![Institute for Healthcare Improvement]

QI Essentials Toolkit:
Histogram

Often, summary statistics alone do not give a complete and informative picture of the performance of a process. A histogram is a special type of bar chart used to display the variation in continuous data like time, weight, size, or temperature.

A histogram enables a team to recognize and analyze patterns in data that are not apparent simply by looking at a table of data, or by finding the average or median.

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

1) Collect continuous data (time, weight, size, or temperature).

2) Sort and tally individual values in the data set and determine the high and low values (for example, 1 and 20 days, in the sample histogram on the next page).

3) Choose a cell width (for example, 2 days, in the sample histogram) that divides the range into 6 to 12 categories of equal width. Favor narrower cells, or choices that highlight gaps in the data.

4) Determine the cell boundaries.

   o Choose a convenient starting point at, or below, the lowest value.

   o Be consistent in handling values that fall on the boundaries (put all boundary values in next higher cell).

5) Tally number of observations in each cell.

   o Check total tally.

6) Draw and provide clear labels on axes.

   o The vertical axis is frequency; the horizontal axis is the variable being analyzed.

7) Draw bars to represent number of data values in cell. Adjacent bars should touch.

8) Title the chart, indicate total number of data values, and show any standards and limits.

9) Analyze and develop explanations for the pattern.

Example: Histogram

One team used histogram analysis to understand the patterns of variation in electrocardiogram (EKG) turnaround time. The team gathered data on EKG turnaround time in days, collecting 32 data points (see data table). The average turnaround time was 8.3 days, which revealed relatively little about the performance of the process. To get a better understanding of the data, the team then sorted the data, tallying the number of data points in each of 10 categories: 1-2 days, 3-4 days, and so on. The team then displayed the data in a histogram. The histogram provided the team valuable new information about the distribution of EKG turnaround times: the vast majority of turnaround times fall in the 1- to 2-day range, with a smaller clump in the 7- to 10-day range, and a third clump in the 13- to 20-day range.
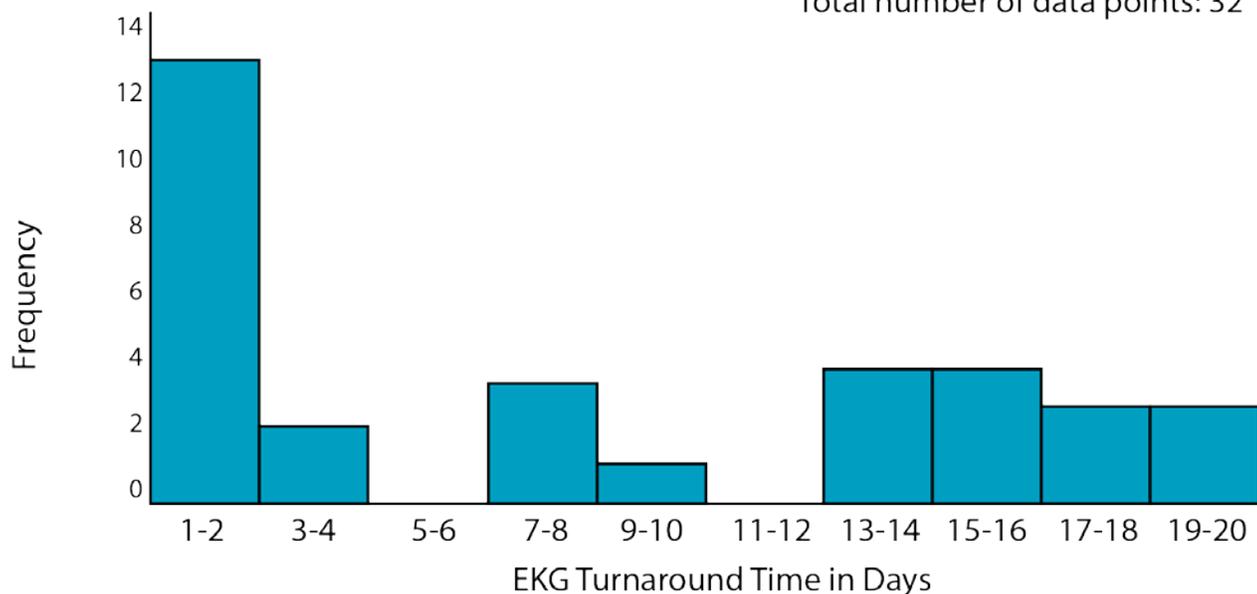
Sample Data Table: EKG Turnaround Time

EKG Turnaround Time in Days

9	16	1	4
15	8	13	1
13	16	14	17
7	2	20	2
2	2	18	3
1	1	2	7
1	2	15	2

Average = 8.3 Days

Sample Histogram: EKG Turnaround Time

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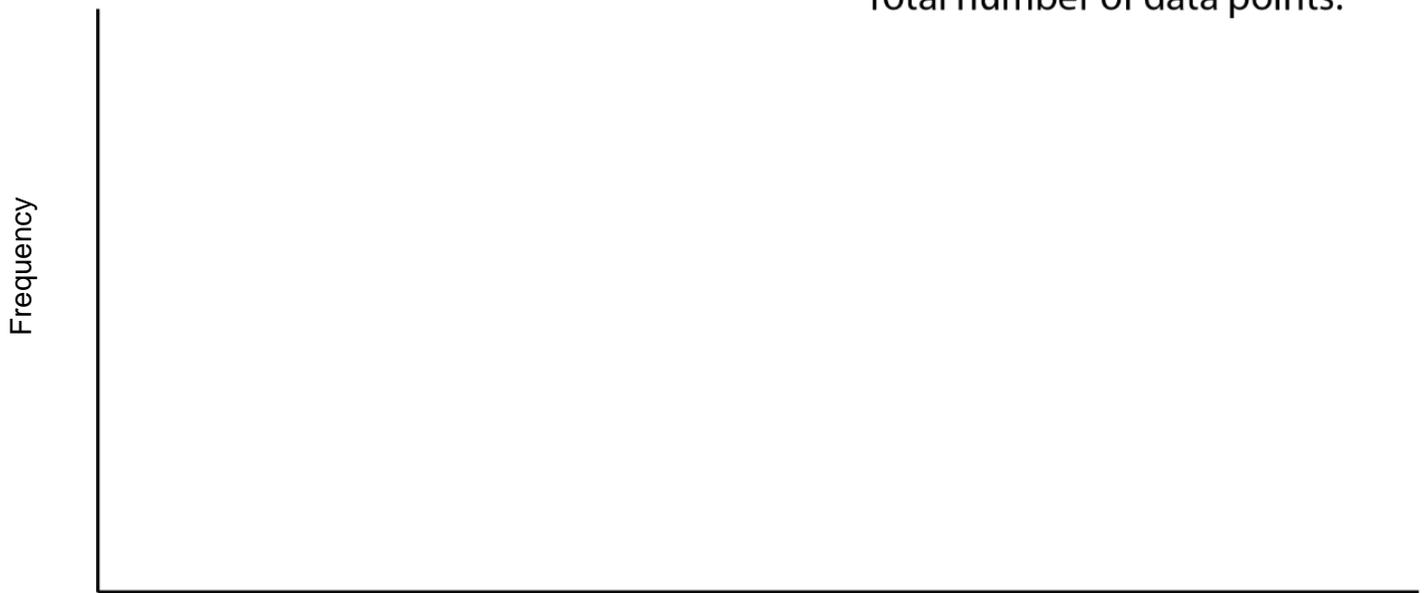
Template: Data Table & Histogram

Data Table

Histogram

Total number of data points:

Frequency

Variable You Are Analyzing