QI Essentials Toolkit:
Pareto Chart

According to the "Pareto principle" — also known as the "80/20 rule" — in any group of factors that contribute to an overall effect, roughly 80% of the effect comes from 20% of the causes.

A Pareto chart is a type of bar chart in which the various factors that contribute to an overall effect are arranged in order from the largest to the smallest contribution to the effect. This ordering helps identify the "vital few" (the factors that have the largest contribution to the effect and therefore warrant the most attention), as distinguished from the "useful many" (factors that, while useful to know about, have a relatively smaller contribution to the effect).

Using a Pareto chart helps teams concentrate their improvement efforts on the factors that have the greatest impact. It also helps teams explain their rationale for focusing on certain areas and not others.

IHI's QI Essentials Toolkit includes the tools and templates you need to launch and manage a successful improvement project. Each of the nine tools in the toolkit includes a short description, instructions, an example, and a blank template. NOTE: Before filling out the template, first save the file on your computer. Then open and use that version of the tool. Otherwise, your changes will not be saved.

- Cause and Effect Diagram
- Driver Diagram
- Failure Modes and Effects Analysis (FMEA)
- Flowchart
- Histogram
- **Pareto Chart**
- PDSA Worksheet
- Project Planning Form
- Run Chart & Control Chart
- Scatter Diagram

Instructions

Collecting Your Data

1) Write your data in a simple table, listing the contributing factors to a particular effect (for example, types of errors during surgical setup) and the magnitude of each factor (for example, frequency of each type of error).

2) Order the factors according to the magnitude of contribution to the effect, from largest to smallest. If there are many insignificant factors, you can group them together into one category labeled "Other."

3) Calculate the percentage of the total that each factor represents. For example, number of times a certain error occurred last year divided by the total number of errors last year, multiplied by 100.

4) Working from the largest category to the smallest, calculate the cumulative percentage for each category until you reach 100%.

Drawing Your Pareto Chart

1) Draw and label the left vertical axis (Y) with the unit of comparison (for example, "Number of Errors," from 0 to the total).

2) Draw and label the horizontal axis (X) with the categories (for example, "Type of Error"), largest to smallest from left to right.

3) Draw and label the right vertical axis "Cumulative Percentage," from 0% to 100%, with the 100% value at the same height as the total mark on the left vertical axis.

4) Draw a bar chart to depict the magnitude of effect. Using the units on the left vertical axis as a guide, draw a solid bar to represent the magnitude of contribution for each category on the horizontal axis.

5) Draw a line graph of the cumulative percentage, beginning in the lower left corner of the graph (the "0" point) and ending at 100% in the upper right.

6) Annotate the diagram to indicate the cumulative percentage associated with the "vital few" (for example, circle or draw an arrow to the first three error types that account for 75% to 80% of all errors).

Example: Data Table and Pareto Chart
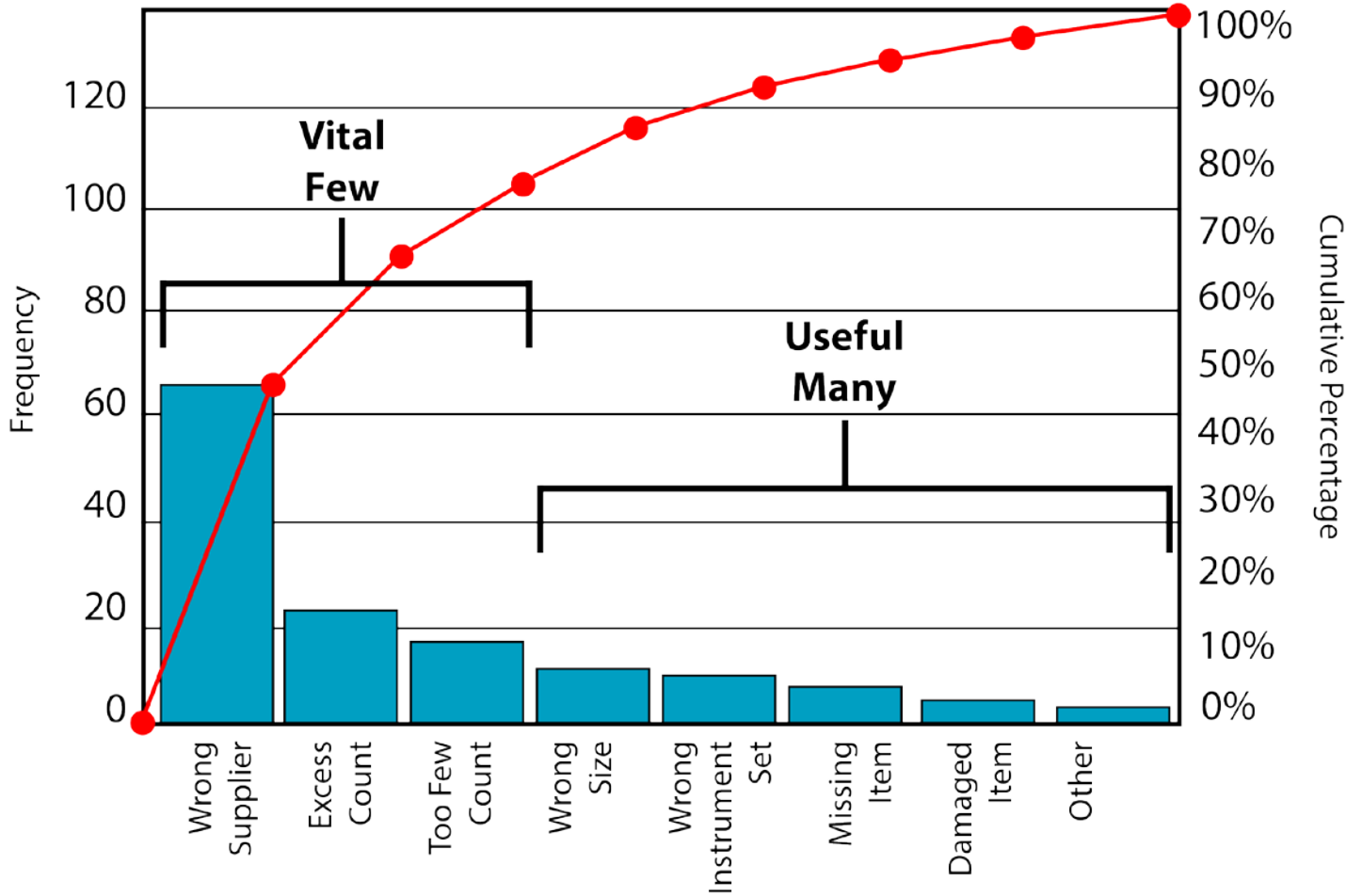
Errors During Surgical Set-up

One team used Pareto analysis to identify the "vital few" factors that contributed to errors during surgical setup. The team identified eight **types** of surgical set-up errors, and collected data on the **frequency** of each type (see table). They calculated the **percentage** of the total effect for each error type, then listed error types in order from largest to smallest effect. Finally, they calculated the **cumulative percentage** of effect.

When the team displayed this data in a Pareto chart, they discovered that **three types of errors accounted for 75% of all errors**. Instead of working on all error types, the team decided to focus its efforts on these three "vital few" error types — Wrong Supplier, Excess Count, and Too Few Count — because together they account for roughly 80% of the problem.

Data Table: Types of Errors Discovered During Surgical Set-up

Error Type	Frequency	Percent	Cumulative %
Wrong Supplier	67	46.5	46.5
Excess Count	24	16.7	63.2
Too Few Count	17	11.8	75
Wrong Size	10	6.9	81.9
Wrong Sterile Instrument Set	10	6.9	88.8
Missing Item	8	5.6	94.4
Damaged Item	6	4.2	98.6
Other	2	1.4	100
TOTAL	**144**	**100**	

Pareto Chart: Types of Errors Discovered During Surgical Set-up

Before filling out the template, first save the file on your computer. Then open and use that version of the tool. Otherwise, your changes will not be saved.

Template: Data Table and Pareto Chart

Contributing Factor	Frequency	Percent	Cumulative %
TOTAL			

Vital Few

Useful Many

Frequency

Cumulative Percentage

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

Contributing Factors