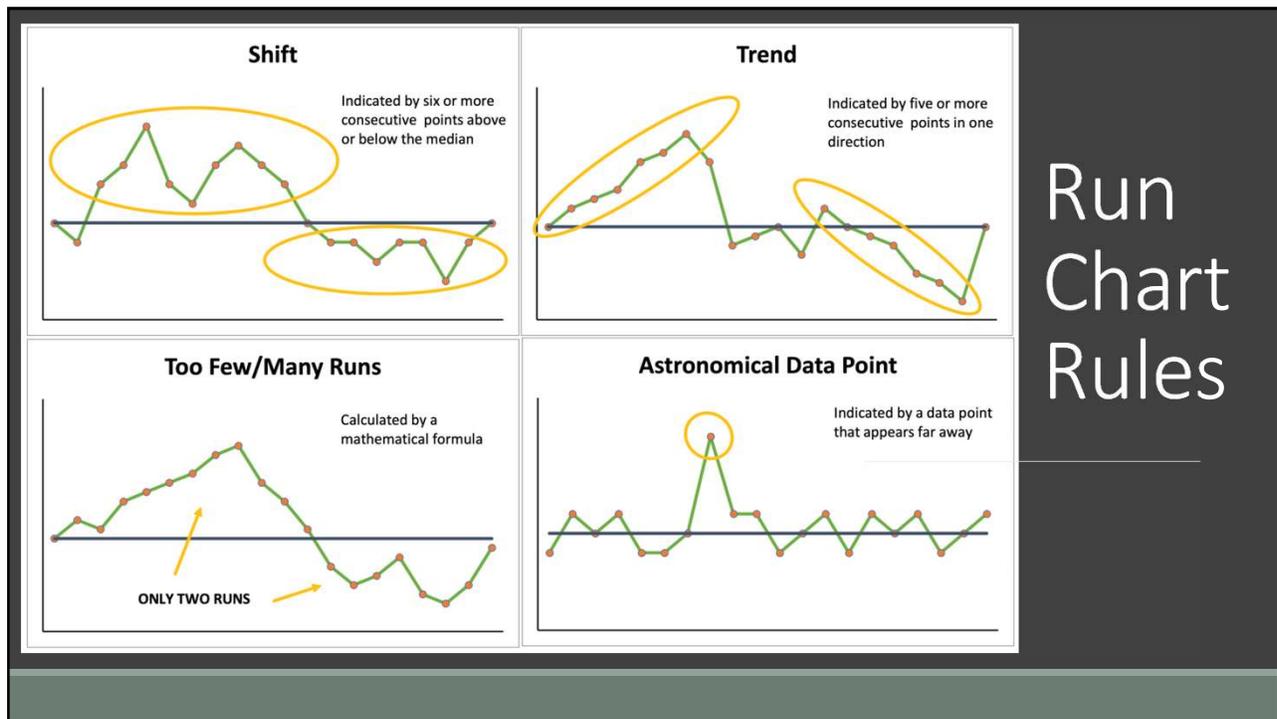
RUN CHARTS, CONTROL CHARTS, AND OTHER MEASUREMENT TOOLS

9



Run Charts

10



11

Common Cause Variation	Special Cause Variation
Inherent to the system or process	Not inherent to the process design
Due to regular, natural, or ordinary causes	Due to irregular or unnatural causes
Affects all the outcomes of a process	Affects some but no necessarily all aspects of the process
Results in a "stable" process that is predictable	Results in an "unstable" process that is not predictable
Also know as <i>random</i> or <i>unassignable</i> variation	Also known as <i>non-random</i> or <i>assignable</i> variation

Variation

12

Common Cause Variation

Points equally likely above or below center line

There will be a high data point and a low, but this is expected

No trends or shifts or other patterns

13

Special Cause Variation

Unintentional

When the system is out of control and unstable

Intentional

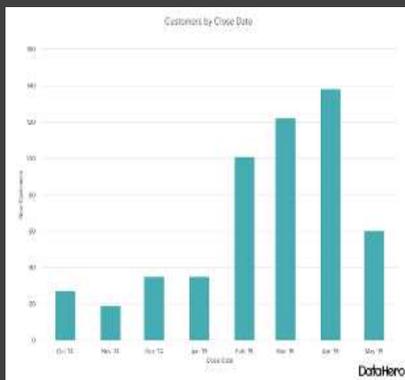
When we're trying to change the system

14



15

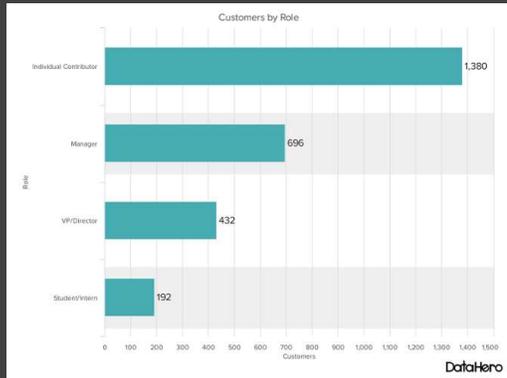
Column Chart



- Used for categorical data (distinct groups or labels)
- Bars represent counts or values for specific categories
- Bars are separated because categories are separate things

16

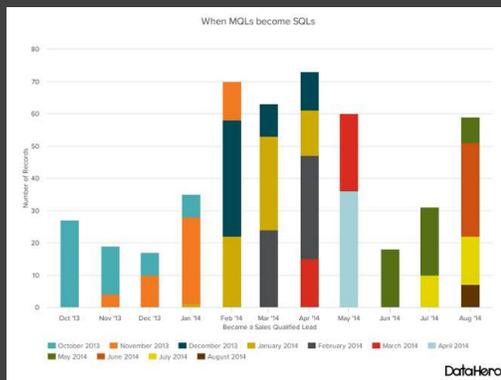
Bar Graph



- Used when category labels are long
- Helpful when comparing more than 10 items
- Can display negative values
- Good for avoiding clutter in tall, narrow category lists
- Bars run horizontally instead of vertically

17

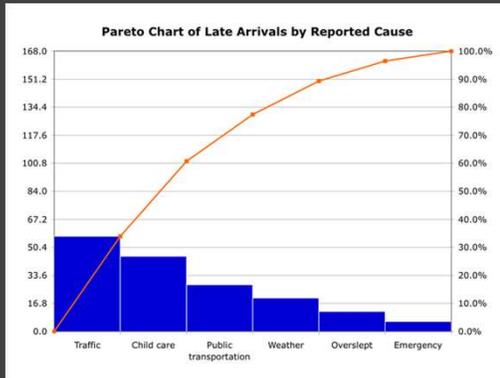
Stacked Bar Chart:



- Used to compare multiple items at the same time
- Shows the composition of each item
- Each bar is divided into segments that represent parts of a whole
- Helpful when you want to compare both totals and breakdowns

18

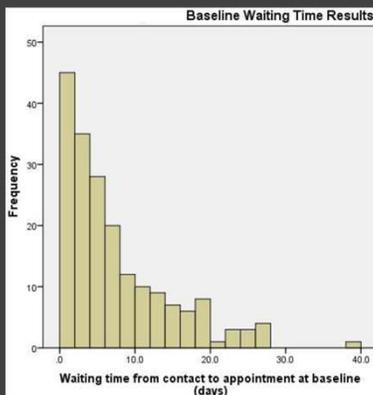
Pareto Chart



- Ordered bar chart showing frequency of problems
- Based on the 80/20 principle (vital few vs. useful many)
- Helps identify the biggest contributors to an issue
- Bars show frequency; line shows cumulative percentage
- Focuses improvement efforts on what will have the greatest impact

19

Histogram

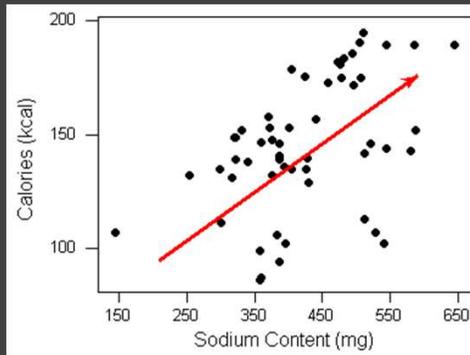


- Used for continuous numerical data (measurements)
- Bars represent ranges of numbers, called bins (e.g., 0–5 minutes, 6–10 minutes...)
- Bars touch because the ranges are continuous

Examining access to addiction treatment: Scheduling processes and barriers - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Histogram-of-Waiting-Time-from-Contact-to-Appointment-Results-Mean-726-Median-500_fig2_231611238 [accessed 25 Jan 2026]

20

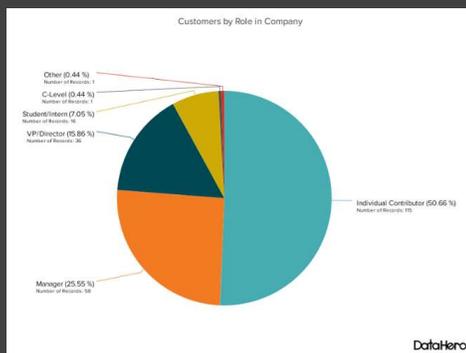
Scatter Plot



- Used to compare two variables
- Shows the relationship or pattern between the variables
- Each point represents one observation
- Helpful for spotting correlations, clusters, or outliers
- Can show change over time or across different items

21

Pie chart



- Shows parts of a whole
- Each slice represents a percentage
- Total must equal 100%
- Best for showing proportions, not exact comparisons
- Works well when there are only a few categories

22

Telling Our Story

HOW DO WE TELL THE STORY OF OUR IMPROVEMENT JOURNEY?

23

Kübler-Ross Model...of Data



24

Principles of Good Data Display

One size does
not fit all

Know your
audience

Make success
& failure
visible

Check for
accuracy

25

The Power (and Risk) of Data Display

Informative and
effective

Misleading if done
poorly

Able to change
how people
interpret
performance

A fast way to
convey a story at a
glance

26

Telling the Story with Data



WHAT STORY ARE YOU TRYING TO TELL?



HOW WILL THE DISPLAY SUPPORT THAT STORY?



WHO NEEDS TO UNDERSTAND THIS — AND WHY?

27

Choosing the Right Chart

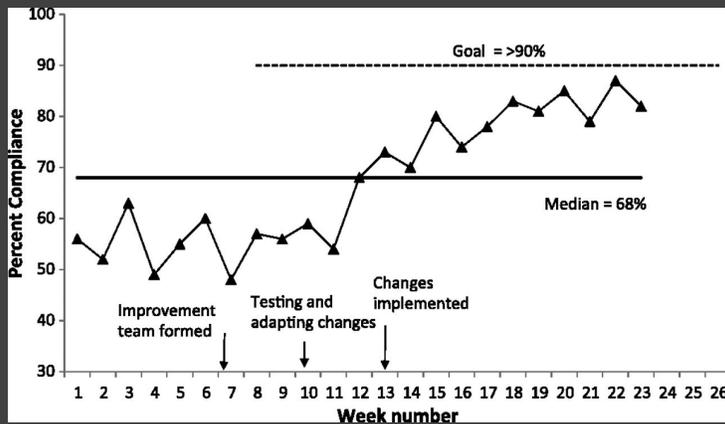
Run Chart	• View data over time
Column Chart	• Compare categories
Bar Graph	• Long labels or many items (horizontal)
Stacked Bar	• Compare totals AND see what totals are made of
Pareto	• Identify vital few issues cause most problem (80/20)
Histogram	• Show distribution of continuous data
Scatter Plot	• Explore relationship between 2 variables
Pie Chart	• Show how parts make up a whole

28



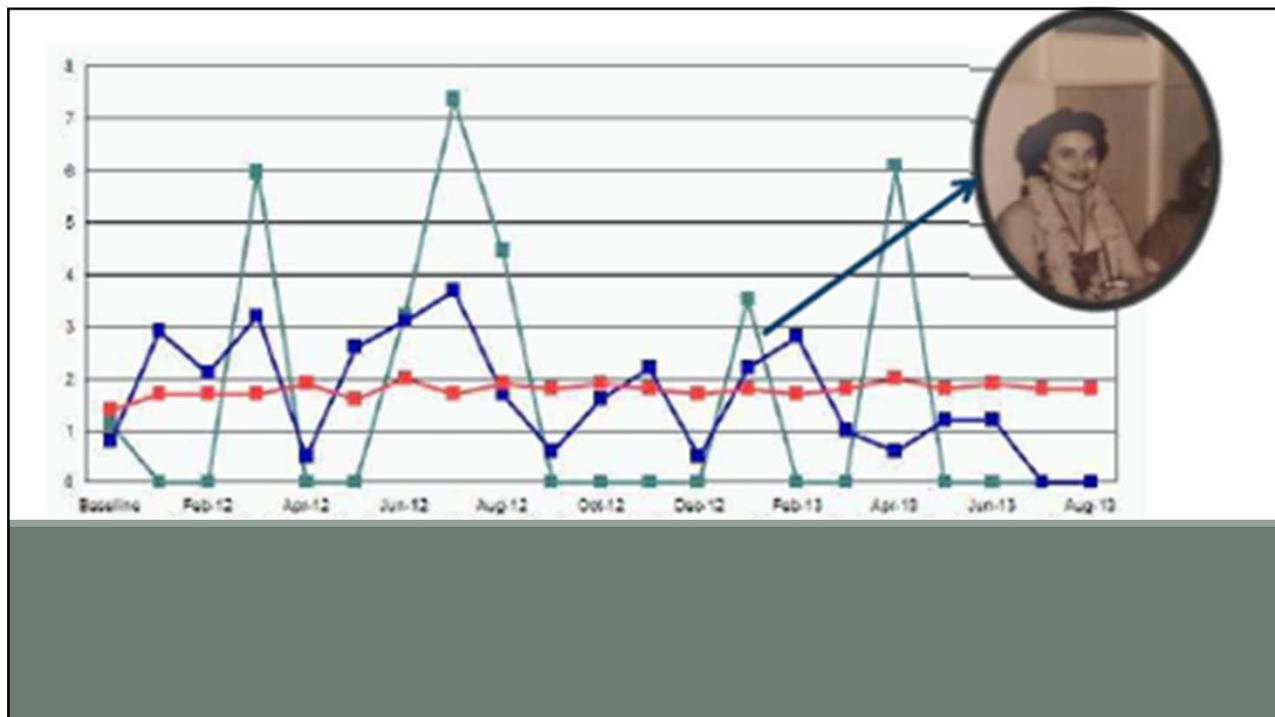
How else
can we tell
a story
with data?

29

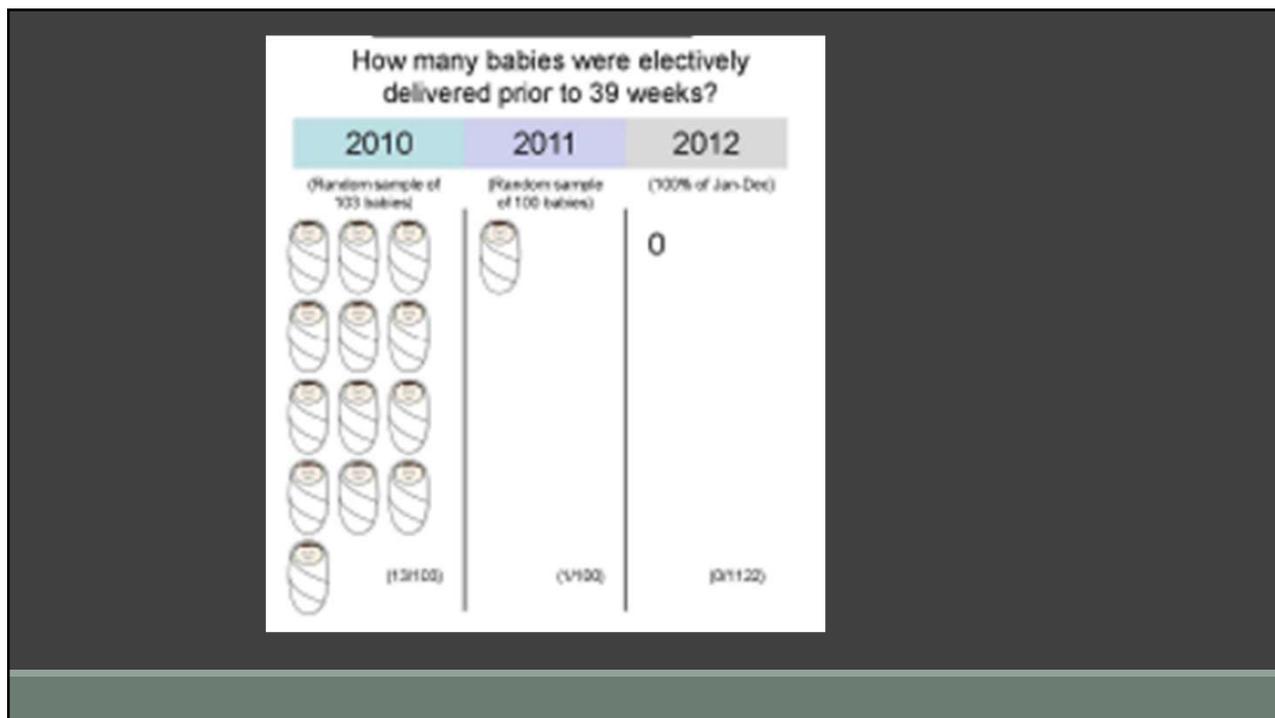


Annotation

30



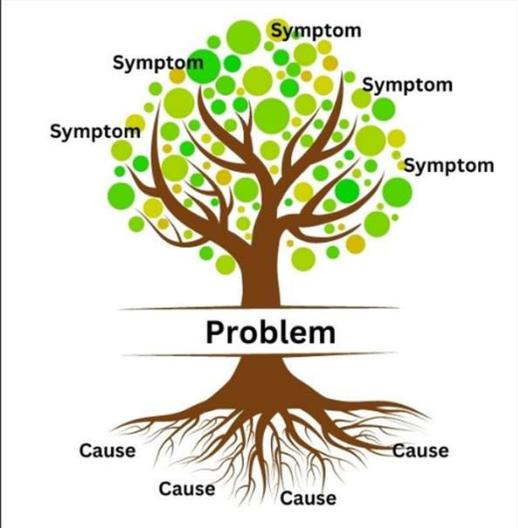
31



32

Finding Opportunities

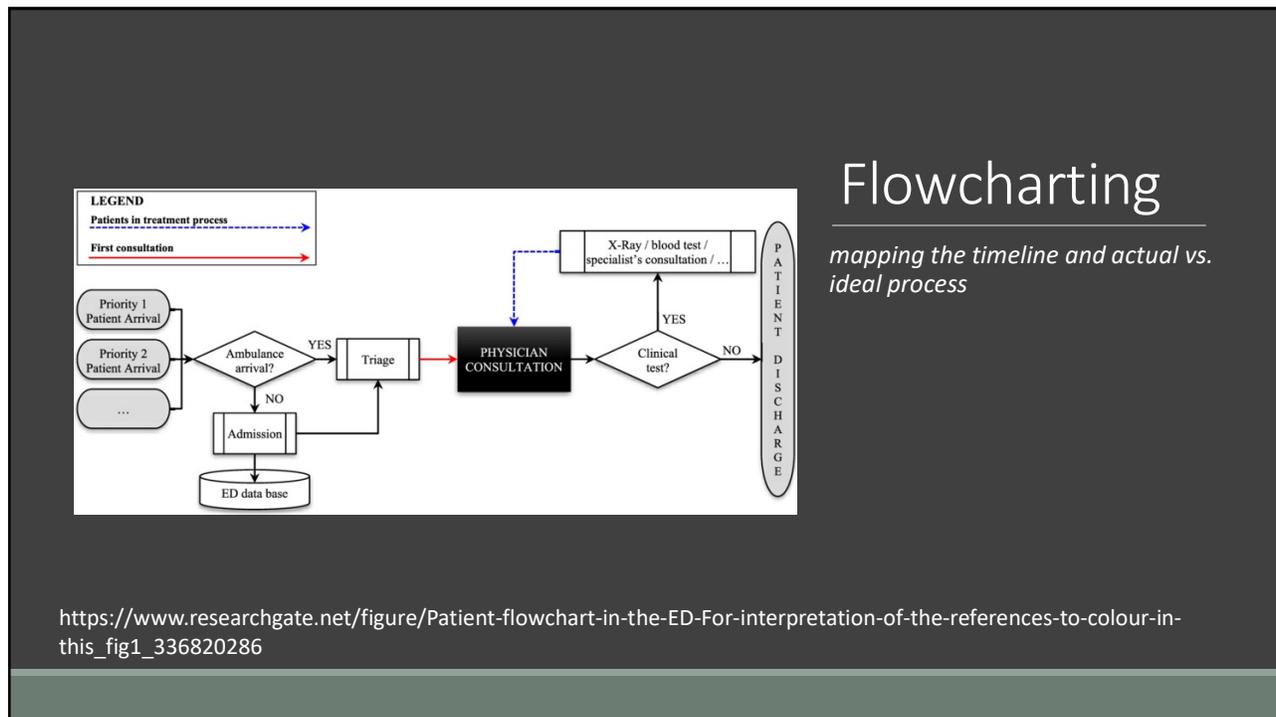
33



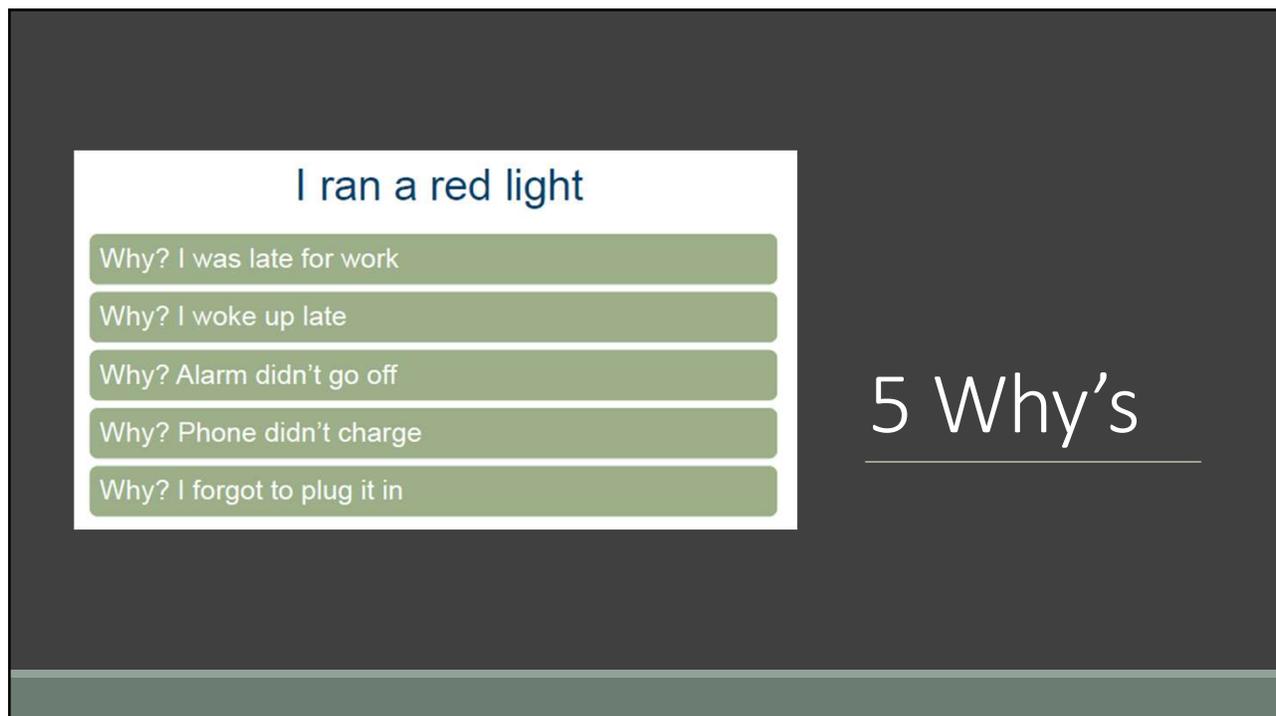
Root Cause Analysis

IMAGE SOURCE: [WORKFELLOW](#)

34



35



36

Fishbone or Ishikawa Diagrams

categorizing causes into system areas

<https://easycra.com/blog/improving-patient-safety-with-fishbone-diagrams/>

37

Tracer & Trigger Tools

MEDICATION RECONCILIATION PROCESS IMPROVEMENT DISCOVERY TOOL

Medical Records #	
Admission Medication Reconciliation Process Steps	
A complete Home Medication List of prescribed medications along with over-the-counter (OTC) medications, vitamins, and supplements currently being taken by the patient are reviewed at admission prior to admission, including list dose taken and next dose due for each.	
The date of home OTC, vitamins and herbal and non-prescribed medications is discussed with the patient and documented in the Home Medication List.	
If there were documented that discussion was held with family members and dispensing pharmacist to ensure consistency of the Home Medication List.	
If discrepancies between records are found, they are discussed with the patient or family and resolved by the pharmacist or provider.	
The Home Medication List was reconciled with the provider's admission orders to such a step that was done by at least one pharmacist on the Home Medication List was Confirmed, Modified or Discontinued and Modified, how.	
Documentation exists that a pharmacist reviewed and reconciled the Admission Medication List.	

Level 1 Medication Triggers	Event Description and Item Category (E#)	Medication Medication Triggers	Event Category
C1	Examination or use of blood products	M1	Chloride-related positive event
C2	Cardiovascular response, non	M2	Thyroid (thyroid) tests (thyroid) greater than 100 weeks
C3	Acute diarrhea	M3	International Normalized Ratio (INR) greater than 6
C4	Excessive blood cultures	M4	Chloride ion less than 90 mg/dl
C5	Seizure or Clonus (muscle twitching) or DVT	M5	Bilirubin 0.5 or more (bilirubin) greater than 2.5 times baseline
C6	Presence of greater than 20% in hemoglobin or hematocrit	M6	Vitamin B administration
C7	Presence of	M7	Respiratory (Respiratory) test
C8	Presence of	M8	Respiratory (Respiratory) test
C9	Respiratory system 30 days	M9	Respiratory (Respiratory) test
C10	Respiratory test	M10	Respiratory (Respiratory) test
C11	Respiratory system infection	M11	Respiratory (Respiratory) test
C12	In hospital stroke	M12	Respiratory (Respiratory) test
C13	Stroke or higher level of care	M13	Respiratory (Respiratory) test
C14	Any procedure complication	M14	Respiratory (Respiratory) test
C15	Other	M15	Other
Level 2 Medication Triggers			
L1	Diabetes test	M16	Diabetes (Diabetes) test
L2	Change in procedure	M17	Reduction in sensitive care
L3	Reduction in sensitive care post-op	M18	Testing procedure
L4	Reduction in sensitive care post-op (Reduction in Sensitive Care (RISC))	M19	Reduction in sensitive care
L5	3 or more test or in PACU	M20	Reduction in sensitive care
L6	Testing or group testing	M21	Reduction in sensitive care
L7	Medical condition greater than 10 days post-op	M22	Reduction in sensitive care
L8	Testing of electrolytes, uremia, hypoxemia, or infection	M23	Reduction in sensitive care
L9	Testing requires level greater than 1.5 mg/dl	M24	Reduction in sensitive care
L10	Testing requires or removal of organ	M25	Reduction in sensitive care
L11	Any operative complication	M26	Reduction in sensitive care
Level 3 Medication Triggers			
L12	Medical condition greater than 10 days post-op	M27	Reduction in sensitive care
L13	Testing of electrolytes, uremia, hypoxemia, or infection	M28	Reduction in sensitive care
L14	Testing requires level greater than 1.5 mg/dl	M29	Reduction in sensitive care
L15	Testing requires or removal of organ	M30	Reduction in sensitive care
L16	Any operative complication	M31	Reduction in sensitive care
Emergency Department Status			
E1	Reduction in sensitive care	M32	Reduction in sensitive care
E2	Time in ED greater than 10 hours	M33	Reduction in sensitive care

Patient Identifier: _____ Test Dates: _____ Test I/Os: _____ Write description of the event in greater detail in the [Pharmacy Worksheet single-sided, Leave opposite side blank for notes.]

38



Step 1

TAKE AN INVENTORY

39



Step 2

PRIORITIZE

When everything is a priority, nothing is a priority

When one person is responsible for everything, everything cannot be done

40



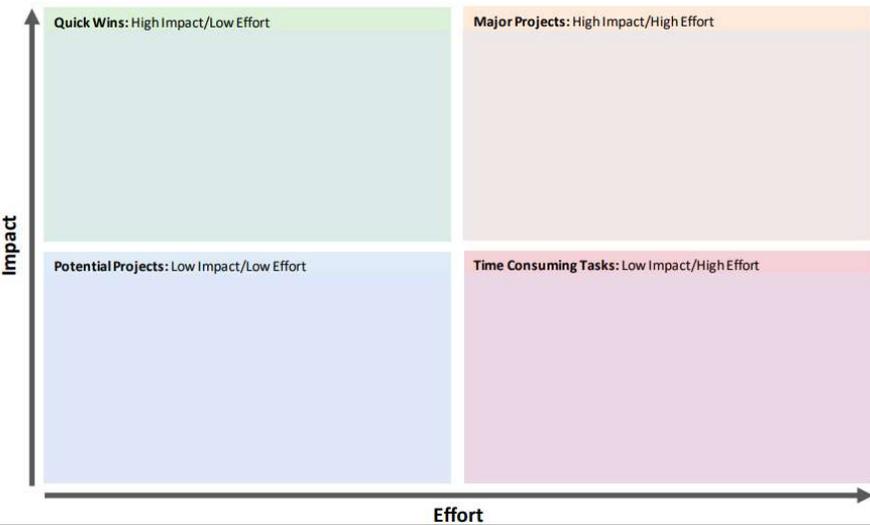
Characteristics of a Good Priority Matrix

- Identifies measures that fit within the organization's strategic goals
- Identifies those measures that support the highest risk and most problem-prone areas
- Tracks measures related to past accreditation, licensing and risk areas
- Has a clearly defined system of measurement within the matrix

41

Prioritization Matrix/Eisenhower Matrix

A prioritization matrix is a process improvement tool that helps teams identify areas of opportunity that are most important to address first. Rank is established by level of impact and difficulty of implementation. Use group-think and brainstorming techniques to rank each item. It is key to focus on the quick wins of high impact/low effort areas first, as well as eliminate or delay the time consuming low impact/high effort items.



Impact	Low Effort	High Effort
High Impact	Quick Wins: High Impact/Low Effort	Major Projects: High Impact/High Effort
Low Impact	Potential Projects: Low Impact/Low Effort	Time Consuming Tasks: Low Impact/High Effort

Effort

42

Priority Matrix

This tool will help prioritize which root cause(s) to address first. By sorting root causes by feasibility and importance, you can strike a balance between "quick wins" and long-term efforts to achieve the greatest impact on disparities. To complete the matrix, you'll take the smallest branches from your fishbone diagram and, for each one, ask yourself 1) "How feasible is it to tackle this issue?" and 2) "How important is it to tackle this issue?" Then, based on your answers to these questions, place each root cause in the appropriate box.

Which of our root causes are....	Very Important	Less Important
Very Feasible to address		
Less Feasible to address		

43

Prioritization Worksheet for Performance Improvement Projects

This worksheet will assist in choosing potential areas for improvement based on the highest priority. This tool is intended to be completed and used by the departments or QAPI team members to determine which areas to prioritize interventions. List potential areas for improvement in the first column and then score each area in the following columns based on the rating system in the "Total Score" column unless otherwise directed. Add the scores across the row and tally in the final column. Potential improvement areas with a higher score indicate a higher priority. The rating is not prescriptive and is meant to stimulate discussion.

Potential Areas for Improvement	REQUIREMENT	COMMUNITY or ORGANIZATION	VOLUME	RISK	PROBLEM PRONE	COST	RESPONSIVENESS	FEASIBILITY	CONTINUITY	TOTAL SCORE
Consider areas identified through: Dashboard(s) Feedback from staff, families, residents, incidents, near misses, unsafe conditions, survey deficiencies, new or changing evidenced based best practices.	Is the measure a state, federal, or accreditation requirement? Weighted: 4 = Yes 0 = No	Is the measure a community priority (ie from CHNA) or an organization priority (ie from Strategic Plan). Weighted: 3 = Yes 0 = No	The frequency at which this issue arises in our organization.	The level to which this issue poses a risk to the wellbeing of our patients.	The extent to which addressing this issue would affect patient quality of life and/or quality of care and prevent or reduce medical errors, adverse patient outcomes, or hospital acquired conditions.	The cost incurred by our organization each time this issue occurs.	The likelihood an initiative on this issue would address a need expressed by patients, family, senior leaders, staff or governing boards.	The ability of our organization to implement a performance improvement project on this issue, given current resources.	The level to which an initiative on this issue would support our organizational goals and priorities.	1 = very low 2 = low 3 = medium 4 = high 5 = very high Max: 42
Reduce falls with injury	0	0	5	5	5	4	4	5	5	33
Increase sepsis compliance	4	3	1	5	5	5	3	4	5	35
Reduce readmissions	4	0	4	2	3	4	1	4	3	25

44



Step 3

DIVIDE AND CONQUER

Leverage your bench talent

Assign ownership appropriately –
so everyone knows who's "Got It"

45



Key Take Aways

- Data has a purpose
- Little data matters
- Look for variation
- Use simple tools
- Prioritize wisely
- Divide and conquer

46

Applied Learning

47

Preparing for Your Performance Improvement Project



BUILD YOUR TEAM



IDENTIFY MEASURES

BRAINSTORM CHANGES
TO TEST

48

Date	Content
February 12	Leadership & Engaging Teams, Patients, Families, and Partners
February 26	Leading Quality Through the Triple Aim: Integrating Population Health and Health Equity
March 12	Introduction to Patient Safety
March 26	Project Sharing Celebration

Quality & Patient Safety Fellowship

49



Questions & Contact

Reach out anytime!

Jennifer Wagner

jwagner@convergencehealth.org

50