

Quality improvement for General Practice

A guide for GPs and the whole practice team

The Royal College of General Practitioners (RCGP) has published *Quality improvement for General Practice: A guide for GPs and the whole practice team*. Designed with the busy primary care professional in mind, the guide details a range of straightforward quality improvement (QI) techniques that will see you and your team through a cycle of improvement time after time.

This paper offers practical guidance on using run charts, one of a range of helpful tools described in the RCGP QI Guide.

RUN CHARTS

Run charts help you to analyse any numerical data gathered to see whether a new initiative results in an improvement and whether the improvement is sustained over time.

There are many ways of analysing data. Run charts are useful when looking at data that varies from day-to-day (e.g. the number of days to the next routine appointment or the number of 'extra' patients seen each day). The charts enable you to study the variation and identify times when things appear to be 'out of the ordinary'.

The following fictional QI project shows how a run chart can be used to analyse the data.

Run chart example project – Reducing the number of 'extra' patients seen each day

Every practice has to deal with patients who need to be seen on the same day once all the routine and urgent appointments have been filled. For the purposes of this example these are called 'extras'.

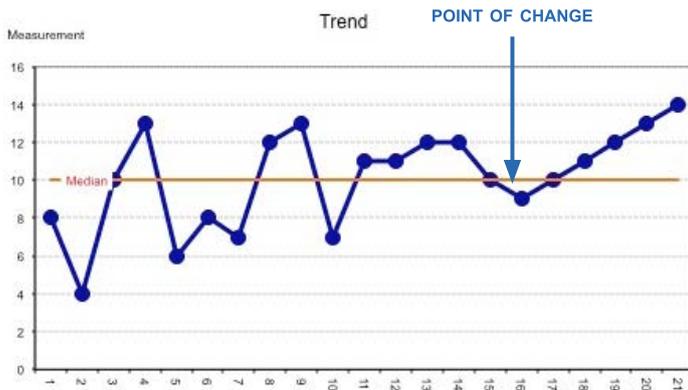
Unpredicted peaks in the number of extras seen can cause stress for GPs and their staff, as well as leaving less time for other important work. The example practice would like to study the number of extras. They want to understand the existing variation over time before they experiment with new ways of doing things.

Inputting the data into a spreadsheet to create a run chart

All that is needed to create a run chart is a basic knowledge of MS Excel and a look at the useful tips described below. However, to make this even easier, the Institute for Healthcare Improvement USA (IHI), has created an [Excel template](#)¹. To access this template you will need to register with the IHI, but this is free and straightforward. It is best to gather at least 15 days of data before constructing your chart. In our example, the lead receptionist gathers data about the number of extra patients seen over 20 working days. This is inputted into the IHI spreadsheet: dates in the left-hand column and the numbers seen in the 'value' column.

1. Scoville, R. Run Chart Excel Template. *Run Chart Tool*. Cambridge, MA: Institute for Healthcare Improvement. <http://www.ihi.org/resources/Pages/Tools/RunChart.aspx> [accessed 28 May 2015].

Rule 2



A trend has five or more data points ascending or descending. The trend may cross the median and data points on either side of the median should be counted. For this rule, if two or more points are the same, only count as one. In the example above, there is a trend occurring just after the change.

Counting runs

A run is a set of points that are on one side of the median. You can calculate the number of runs by counting the times the line crosses the median and adding one.

Rule 3



Too many or too few runs. In the example above, there are 14 data points that are not on the median but only two runs, which are too few runs for the number of data points. This is explained in more detail in the next section. No 'change' is marked on this chart because it illustrates baseline data collected before any intervention has been trialed.

Expected number of runs

If your data is random, there is an expected lower and upper limit of runs you should see for the number of data points collected, illustrated by the expected number of runs table below. Too few or too many runs may mean your process is already changing. This will make it hard to know if your project is successful and will require investigation before you embark on your project.

Figure 21: Expected number of runs table³

Number of observations / data points not falling on the median	Lower limit for number of runs	Upper limit for number of runs	Number of observations / data points not falling on median	Lower limit for number of runs	Upper limit for number of runs
15	4	12	30	11	20
16	5	12	31	11	21
17	5	13	32	12	22
18	6	13	33	12	22
19	6	14	34	12	23
20	6	15	35	13	23
21	7	15	36	13	24
22	7	16	37	13	25
23	8	16	38	14	25
24	8	17	39	14	26
25	9	17	40	15	26
26	9	18	41	16	27
27	9	19	42	17	28
28	10	18	44	18	30
29	10	20	46	19	31

In our example, the number of data points will be the number of days surveyed, which was 20 days. If we look at the table, for 20 data points we should expect between six to 15 runs if the data is random. Our example has 11 runs with no shifts or trends and so it does seem to be random variation.

What next?

The practice has now gathered its baseline data and decided that the variation is random. They would like to reduce the number of extras seen in the surgery.

The first experiment is a GP telephone triage of all requests for same-day appointments. This involves significant change to the working day for the GPs and has the potential for fewer routine appointments to be made with them. However, it is seen by the practice as an experiment and they are confident that the run chart will help them to see if it makes a difference.

They continue to gather the data and input it into the spreadsheet:

Figure 5: Data for 'extras seen' (post-change)

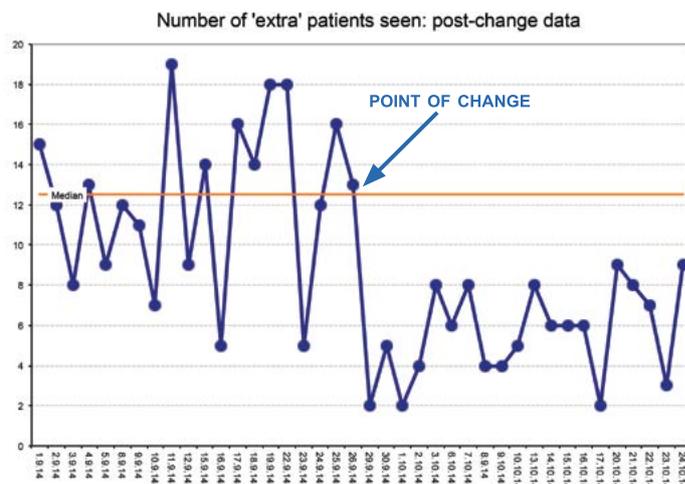
Date / Observation	Value	Median	Goal	End Median
1.9.14	15	12		
2.9.14	12	12		
3.9.14	8	12		
4.9.14	13	12		
5.9.14	9	12		
8.9.14	12	12		
9.9.14	11	12		
10.9.14	7	12		
11.9.14	19	12		
12.9.14	9	12		
15.9.14	9	12		
16.9.14	14	12		
17.9.14	5	12		
18.9.14	16	12		
19.9.14	14	12		
22.9.14	18	12		
23.9.14	18	12		
24.9.14	5	12		
25.9.14	12	12	x	
26.9.14	16	12		
29.9.14	13	12		

Mark with an 'X' the last number from the baseline data. This 'freezes' the median. Everything after this point came following the introduction of GP telephone triage for same-day appointment requests ('the intervention').

So what happened?

Here is the chart that was created by the IHI Excel template once the new data was inputted:

Figure 6: Run chart for 'extras seen' (post-change)



This graph shows that all the data points collected after the intervention fall on one side of the median. There is only one run after the intervention and there has been a definite shift (more than six points consecutively on one side of the median). As the shift coincided with the intervention, it suggests to the team that the intervention has generated a change.

Further information

If you are interested in finding out more, then the Health Service Executive (Ireland) provides useful guidance⁴ which covers:

- how to check for 'special cause variation'
- how to use 'statistical control lines' to spot when something odd is happening
- the limitations of run charts.

4. *Measurement and improvement: Guidance note on key concepts.* Produced for the Pressure Ulcers to Zero collaborative, Dublin North East region, part of the National Quality Improvement Programme, supported by the Health Service Executive, Ireland, and the Royal College of Physicians Ireland. http://www.hse.ie/eng/about/Who/qualityandpatientsafety/safepatientcare/Pressure_Ulcers/Pressure_Ulcer_Information/Measure_and_Improvement_Guidance_Document.pdf