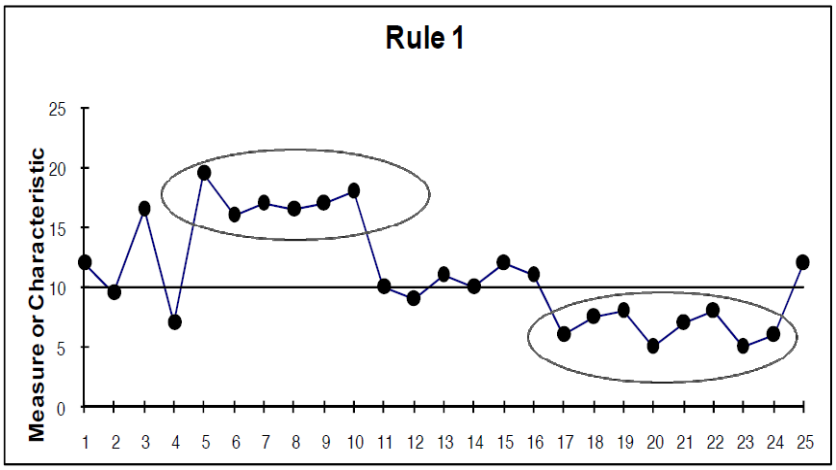
Run Chart Rules for Interpretation

This guide is paraphrased from Lloyd & Provost (2011): *The Health Care Data Guide – Learning from Data for Improvement,* Chapter 3 and from http://www.knowledge.scot.nhs.uk/media/CLT/ResourceUploads/1006891/Good_Practice_Guide_Data_Management_run_chart_rules.pdf

There are four rules that can be applied to a run chart to help determine whether or not the variation within the dataset is due to the random variation typical of performance of that process, or due to non-random attributable change in the process:

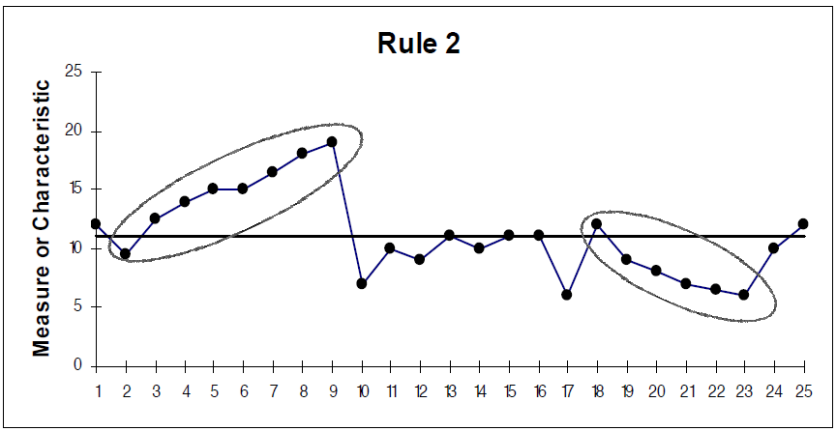
Rule One – A Shift

A shift on a run chart is **six** or more consecutive points either all above or all below the median. Values that fall on the median do not add to nor break a shift. Skip values that fall on the median and continue counting. This rule is based on statistical probability. For example, for an event with two possible outcomes, where each outcome is likely to happen 50% of the time, the probability of the same outcome occurring six times in a row is less than 3 in 1000. Therefore the change is likely to be attributable to something, and not the result of random variation within a process.



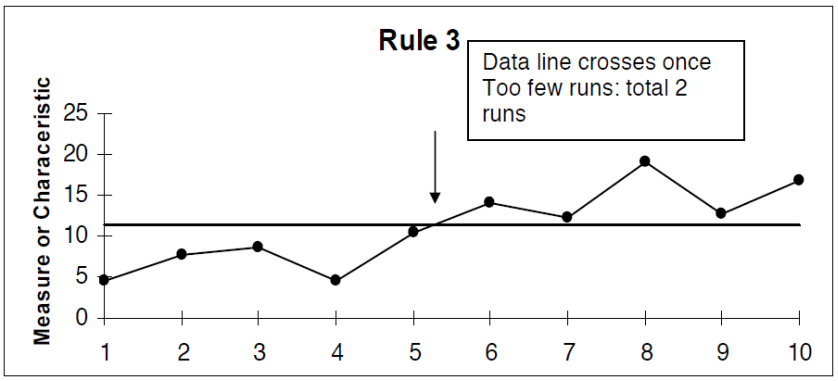
Rule Two - Trend

A trend on a run chart is **five** or more consecutive points all going up or all going down. If the value of two or more successive points is the same, ignore one of the points when counting. Like values do not make or break a trend.



Rule Three - Runs

A run is a series of points in a row on one side of the median. A non-random pattern or signal of change is indicated by too few or too many runs or crossings of the median line. To determine the number of runs above and below the median, count the number of times the data line crosses the median and add one. Statistically significant change is signalled by too few or too many runs, again calculated using statistical probability.



This table is used in conjunction with this rule to identify the lower and upper limit for the number of runs depending on the number of data points you have:

Tests for Number of Runs Above and Below the Median

Number of Data Points	Lower Limit for Number of Runs	Upper Limit for Number of Runs	Number of Data Points	Lower Limit for Number of Runs	Upper Limit for Number of Runs
10	3	8	34	12	23
11	3	9	35	13	23
12	3	10	36	13	24
13	4	10	37	13	25
14	4	11	38	14	25
15	4	12	39	14	26
16	5	12	40	15	26
17	5	13	41	16	26
18	6	13	42	16	27
19	6	14	43	17	27
20	6	15	44	17	28
21	7	15	45	17	29
22	7	16	46	17	30
23	8	16	47	18	30
24	8	17	48	18	31
25	9	17	49	19	31
26	9	18	50	19	32
27	9	19	60	24	37
28	10	19	70	28	43
29	10	20	80	33	48
30	11	20	90	37	54
31	11	21	100	42	59
32	11	22	110	46	65
33	11	22	120	51	70

Rule Four – Astronomical Point

This rule aids in detecting unusually large or small numbers. They are characterised by data points that are obviously, or even blatantly different from all or most of the other values, and anyone studying the chart would agree that is unusual. Note that every data set will have a highest and lowest data point, however this does not mean the high and low are astronomical.