Informing QI With Assessment Data

Alena Guenther, MPH – Nexus Family Healing

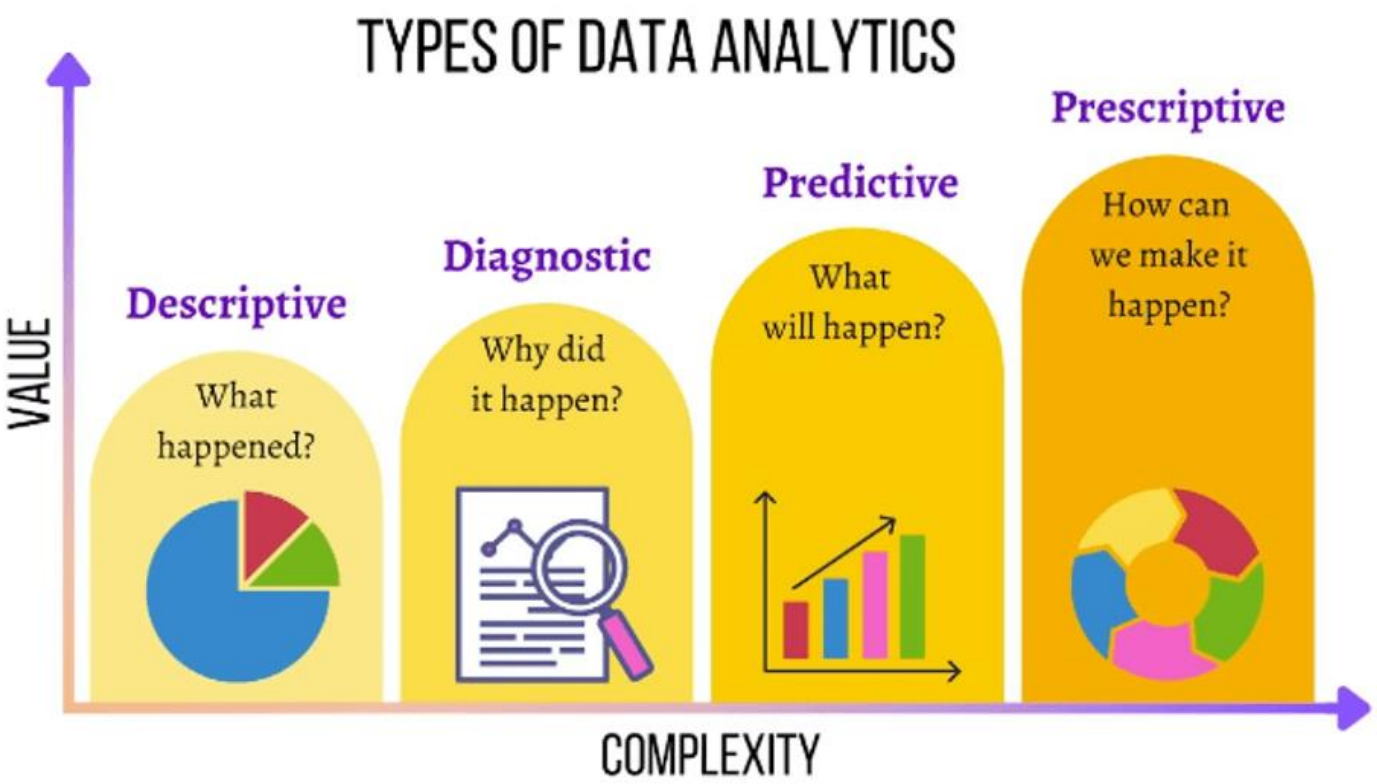
Agenda

- Overview of Data Analysis
- Statistical Significance vs Programmatic Importance
- Why does QI require Data Analysis?
- Data Analysis through PDSA Lens
- Using Data Analysis to Inform Logic Models

What is Data Analysis?

- "Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data." (Office of Research Integrity (hhs.gov))

- Includes statistics, but also many other data-related activities



Types of Data Analysis in Data Science and Its Applications (almabetter.com)

What is Statistical Significance?

- "When a finding is significant, it simply means you can feel confident that's it real, not that you just got lucky (or unlucky) in choosing the sample." – Harvard Business Review
- Usually, you are trying to disprove a null hypothesis that the results are due to chance
- Factors that lead to significance
  - Sample size
  - Variation in underlying population
  - Chosen significance level (p-value)

Quote from Harvard Business Review

The reason managers bother with statistical significance is they want to know what findings say about what they should do in the real world. But "confidence intervals and hypothesis tests were designed to support 'science,' where the idea is to learn something that will stand the test of time," says Redman. Even if a finding isn't statistically significant, it may have utility to you and your company. On the other hand, when you're working with large data sets, it's possible to obtain results that are statistically significant but practically meaningless, like that a group of customers is 0.000001% more likely to click on Campaign A over Campaign B. So rather than obsessing about whether your findings are precisely right, think about the implication of each finding for the decision you're hoping to make. What would you do differently if the finding were different?

Programmatic Importance

- Ability to draw meaningful conclusions and act on our results

- Some examples:
  - Confirm anecdotal evidence
  - Identify issues with quality
  - Compare results to research on a similar population

Poll: Why does QI require data analysis?

Some answers:

- Anecdotes are helpful but cannot provide a full view of a program's effects
- Identify problems/areas for improvement (including unintended consequences)
- Track progress & measure success
- Measure fidelity to process
- Grant writing & fundraising
- Disentangle bias & challenge assumptions
- Boost confidence

Good News!

- We already collect SO MUCH DATA as part of our day-to-day that we can analyze to inform our quality improvement work

Assessment Data

- Something most organizations have
- Often used to inform care at the individual level
- Also has value at the programmatic level and organization level

Data Analysis through a PDSA Lens

PLAN: Understand the Assessment

- How is the assessment scored?
- Does each item matter or is there a final aggregated score?
- How is the aggregated score calculated?
- How often is the assessment given?
- It can even be helpful to know how program staff use the assessment

Our Example: CANS Assessments

- Child and Adolescent Needs and Strengths Assessment
- Used across the organization, varying frequencies
- How results used at Nexus
  - Clinically, for client-level treatment planning
  - Basic aggregations at organization-level for annual reports

PLAN: Setting Goal for Data Analysis

- To set a goal, you need a fairly specific question
- It's okay to start small!

- Some questions to think about when you're setting your goal:
  - What is your question of interest? Are you trying to solve a problem?
  - Do you have data that could answer it?
  - Would the answer make sense programmatically?
  - Would you/your organization be able to act on the results?
  - What data will make up your sample?

PLAN: Set Expectations for Results

- How many assessments (and/or clients) do you expect to be in the data?
- What scores are possible on the assessment?
- What is the expected distribution of scores?
- If you're looking at change over time, do you expect to see an increase or decrease?

PLAN: Our Example

- Collected a list of questions/data points people have asked for related to the CANS

Some questions being asked of our CANS data:

- Do any of these things predict a change in score?
  - Basic demographics (Race, Ethnicity, Gender, Age)
  - Program
  - # of therapy hours received
  - Referral source
  - Socioeconomic status
- Are clients at X agency really "more difficult" than clients at Y agency?
- Does intake CANS predict success of discharge placement?
- Are we seeing a change in the CANS items our programs are designed to impact?
- Which programs are the most successful with which types of youth?
- Can we create an indicator of staff workload based on their clients' needs?

PLAN: Our Example

- Chose something manageable
  - Basic to start with, able to be built upon down the road
  - Has some meaning/value – wanted to learn something, encourage staff, share with MarComm team, etc.
- Our question: How do discharge CANS compare to intake CANS for our residential programs? And does it vary between agencies?
- Expected result: we will see improvements (decrease in needs, increase in strengths) and little to no change in the trauma exposure domain. Some agencies may have more change than others, but they will be relatively similar

PLAN: Plan Analysis

- Where is your data stored?
- How will you access it?
- Outline your dataset – date range, specific programs, what kinds of variables to include, etc.
- Will you need to compile data from multiple sources? (If yes, how will you connect them?)
- What program(s) will you use to compile and analyze your data?

DO: Data Work

- Get Data
- Clean Data
- Analyze Data
- DOCUMENT

- One Resource: The Art of Data Science – Peng & Matsui

DO: Get Data

- In PLAN section, we talked about these questions:
  - What data do you want to analyze?
  - How is your data stored?
  - How do you access it?
  - What format do you need it to take for analysis? (excel often fine)
  - Do you need to compile data from different sources?

- Now is the time to carry it out

DO: Clean Data

- Take a preliminary look at your data
- Are there as many rows and columns as you expect?
- What format does it take? (i.e., long vs wide)
  - Will that work or do you need to pivot it?
- How are you going to handle missing data?
- Are values in the data workable?
  - May need to change yes/no values to 1/0 values
  - If you don't need comments or narrative fields, you can remove them
- Will you need to aggregate any data points?

DO: Perform Analysis

- Descriptive Analysis (Types of Descriptive Statistics – Baseline Help Center (campuslabs.com))
  - Mean, median, range, standard deviation, outliers
  - If looking at multiple time points, do these for each, then look at change over time – raw change, percent change
- Diagnostic Analysis
  - Break descriptives down by meaningful metrics – things that might correlate with difference in scores. Ex: program, gender, length of stay, etc.
  - Consider comparing each program to overall average
- Program options: Excel, R, SPSS, etc.
- Will likely have to go back and forth between cleaning and analysis. Ex: you replaced "No" values with 0 but didn't realize there were also 'N' values in the data

DO: Get and Clean Data – Our example

- Extracted data from warehouse with SQL
- Limited to Nexus CANS items
- Replaced Yes and No values with 1 and 0
- Created new column to categorize scores as Actionable and Non-Actionable
- Removed any rows with remarks/comments fields
- Removed missing values

DO: Perform Analysis – Our example

- Used R for cleaning and analysis; Excel to save and share results
- Distribution of demographics in sample
- Distribution of actionable items at intake and discharge. Ex:

Actionable Needs (CBEN) - Intake Only

13 possible

Number of Actionable Needs	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Count	16	18	39	63	88	105	69	63	21	9	6	3	0	0	500

Avg	4.72
Std Dev	2.12
Min	0
Median	5
Max	11

Agency	Avg	Std Dev	Min	Median	Max	Count
Agency A	4.92	1.96	0	5	11	219
Agency B	5	1.87	1	5	10	73
Agency C	4.62	2.32	0	5	11	89
Agency D	5	2.06	1	5	10	47
Agency E	3.75	2.38	0	4	10	72

DO: Descriptive Analysis – Our example

- Looked at prevalence of each item individually at intake and discharge as well as percent change. Ex:

STRENGTHS							
Intake Strengths %s for Closed Enrollments							
Family Strength	Cultural Identity	Optimism	Interpersonal Skills	Natural Supports	Community Life	Spiritual/Religious	
49.7%	50.3%	40.8%	31.3%	35.5%	27.0%	40.8%	
Relationship Permanence	Vocational Skills	Coping and Survival Skills	Educational Setting	Resiliency	Talents/Interests	Youth Involvement with Care	
64.1%	66.8%	22.4%	56.3%	43.8%	62.8%	54.3%	
Discharge Strengths %s for Closed Enrollments							
Family Strength	Cultural Identity	Optimism	Interpersonal Skills	Natural Supports	Community Life	Spiritual/Religious	
59.2%	58.6%	59.9%	51.3%	41.8%	32.9%	44.7%	
19.2%	16.3%	46.8%	**64.2%**	17.6%	22.0%	9.7%	PERCENT CHANGE (positive is an increase in strengths)
Relationship Permanence	Vocational Skills	Coping and Survival Skills	Educational Setting	Resiliency	Talents/Interests	Youth Involvement with Care	
69.1%	74.7%	48.4%	72.4%	66.8%	77.0%	73.4%	
7.7%	11.8%	**116.2%**	28.7%	**52.6%**	22.5%	35.2%	PERCENT CHANGE (positive is an increase in strengths)

Study: Does the Data Look How We Expect?

- Important to examine from multiple perspectives
  - Analyst
  - Program staff

- It may be helpful to create some basic visualizations to help understand the results

Study: Analyst Questions

- Examine Descriptive Statistics
  - Number of assessments overall and per client
  - Average scores and range of scores – are they within the range of possible scores on the assessment?
  - Are there extreme outliers that might indicate something is wrong with the data?
- Does anything just seem off with your results?
- Our example:
  - Very different sample sizes prevents appropriate comparisons

Study: Programmatic Questions

- Based on your experience with the clients, do these results make sense?
  - For example, our data showed several clients who had a score of 0 (no needs) at intake – is that something that is actually seen in the client population?

- Are the results different than what you expected?
  - If yes:
    - What did you expect to see?
    - Can you think of a reason that we didn't see what we expected?

Study: Unmet Expectations

- Were your goals realistic? Did they make sense programmatically?

- Example: ECSII Assessment – Service Intensity (SI) Level
  - Expectation: See a large % of clients decrease in SI Level over time
  - Reality: Only a small % of clients had a decrease
  - Explanations:
    - SI level isn't something that often changes
    - Unrealistic to expect changes in clients already at lowest level

Study: Unmet Expectations

- Are there quality issues in the data?

- Example: The data was not as positive as expected.
  - Program Staff raised a concern about the quality of assessments being completed due to Copy Forward function of our EHR

Study: Unmet Expectations

- Is there some other contributing factor you might need to consider?

- Our Example: Varying Sample Sizes across Agencies
  - Length of Stay determines sample size when there are a limited number of beds available.
  - Our agencies have varying lengths of stay ranging from a couple months to several years

Act: Revise Analysis

- If you had a lot of unmet expectations during your STUDY stage, you may have to go back to the beginning and start over with your analysis.

- Our Example: Revised analysis to get equal sample sizes from each agency to facilitate meaningful comparison

Act: Interpret & Communicate

- Work with program staff to identify key measures to communicate, especially when the assessment is extensive
  - Add these to logic models if applicable

- Address potential quality issues with your team. Compare results after implementation to see if the intervention affected the data.

- This step will likely lead to more questions for analysis!

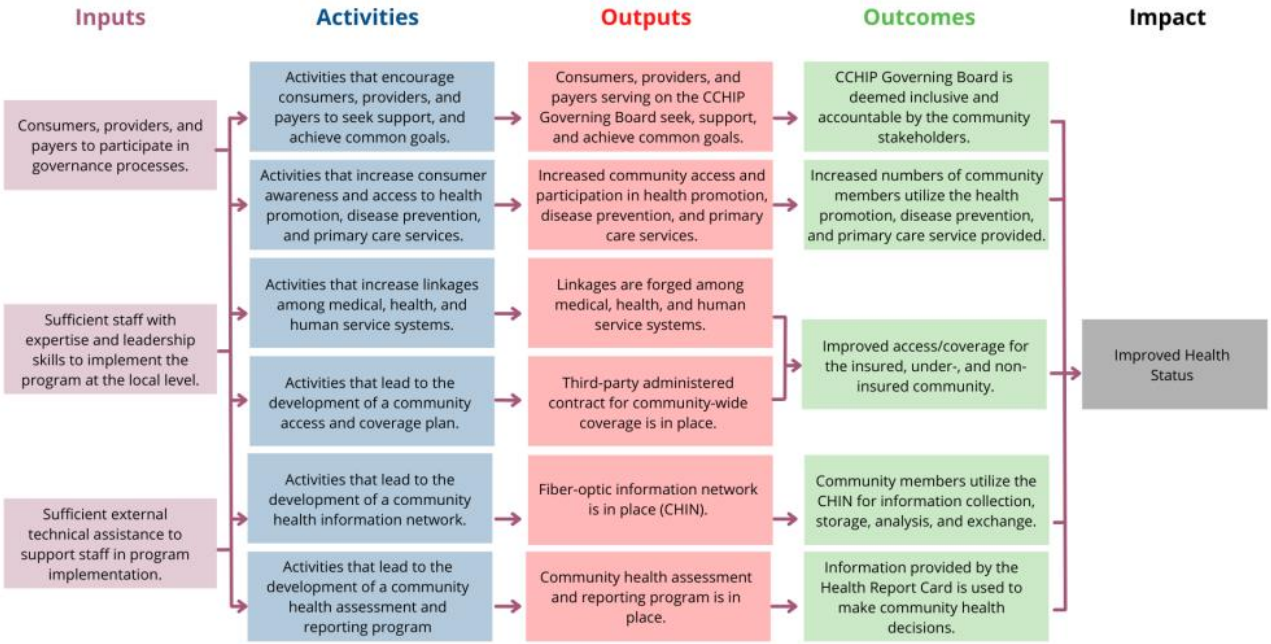
Act: Our Example

- Met with a key clinical leader to review results
  - Identified measures of focus for communication and outcome tracking
    - Self-Regulation
      - Emotional and/or Physical Dysregulation
      - Anger Control

- Shared results and data quality concerns with agency leaders

- Added a self-regulation focused outcome to the logic model for Residential programs with our results as a baseline for goal setting

Refresher: Logic Model



W.K. Kellogg Foundation Example Logic Model

Chris Lysy - Canva Redesign - freshspectrum.com

Residential Logic Model

Inputs	Activities	Outputs	Short-term Outcomes
Training* (ERE, CANS, JSOAP, EMDR, Motivational Interviewing, etc.*) Funding & Reimbursement* Facility* Partnerships* **Agency Treatment Team*** Parent partners Aftercare Coordinators Admission Coordinators Therapists*	*TIC framework* **ERE model** -paradigm shift -specific ERE tasks -programming components Debriefing of incidents **Guidance Plans:** are Completed Guidance Plans are Regularly Reviewed **Restraint reduction** "work" Debriefings **Specialized Services*** Sex-specific treatment practices (RNR Model)	All clients in care have a Guidance Plan completed. All Treatment plans goals are connected to CANS Needs and Strengths necessary for successful discharge from RTC. All staff interacting with clients will have access to and utilize the contents of guidance plans in care with intention **Restraint Reduction** All risk events are reviewed quarterly: # of restraints Debriefing completion compliance	**Key Measures** 75% of clients successfully discharged from the program. * 80% of clients demonstrate a reduction in # of needs from admission to discharge 100% of families report overall satisfaction with services received* XX% of clients improve self-regulation skills.

Residential Logic Model

Inputs	Activities	Outputs	Short-term Outcomes
Training* (ERE, CANS, JSOAP, EMDR, Motivational Interviewing, etc.*) Funding & Reimbursement* Facility* Partnerships* **Agency Treatment Team*** Parent partners Aftercare Coordinators Admission Coordinators	*TIC framework* **ERE model** -paradigm shift -specific ERE tasks -programming components Debriefing of incidents **Guidance Plans:** are Completed Guidance Plans are Regularly Reviewed **Restraint reduction** "work" Debriefings **Specialized Services***	All clients in care have a Guidance Plan completed. All Treatment plans goals are connected to CANS Needs and Strengths necessary for successful discharge from RTC. All staff interacting with clients will have access to and utilize the contents of guidance plans in care with intention **Restraint Reduction** All risk events are reviewed quarterly: # of restraints Debriefing completion compliance	**Key Measures** 75% of clients successfully discharged from the program. * 80% of clients demonstrate a reduction in # of needs from admission to discharge 100% of families report overall satisfaction with services received* 50% of clients with Actionable needs in Anger Control and Emotional and/or Physical Dysregulation on the CANS see clinical improvement by discharge.

Repeat

- Depending on how the analysis and assessment of the analysis went, you may have to revise your goals, questions, and/or approach. This is okay! Data analysis is an iterative process.

- If you feel that your analysis achieved your goals, you can repeat the process with a different question.
  - Our example: Once we felt the analysis of the residential CANS was in a good place, we moved on and repeated the analysis with our foster care service line.

Questions?