

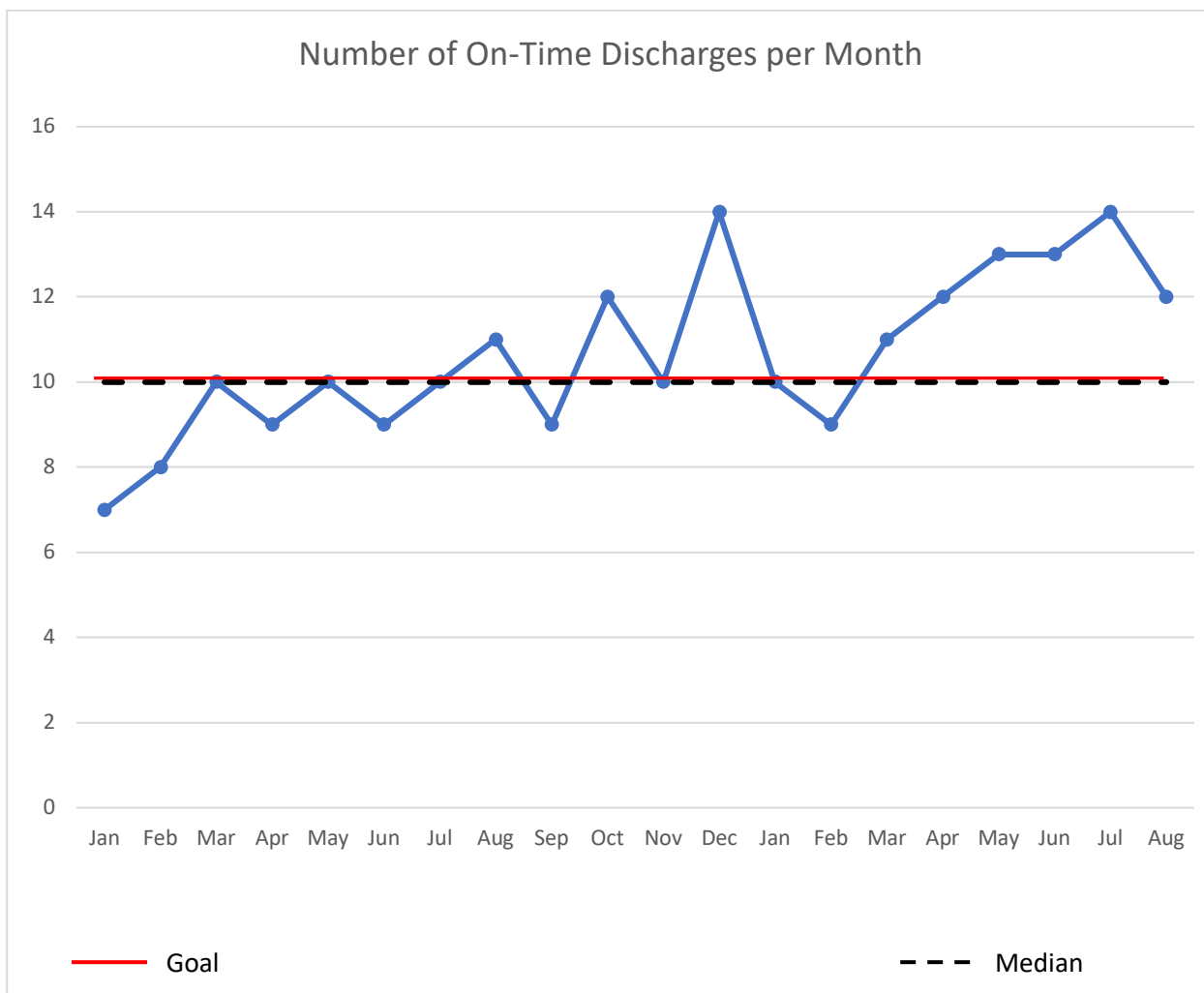
Run Charts

Run charts are simple displays of data that improve your ability to analyze and communicate your data. Run charts allow you to:

- Visualize the performance of your process
- Determine whether changes you made to your process resulted in an improvement
- Determine whether improvements introduced to your process are sustained

Constructing a Run Chart

1. After choosing the question your Run Chart will answer, choose an appropriate time interval for the horizontal axis and scale for the vertical axis. A well-designed Run Chart is easy to read and gives insights into the data just based on visual inspection.
2. Plot your data points on your pre-determined axes.
3. Add a line representing the **median** of your data.
4. Add labels, title, and (if desired) a line for your aim or goal.





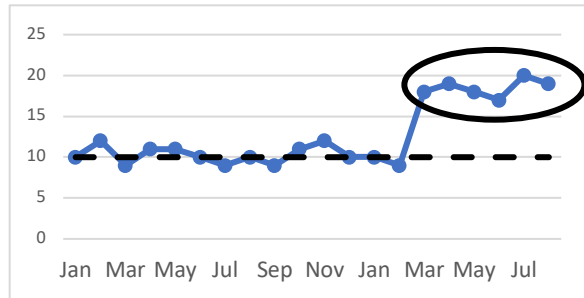
Signals of Non-Random (Meaningful) Change

These tests of the data in a Run Chart can aid in interpreting whether a non-random change has occurred in your data if it is not obvious upon initial visual inspection.

Probability of <5% ($p=0.05$) of occurring by chance

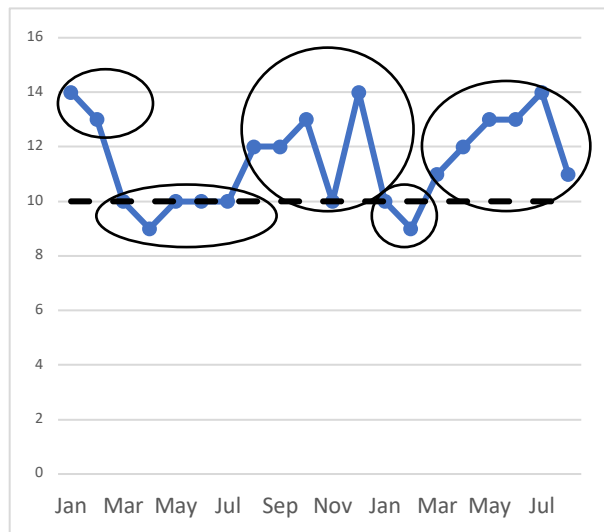
Shifts

Six or more consecutive points all above or all below the median ($p = 0.03$ for 6 points)



Runs

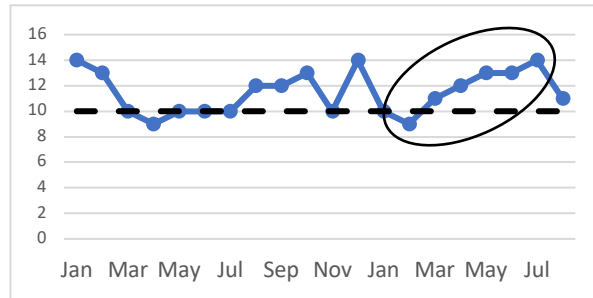
A run is a series of points on one side of the median. The trendline must cross the median before a new run begins. You can quickly calculate the number of runs by counting the number of times the trendline crosses the median and adding one. The number of runs in a series should be between a lower and upper limit determined by the number of data points in the data set. Any more, or any fewer, and the series is likely to be non-random. See next page for a reference table on upper and lower limits.



Aids in visual inspection and interpretation, not based on statistical probabilities

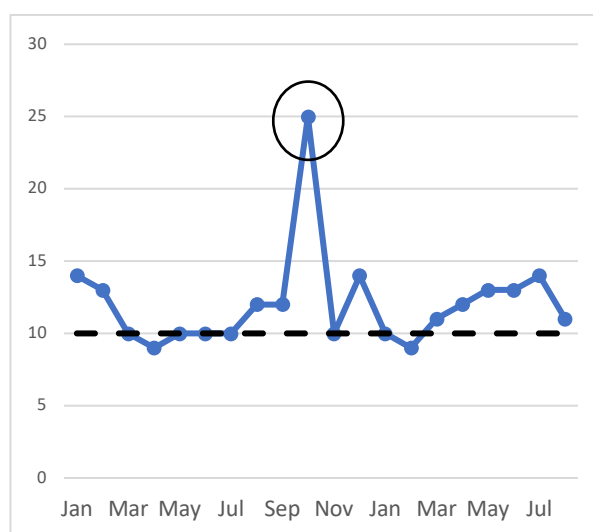
Trends

Five or more consecutive points all increasing or decreasing



Astronomical Data Points

Data points that are obviously outside of normal variation. As a general rule, seek consensus from the team to determine whether a point is "astronomical" or just the high or low point in the data set.





Total Number of Data Points on Run Chart Not Falling on Median	Lower Limit of Number of Runs	Upper Limit for Number of Runs
10	3	9
11	3	10
12	3	11
13	4	11
14	4	12
15	5	12
16	5	13
17	5	13
18	6	14
19	6	15
20	6	16
21	7	16
22	7	17
23	7	17
24	8	18
25	8	18
26	9	19
27	10	19
28	10	20
29	10	20
30	11	21
31	11	22
32	11	23
33	12	23
34	12	24
35	12	24
36	13	25
37	13	25
38	14	26
39	14	26
40	15	27
41	15	27
42	16	28
43	16	28
44	17	29
45	17	30
46	17	31
47	18	31
48	18	32
49	19	32
50	19	33
51	20	33
52	20	34
53	21	34
54	21	35
55	22	35
56	22	36
57	23	36
58	23	37
59	24	38
60	24	38