Run Chart Guide

A run chart is used to determine if time-series data displays signal special cause variation or common-cause variation.

TERMINOLOGY

- **RUN**: one or more data points on same side of median line

- **MEDIAN LINE**: straight line across the chart at the median value for that set of numbers

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RULES

1) **ASTRONOMICAL POINT**: an obviously different point; an outlier

   Every set of numbers has a highest and lowest value. Just being highest or lowest in the set does **not** make a data point astronomical.

2) **SHIFT**: six points in a row on the same side of the median line (aka center line)

   Points *on the centerline* do not cancel out, nor do they contribute to the count towards a shift.

3) **TREND**: five points in a row headed in the same direction (positive/negative)

   Consecutive points with the *same value* do not stop the count towards a trend, nor do they contribute to it.

4) **TOO MANY** OR **TOO FEW**: the number of runs above or below an *acceptable range* (refer to chart).

   Circle all the runs on the chart, then use the table on the next page to determine if the number of runs counted is outside the normal range for the total number of observations in your data set.
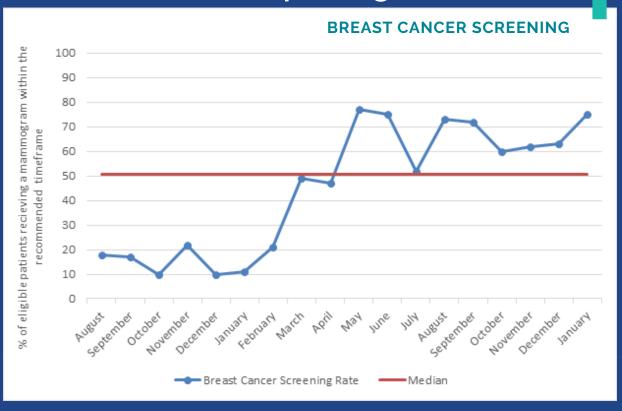
Expected Runs Table

Use this table to determine if the number of runs counted in your data set fall outside of the expected range.

Useful Obser.	Lower # Runs	Upper # Runs	Useful Obser.	Lower # Runs	Upper # Runs	Useful Obser.	Lower # Runs	Upper # Runs	Useful Obser.	Lower # Runs	Upper # Runs
10	3	9	23	7	17	36	13	25	49	19	32
11	3	10	24	8	18	37	13	25	50	19	33
12	3	11	25	8	18	38	14	26	51	20	33
13	4	11	26	9	19	39	14	26	52	20	34
14	4	12	27	10	19	40	15	27	53	21	34
15	5	12	28	10	20	41	15	27	54	21	35
16	5	13	29	10	20	42	16	28	55	22	35
17	5	13	30	11	21	43	16	28	56	22	36
18	6	14	31	11	22	44	17	29	57	23	36
19	6	15	32	11	23	45	17	30	58	23	37
20	6	16	33	12	23	46	17	31	59	24	38
21	7	16	34	12	24	47	18	31	60	24	38
22	7	17	35	12	24	48	18	32			

Expected Runs Table: Count useful observations only – Ignore points on median!

Source: Provost LP, Murray S. *The Health Care Data Guide: Learning from Data for Improvement.* San Francisco, California: Jossey-Bass; 2011.

Interpreting Run Charts **1**

BREAST CANCER SCREENING

By just eye-balling the run chart (don't apply the rules yet),

1. Are we observing common-cause or special-cause variation?   1.

2. Is their evidence of improvement?   2.

Apply the run chart rules.

1. Is there a shift in the data?   1.

2. Is there a trend?   2.

3. Is there an astronomical point? If yes, which point?   3.
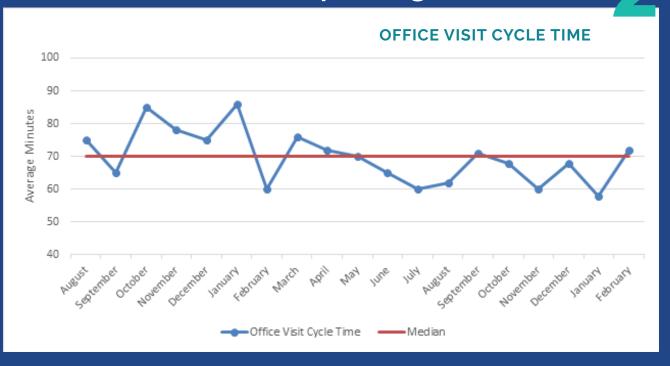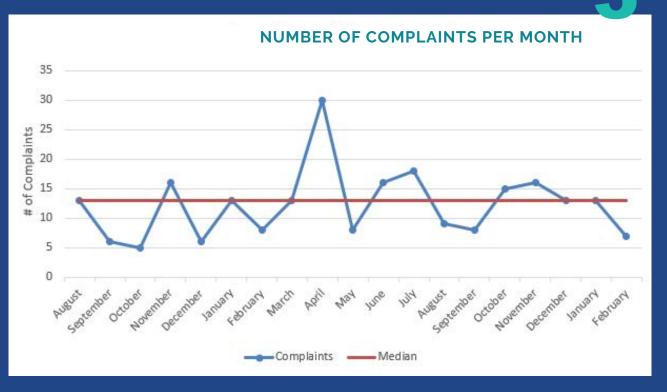
4. Are there too many or too few runs?   4.

Using the run chart rules,

1. Are we observing common-cause or special-cause variation?   1.

2. Is there evidence of improvement?   2.

Did your interpretation of the data change after applying the run chart rules?

Interpreting Run Charts 2

OFFICE VISIT CYCLE TIME

By just eye-balling the run chart (don't apply the rules yet),

1. Are we observing common-cause or special-cause variation?	1.
2. Is their evidence of improvement?	2.

Apply the run chart rules.

1. Is there a shift in the data?	1.
2. Is there a trend?	2.
3. Is there an astronomical point? If yes, which point?	3.
4. Are there too many or too few runs?	4.

Using the run chart rules,

1. Are we observing common-cause or special-cause variation?	1.
2. Is there evidence of improvement?	2.

Did your interpretation of the data change after applying the run chart rules?

Interpreting Run Charts **3**

NUMBER OF COMPLAINTS PER MONTH

By just eye-balling the run chart (don't apply the rules yet),

1. Are we observing common-cause or special-cause variation?	1.
2. Is their evidence of improvement?	2.

Apply the run chart rules.

1. Is there a shift in the data?	1.
2. Is there a trend?	2.
3. Is there an astronomical point? If yes, which point?	3.
4. Are there too many or too few runs?	4.

Using the run chart rules,

1. Are we observing common-cause or special-cause variation?	1.
2. Is there evidence of improvement?	2.

Did your interpretation of the data change after applying the run chart rules?

Answer key: All examples display instances of special-cause variantion: 1) shift and too many, too few; 2) trend; 3) astronomical point.

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