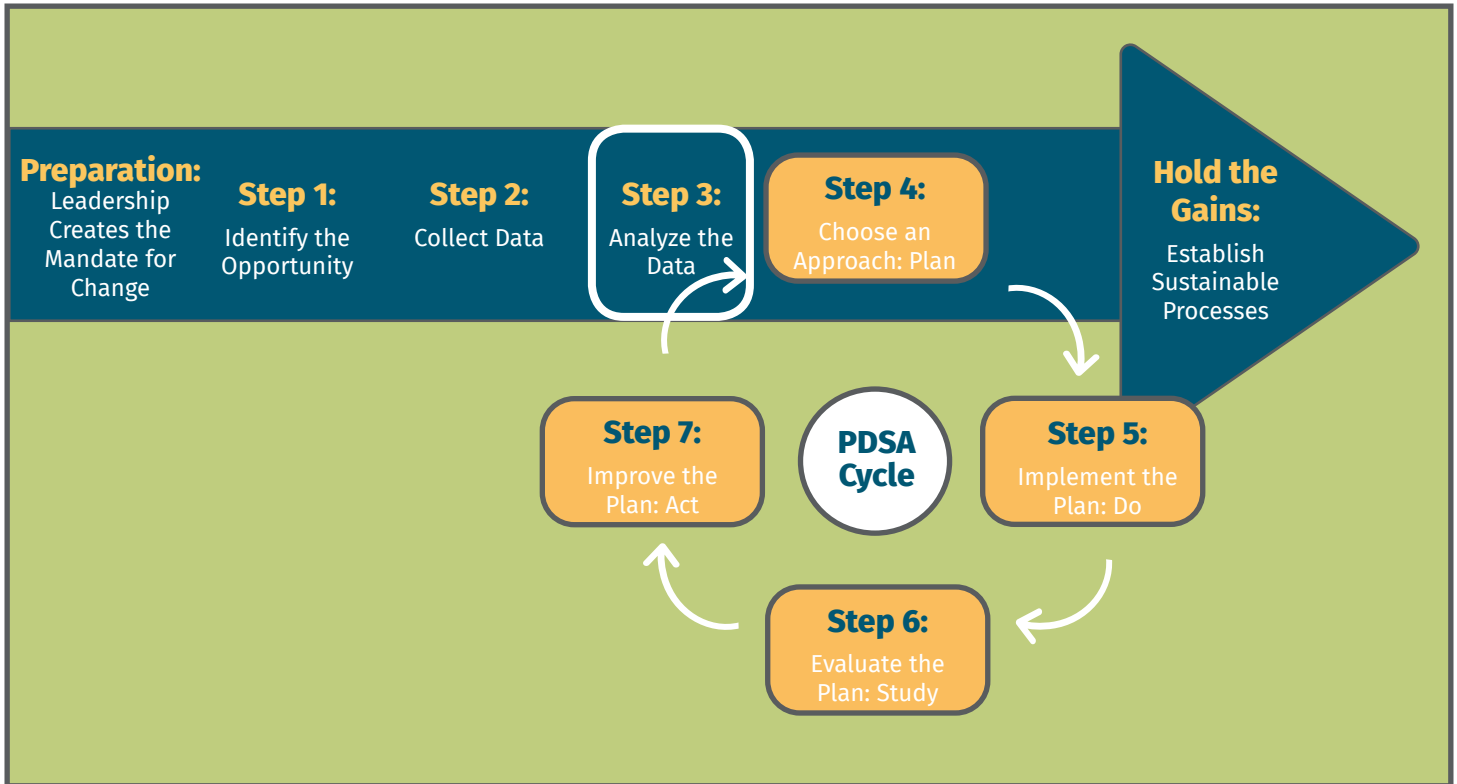


STEP 3: ANALYZE THE DATA

THE QI APPROACH:

- [About this Step](#)
- [Suggested Activity Details](#)
- **RESOURCES**



About this Step

Purpose

By itself, data can be fairly meaningless. Some organization and translation is usually needed to transform the data into useful information. By translating the data collected into useful information, the team will be able to make key observations about the process they are focusing on and determine the root causes. This is what is meant by data analysis.

Data analysis is like making a diagnosis based on lab test results, symptoms, family history and other patient data. The lab data enables the provider to diagnose the underlying illness causing the patient's symptoms. Likewise, identifying root causes will allow you to direct your improvement efforts at the underlying "disease" (i.e.: the causes of the problems) rather than simply treating the symptoms.

Analyzing and presenting the data can be a lengthy process, especially if you haven't done it before. As with Step 2, Step 3 may require multiple meetings and work between meetings to accomplish this step. The team should be prepared for that.

As a part of each meeting, you'll want to make sure to:

- Discuss next steps
- Review the meeting record and task assignments

- Evaluate the meeting and make changes to improve the meeting process where indicated
- Set a tentative agenda for your next meeting

Objectives

- Transform the data into usable information by organizing and displaying it clearly and simply
- List key observations from the data collected
- Identify all the root causes of process problems
- Communicate the findings in order to build understanding and support for future changes

Preparation for Team Work

- Gather all the data in one place
- Review the data collection objectives
- Display your high-level flow chart so all can easily view it

Overview of Suggested Activities

1. Review the raw data to determine its integrity and whether objectives are met
2. Summarize the data
3. Determine the best way to display the data
4. Make key observations about problems you observe with the current process
5. Determine root causes of each of the key observations
6. Review your high level flow chart to see where in the process the root cause of problems occur
7. Communicate the team's conclusions

Suggested Activity Details

During the QI Team meetings...

1. Review the raw data to determine its integrity and whether objectives are met

- Gather the data in one place, and inspect the results while asking:
 - Were there any problems encountered with the data collection which may have distorted the results?
 - Was the desired sample size actually attained?
 - Were any questions on the forms left blank?
 - If a survey was conducted, what was the response rate? If less than 25%, the results may be biased.
 - If a sample was used, was it representative of the population (i.e.: randomly selected)?
- Discard any items having obvious collection problems, biases, incompleteness or implausible results. Look for answers to any questions about the data, interviewing the data collectors if necessary.
- If significant problems occurred with the data collection process, you may have to revise your approach and collect more data.
- Determine whether the data meets your objectives.

2. Summarize the data

- If you did use a survey/questionnaire and used a program such as Survey Monkey, much of the analysis can be done within the program. If not, you will need to do some basic analysis.

TIP: Piloting, evaluating and revising your process in Step 2 will help mitigate some of these issues before you do your full data collection.

- Begin by developing a score sheet based on the questions in your collection tool. This can be a blank copy of the data collection form used to tally the responses or data entry screen for an electronic data base. Tally any numeric (quantitative) data onto a blank collection form or score sheet and perform any calculations of percentage scores or rates. Microsoft Excel and other similar software work well for this and also allow you to display your data graphically as well.

1. See **Appendix E** for a sample Excel dashboard template

- Tally any numeric (quantitative) data onto a blank collection form or score sheet and perform any calculations of percentage scores or rates.

2. See **Focus On: Calculating Rates, below**

- Double-check your calculations. If possible, have a second person or group of people check all calculations for errors, even if done electronically.
- Summarize the qualitative data, such as open-ended survey questions. Type out all the responses to each qualitative question together on one document. Create categories for possible answers and try to group responses within these categories. Summarizing (and analyzing) qualitative data is always subjective and can be frustrating. First ensure the data has sufficient value to warrant this effort.

Focus On: Calculating Rates

Calculate the percentage scores (also called rates) for each possible answer to each question.

This is done by:

1. Determining the total number of eligible responses for each individual question (discard those responses that are incomplete or problematic). This will be your denominator, or N for the question.

- For example, if 50 surveys were returned (this is your sample size), but only 47 respondents chose to answer question #4, the denominator (N) for question #4 is 47. There are several methods for identifying people with cardiovascular disease. Some methods are more accurate than others, but none are error-free.
- Select a slightly larger sample size than needed to accommodate the inevitable discards.
- If using the list for a survey, verify the diagnosis first. Patients can become alarmed when asked about their cardiovascular disease when they have not been told they have the disease.

2. Divide the number for each answer or response by the denominator N, and multiply that number by 100.

$$\frac{\text{Total number that gave a particular response}}{\text{Total number of eligible responses to the question (N)}} \times 100 =$$

EXAMPLE:

There were 47 respondents for question #4 (N = 47); and there were three possible answers with these responses:

yes	33
no	10
don't know	4

To calculate the rates for question #4's responses:

yes	$(33/47) \times 100 = 70\%$
no	$(10/47) \times 100 = 21\%$
don't know	$(4/47) \times 100 = 9\%$

3. Determine the best way to display the data

- Decide on how best to display each type of data and produce the graphs or tables. There are a number of relatively easy methods for displaying data in a clear way to enhance everyone’s understanding of it. All of these display methods can be hand-drawn and will be just as effective as computer-generated versions.
- Display only the most important and relevant information. Highlight the most significant findings to support a powerful and convincing communication tool. Keep your displays simple with only one or two pieces of information per display, such as on a slide or a poster.
- The most commonly used data display methods include:

- o **A written summary:**

A summary is a narrative description of the aggregate results. The simplest way to do this is to enter the results onto a blank copy of your data collection form. Or, you could simply state findings as a bulleted list of items such as:

54% of patients report they have had a lipid panel in the last year.

- o **A table:**

This method can be an efficient way of summarizing a large quantity of data. Aggregate numbers can be displayed as shown below:

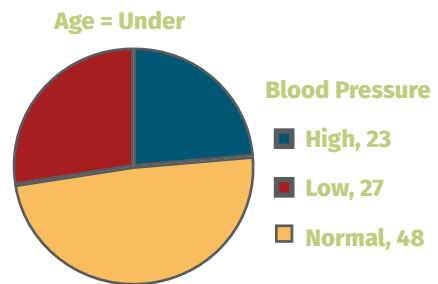
Survey question	Yes	No	I don't know	No response
“Does your provider talk with you about what you might do to make more healthy lifestyle choices?”	52%	46%	2%	0%

- o **A graph:**

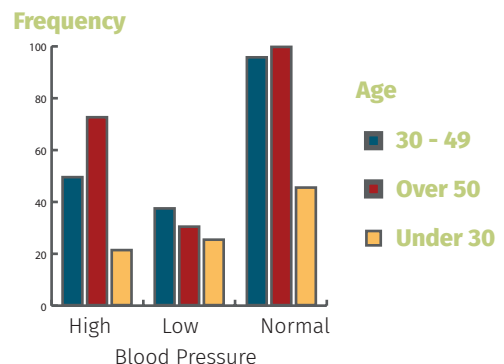
There are a variety of graphic formats you can use to illustrate your more interesting findings. All can be done with or without a computer. If you are using software or programs like Excel or Survey Monkey, all of them have tools to create these graphs using the data you have already entered. Play around with the options to determine which will best serve your purpose.

Examples are:

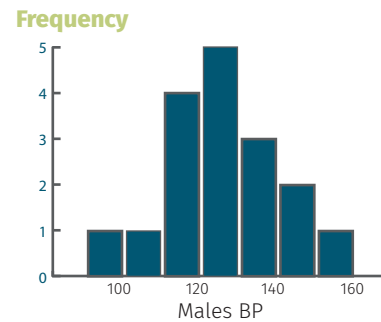
1. Pie chart - This simple graphic helps to demonstrate differences between separate parts of the whole (like pieces of a pie). Use this type of graph when you want to compare magnitudes or frequencies of individual data categories (e.g.: items described in percentage values) to the whole (the 100%).



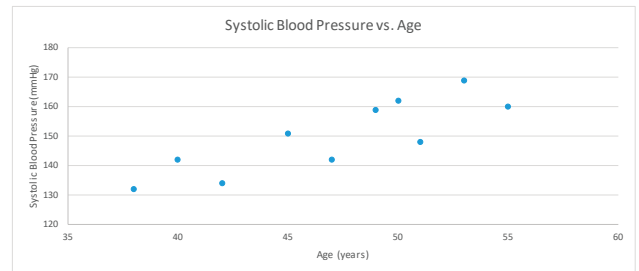
2. Bar graph - This is a simple way to display the number of units (such as number of patients) by discrete categories (such as gender or type of cardiovascular disease). The bar graph allows for easy comparison between characteristics.



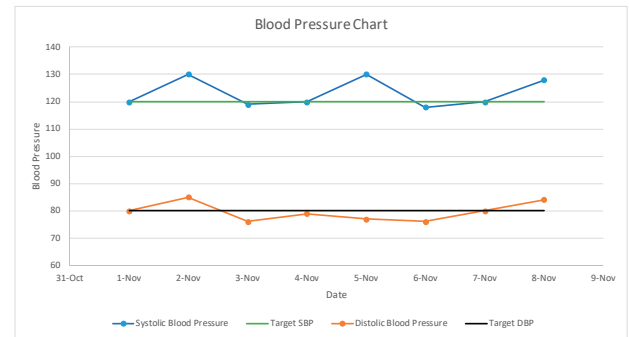
3. Histogram - This graph is used to display data about the number of units (such as number of patients seen) occurring along a continuous sequence (such as time or lab value) broken into intervals (such as a time range or range of values) to illustrate patterns or variations in a process.



4. Scatter plot - This graph displays one set of continuous values by another continuous set to illustrate any correlation between the two sets of values. An example would be to plot patients' weights by their average blood pressure to examine whether weight correlates with blood pressure. A dot on the graph would represent an individual patient. The distribution of the dots would indicate the type of correlation.



5. Run chart or time plot - This graph plots observation points (vertical axis) over time (horizontal axis) to illustrate a sequence of events or trends with time.



o **Infographic or word cloud:**

There are programs that can help you create these images if you have the time and the skill. It is certainly not necessary.

o **A combination of the above:**

Combining graphs, tables and written summaries provides the most complete description of the data and helps keep viewers interested in the content.

4. Make key observations about problems you observe with the current process

- Include your high level flow chart as part of the displayed data.
- Have the team brainstorm observations by making simple statements about the findings from the data summary and displays. Some of the questions to ask to get at the key observations are:
 - o **Are there any surprises or unexpected results in the data?**
 - o **What are the main problems with the process, and who is affected?**
 - o **Under what circumstances do these problems occur?**
- Group, categorize, or rank order the list to identify the “key” observations – those that have significant impact on the process. Key observations will better describe a process or problem, further localize the problem, or identify patterns or variations in the process. They can also identify areas where processes are working well.

TIP: Steer away from blaming PEOPLE for problems or their causes. Use the data to demonstrate how problems are due to flawed PROCESSES, not due to the individuals working in an impaired and non-supportive system.

5. Determine root causes of each of the key observations

- The team’s key observations will probably include symptoms of problems associated with the care process. But a symptom is not a primary reason for the problem. You need to identify the real underlying (root) cause and ask, “Why does this happen?” for each of your key observations.
- Review your key observations to ensure common understanding.
- Identify possible causes of the problems you identified are true underlying causes or merely symptoms of deeper problems.
- Continuously challenge the team to get at the root cause of problems by asking why each of the identified causes of problems occur in the first place. Root causes of problems should not be symptoms caused by other problems.
 - **Continually asking “why” helps to get to the root of things. Keep asking this question until the team has gotten beyond describing symptoms and has identified the real root causes for your problems.**
- After identifying the possible root causes, rank order them in order of importance or impact to identify the “vital few” – those root causes thought to be the most significant contributors to the problems – AND those which may be changeable through your efforts.
- You may need to do this in a series of brainstorming and rank ordering sessions.

TIP: As mentioned earlier, diagnosing is a similar process. A patient may present with symptoms but the provider would not just treat the symptoms without first identifying the underlying cause which will then help determine the appropriate treatment.

6. Review your high level flow chart to see where in the process the root cause of problems occur

- Assess the magnitude of the problems stemming from the root cause.
- Identify what processes appear to work well.

7. Communicate the team’s conclusions

- You have now reached an important milestone in the effort to improve cardiovascular care. At this point, the team has undoubtedly learned a lot about the process of care. It is important that these results be shared, not only with the project Sponsor, but with everyone involved in order to:
 - **Build support for the team’s work and for future changes**
 - **Promote and celebrate the team’s progress and accomplishments**
 - **Allay any fears or anxieties regarding the team’s work or its findings**
 - **Inform people about the current process and the problems that were identified**
 - **Provide an opportunity to answer questions, get feedback and hear people’s concerns**
- Use visuals such as graphs or real examples to demonstrate your points.
- Present your results and encourage an open discussion. Emphasize the problems are due to faulty processes, to allay fears of being blamed. Be open and transparent about the team’s activities. Keep people informed by:
 - **Regularly reporting at staff meetings**
 - **Displaying a poster or storyboard of your work**
 - **Circulating a report or newsletter regularly**
 - **Hosting a celebration to announce this and other milestones in your team’s efforts**

- Build support for future changes by demonstrating the causes of problems and the need for improvement. Outline the team's next steps so it is clear that responsibility for improving the situation lies with the team but will require everyone's support. Support from our co-workers and management is essential to the success of implementing any system-wide improvements.
- Seek recognition for the team's hard work in uncovering these problems. The team's improvement goals, contributions and progress deserve to be recognized by everyone, including your patients.

TIP: Accepting the data and team's conclusions requires trust. Engage opinion leaders – those respected authorities or leading experts in clinical issues – in the analysis process to foster trust of the information collected and of your conclusions.

ACCELERATED QI OPTION

There really is no getting around this step if you have collected any data to know if a change is an improvement. Whatever data you collect should be subjected to the process of summary, analysis and communication. Even if you haven't collected any new data, you will still need to communicate what you will be using as a basis for any improvement decisions you and the team make.

RESOURCES

Managing Data for Performance Improvement

From the Health Resources and Services Administration

<https://www.hrsa.gov/sites/default/files/quality/toolbox/508pdfs/managingdataperformanceimprovement.pdf>

This document illustrates how a QI team can establish a plan and methods for gathering, analyzing, interpreting, and acting on data for a specific performance measurement.