QI in CITY & HACKNEY FACTSHEET 7 - Key Points on Quality Improvement Methodology – *Jen Taylor-Watt, Improvement Advisor*

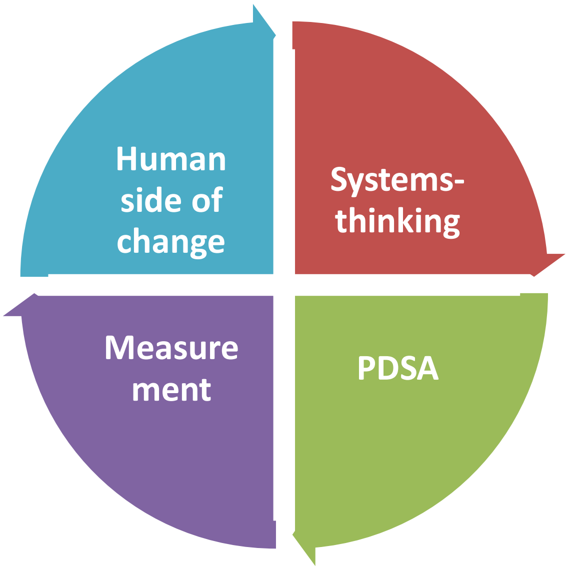
QI involves 4 key dimensions, as shown in the diagram, which connect with each other:

1. Understanding that the services we work in are interconnected and complicated systems,

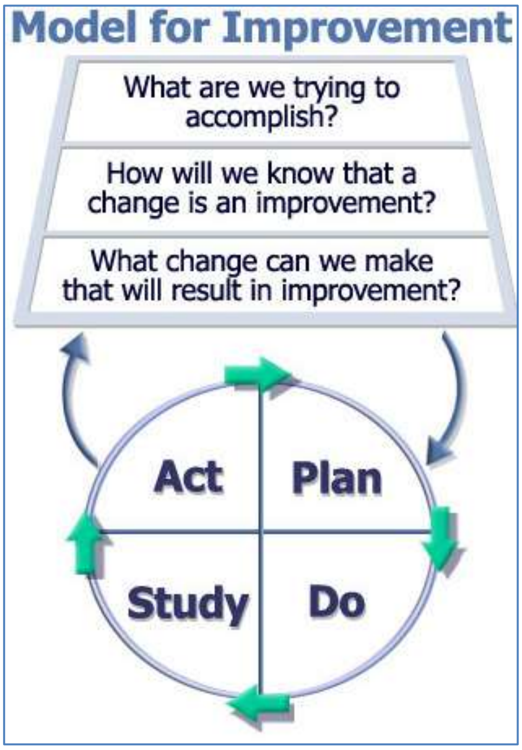
2. Using quick testing and learning in order to develop our understanding of what might help to improve the system (Plan, Do, Study, Act, or PDSA, cycles)

3. Having a robust system of measurement, using data over time, in order to know whether you are seeing improvement and

4. Understanding and working with the human side of change



The Model for Improvement



At ELFT we use a particular model that brings these ideas together called the Model for Improvement (MFI). This is the model developed by the Institute for Healthcare Improvement (IHI), mentioned earlier.

As shown in the diagram, the model includes 3 guiding questions, the first two of which, you need to have a clear answer to when you start your project.

Firstly, you need to develop a clear aim, in order to focus your project, through answering the question *What am I trying to accomplish?*

In order to know whether you achieve your aim, you also need to develop a measurement system: *How will I know that a change is an improvement?*

Unlike a lot of change in healthcare, which goes unmeasured - and therefore means we don't know whether changes have actually improved things in the system - an essential part of QI and the MFI is developing measures that can give us this understanding. This is really important so we don't commit time and resource to spreading ideas, which have no impact – or even worse - a negative impact on the broader system. Unfortunately this happens a lot within healthcare when quality improvement principles are not used, wasting resource and destabilising systems.

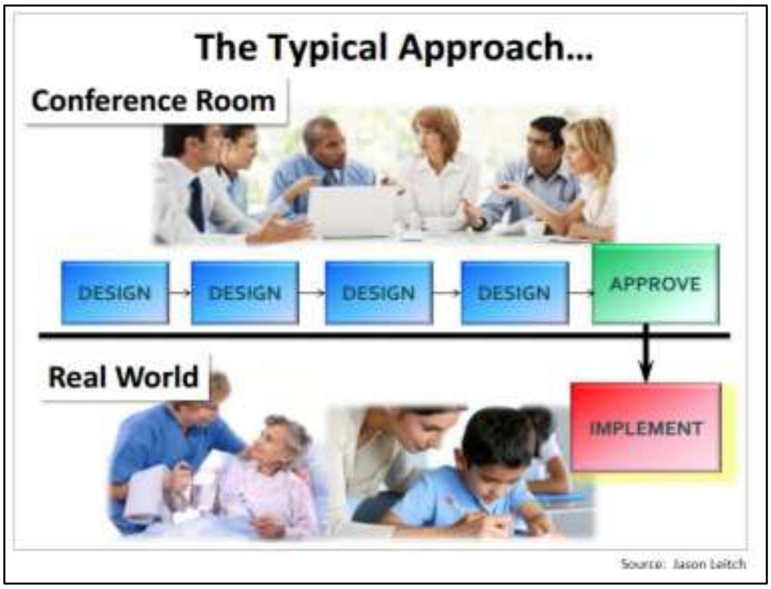
The Model for Improvement also includes a third question regarding *What changes can we make that will result in improvement?* As you take forwards your project, you will use the tools and techniques of quality improvement to help understand your problem and build your theory of change around what is driving your issue and what might help to make a difference. So, you may not have an answer to this third question at the start of your project, but this will develop as you progress things.

Plan, Do, Study, Act – PDSA - cycles

Finally the bottom of the Model for Improvement shows the PDSA cycle, which is core to how we progress QI and can be described as 'the engine' of QI projects. It is this which sets QI work apart from how we've tended to approach resolving issues in the past.

The slides below, courtesy of Scotland's National Clinical Director and QI expert, Jason Leitch, illustrate this and why we need PDSA…

Historically when we've needed to address an issue and improve something in healthcare, there has been a tendency to sit apart for the real world, perhaps in a conference room within provider Trusts – or sometimes even within an entirely different layer of organisation that oversees providers – to come up with 'the answer' to the problem. All the time is spent away from the frontline analysing, thinking and designing the solution and then once this is arrived at, it is implemented and everyone affected is told to change their ways of working and adopt the new practice.



In contrast, Quality Improvement understands that there is a fundamental problem in this approach, in that, if you are dealing with a complex problem, you cannot possibly know the answers when you are apart from the real world.

Instead, you need the opportunity to explore your issue in depth, to develop theories around what might make a difference, and to be able to test these theories, small-scale, in the real world to find out if you've got them right.

You then need to expand these tests to check that the idea works under different conditions (e.g. when used by different team members, on different days of the week, etc), and make any adjustments that are needed. This testing and learning is our PDSA cycles.

Driver Diagrams & more on aims, drivers and change ideas

It's helpful to have your project strategy available to everyone involved in the project in a simple format. For this, we use what we call Driver Diagrams, which summarise things on one page. The key elements of driver diagrams are:

Project Aim

- Shown on the far left
- Like with other areas of strategy development beyond QI, aims need to be SMART: specific, measurable, achievable, relevant and time-bound. They need to make clear *How good?* you want to be and *By when?*
- Note, you may need to work with what we call a 'concept aim' initially, whilst you work out your measurement system, which can take some time, particularly if your project is focused on measuring service user experience. For example the Gold Standards Project team knew they wanted *to improve service users' experience of the ward environment*. This is an 'concept aim' rather than a fully workable aim, because it doesn't fulfil the SMART criteria; particularly, it isn't specific and measurable, nor is it time bound. As you read in Box 5, this project had to do a lot of consultation to understand what was important to service users and what would comprise a good experience of the ward environment. Once the team had done that, and developed a measurement system, involving a 10 part survey, they were able to capture a baseline and set a SMART aim.

Drivers

- These are the forces or factors that your team believes will contribute to improvement in your issue. These are split into Primary Drivers and Secondary Drivers. Primary Drivers are the big buckets of factors, which are usually made up of a number of components, called secondary drivers.

- Drivers need to be framed positively, although when developing drivers, sometimes it can be helpful to think about “What are the factors that contribute to this problem?” (usually using Nominal Group Technique with your whole team and service users/carers). If you use this approach they need to be flipped around so that they are positive on a driver diagram

Change Ideas

- Change ideas are different from drivers in that they are tangible ideas for things we could do differently, rather than factors or forces. They connect very much with drivers though, in that they should be ideas which can help you realise and/or strengthen the driving forces that you believe will help you achieve your aim. A test which often works for determining a driver from a change ideas is *could we actually do this next week?* If not, your idea probably needs a bit more development by the team to make it something tangible. Some examples are below

Driver	Change Idea
Access to information & educational materials	➡ Scope community resources and create a library on the ward
Improve communication across the team	➡ Introduce a team huddle in the morning

Measurement

At the outset, it is important to emphasise that, like the rest of this methodology section, there is limited detail provided here on measurement. This is a particularly big, and probably a bit more complicated, area of QI, so it is really important that you are properly supported to understand how we use data to know if you are seeing improvement. See section 3 on training to find out how to access QI training courses, if you haven’t done one already. Some key fundamentals, though, to keep in mind:

Family of measures

One measure will not be enough to know whether you are seeing improvement and what is resulting in improvement. Instead you need to identify 3 types of measures to help you do this:

Outcome Measures: Measures that tells us whether the aim is being achieved

Process Measures: Measures the things you are changing to try to achieve improvement

Balancing Measures: Measures of what happened to the system as we improved the outcome and process.

These are important to picking up if there are any unanticipated consequences from making changes; for example we don’t want to achieve reductions in length of stay on inpatient wards through experiencing an increase in the number of readmissions, so it’s important to keep an eye on this.

Data over time

Once you have your measures, then the way we look at them in QI is what is called "data over time". This is a particular type of statistics, called *analytical statistics*, which is used a lot in engineering and manufacturing industries to understand how their system is functioning. It is a completely different type of statistics from enumerative statistics, which is commonly used in research.

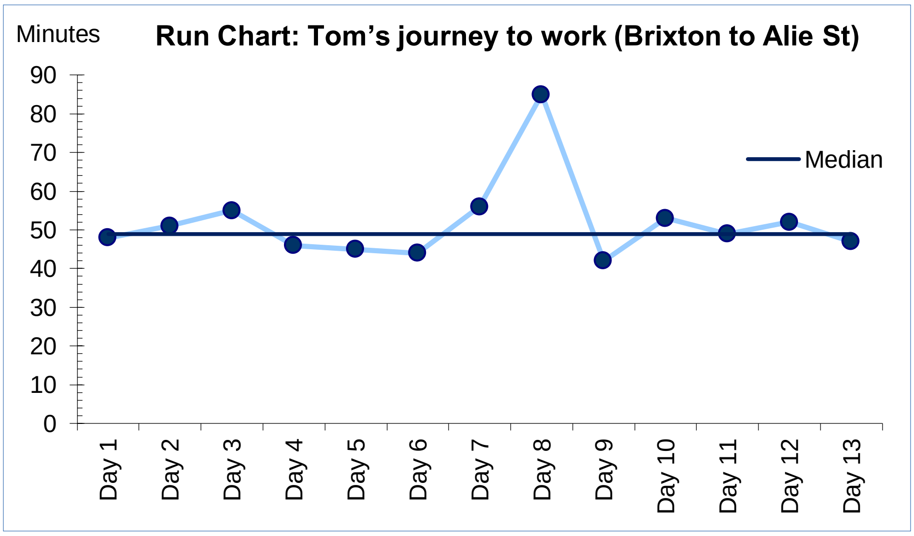
Those with a research background will be familiar with ideas from enumerative statistics, such as testing for significance, t-tests, p-values, etc. These tests are used to develop confidence in research findings, particularly in terms of how generalizable they are beyond the research trial to the broader population.

In contrast, Quality Improvement has a different focus, which is to improve the care our service users and their carers receive within a service, in terms of efficiency and effectiveness[1]. We are not focused on knowing whether improvements are generalisable to the broader population, rather we need to know whether we are seeing improvement in our service. The way we do this is using the rules of analytical statistics, which sit behind data over time.

Variation

Understanding data over time is about understanding the principles and rules of variation. If you think about it, all processes in life vary. For example, your journey to work will not be the same every day you do it. It is going to be affected by a whole range of factors, which are going to mean it varies.

Tom's journey to work from Brixton to Alie Street is shown in the figure below. *What do you think when you look at this data? Does anything stand out as looking a bit different?*



Tom's chart shows us that his journey to work varies from between about 42 minutes and 56 minutes, but on day 8 it took him 85 minutes.

[1] There are a number of other ways in which the aims and practice of Quality Improvement differs from research, as well as other ways in which we use data, like Assurance/Accountability processes (such as commissioning). For information on this, read the Health Care Data Guide, chapter X.

Do you think there might have been anything special about day 8 that resulted in this much longer length of time for his commute?

In fact, there was a specific reason that Tom's journey took 85 minutes on day 8 and that was because there was Tube strike, which meant Tom had to battle in to work via a combination of buses and walking.

This example illustrates the two types of variation we experience in any process. There is the normal variation that you just see in the general run of things in your system; in Tom's case the difference between 42 minutes and 56 minutes. This variation is sometimes called "random variation" or "common-cause variation"; i.e. it is occurring just because of the common causes in the normal system.

Then there are the times when something specific happens to affect the performance of the system – e.g. a tube strike. This type of variation is sometimes called "non-random" or "special cause", because it is not occurring just by chance, but because of something specific, or special.

As well as what we have seen in Tom's example, there are a number of other different rules we can use to identify if the patterns we are seeing in our data are non-random special causes; i.e. they are very unlikely to just be occurring by chance in the normal running of the system. These rules depend on the type of chart you are using to chart your data; Run Charts or the more sophisticated Control Charts (see further info below), and both sets of rules are provided in full in Appendix 1. If you have not yet had training in data over time, as part of Pocket QI or the Improvement Leaders Programme and are involved in a project, please get in touch with your Improvement Advisor or QI Coach to help you understand these.

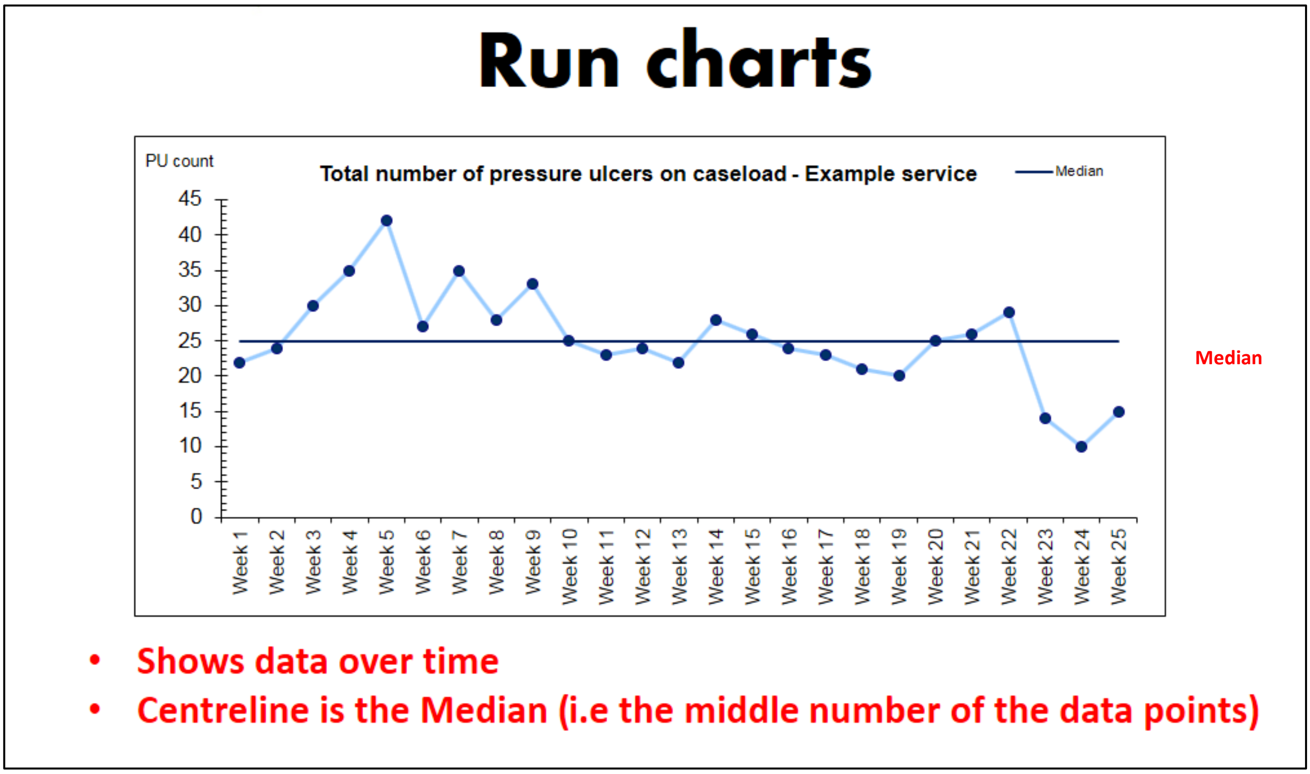
To provide an example of another rule in action, Box 6 has a summary of the CHAMHRAS Waiting Times project, showing an outcome measure *% of people seen within 28 days.* You can see the centreline showing the average has been moved a number of times on this chart. This is because we could see that performance had genuinely improved through there being 8 successive points all above the centreline on the chart.

The key point is you could get 7 points just due to chance, but not 8, so these 8 points are a sign that something has changed the system - in this case the work of the QI project. 8 points above or below the centreline on a Control Chart is one of the rules for detecting special cause variation called a shift.

Run Charts & Control Charts

As mentioned above, we use 2 different types of chart to understand data over time, as shown in the figure below and on the next page. As you can see, these look quite a lot like line charts, which you might be familiar with from school or elsewhere - but they have some important features which set them apart.

Run Charts are the simplest type of chart we use, and the thing which makes it a Run Chart is that we plot the *median*[2] of the points on the chart. Medians are a 'measure of central tendency' and it means we can look at how all the points of the chart are moving in relation to this centreline.



Control Charts, the more sophisticated type of charts are very similar, except for 2 key features:

Firstly, instead of plotting a median, we instead use a *mean*[3] as the measure of central tendency.

Secondly the mathematics behind the chart also enables us to calculate what are called 'control limits'. There are usually two control limits on a control chart, the *Upper Control Limit* and the *Lower Control Limit*. These are the dashed lines you can see above and below the centreline. *The Control Limits show you exactly what the extent of variation is that you can consider as normal in your process*. Any point falling outside these limits is a special cause.

A final point to note about Control Charts is that, unlike Run Charts, there are different types of chart that we use for different types of data. For example we use one type of chart for data which is a count of something, like violent incidents or pressure ulcers (C Chart), and a different type of chart for data which is showing a percentage, such as % DNAs (P Chart).

This is an advanced point and your QI Coach/Improvement Advisor is there to help you work out which type of Control Chart you need. A decision-making tool is also provided in the Appendix if you have already been taught this for reference.

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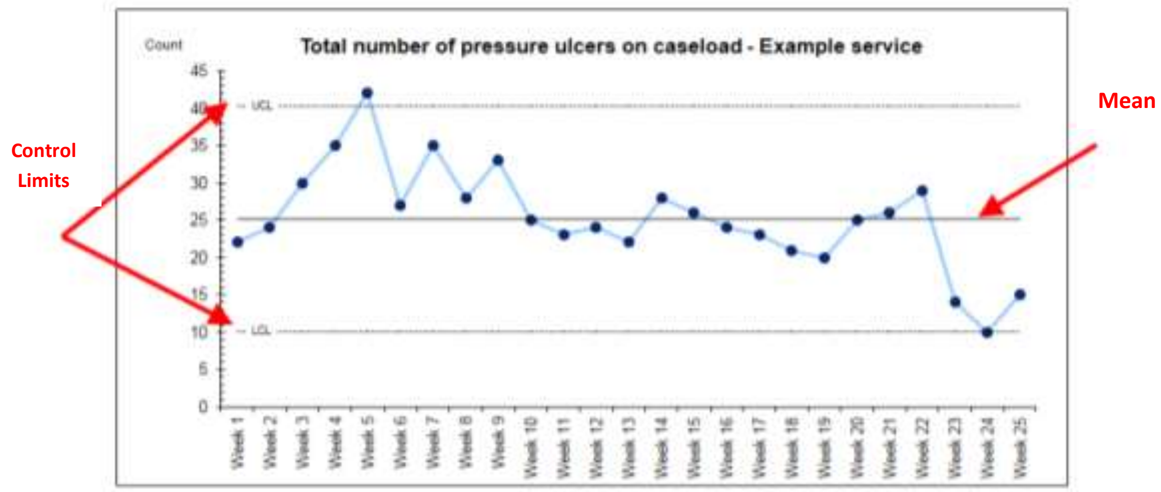
[2] The Median of a set of numbers is the central number when ordered in sequence and counting in from either end; so for example: 1, 3, 6, **7**, 9, 11, 14: 7 is the Median. If you have an even set of numbers, you work out the average of the middle 2 numbers.

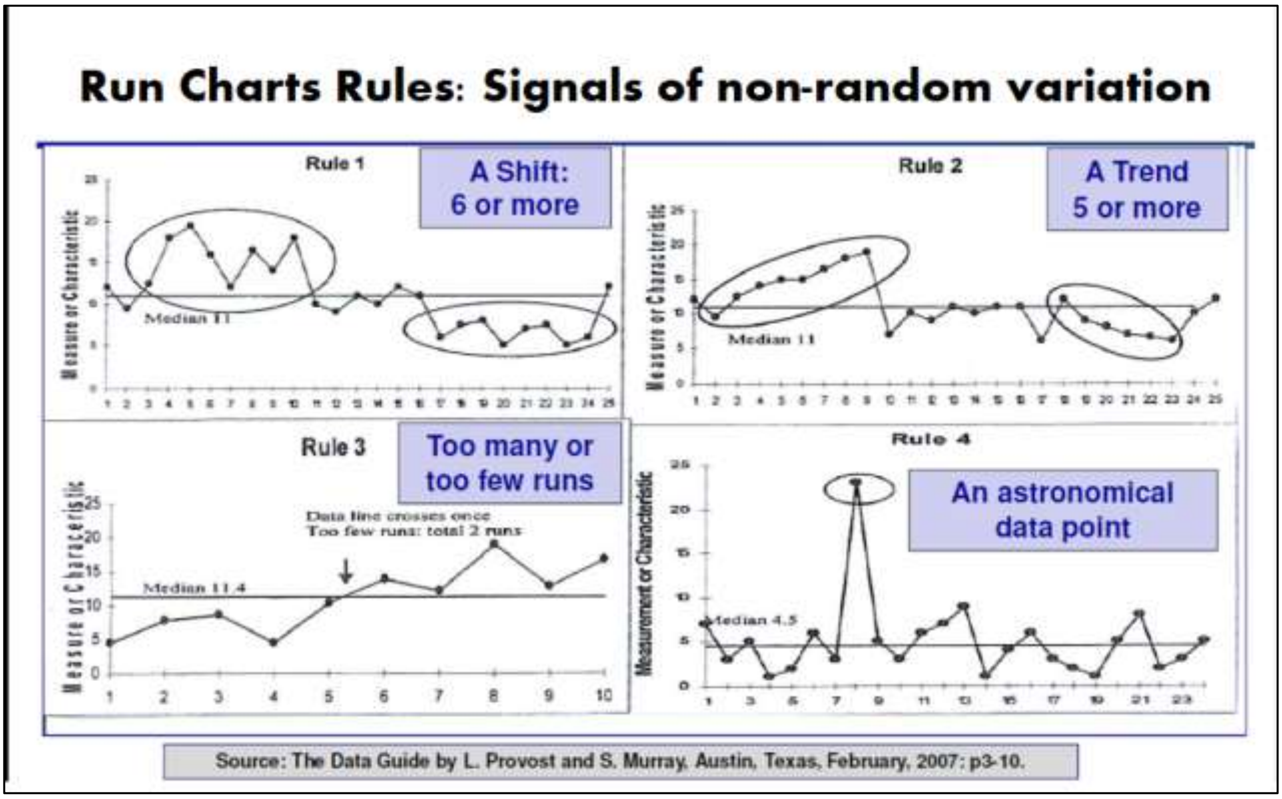
[3] The Mean is what most people think of when they think about an average of a set of numbers. To calculate a Mean you add up all the figures and divide by the number you have. So for example, for the set: 1, 3, 6, 7, 9, 11, 14 the Mean is 7.29 (Total of 51/7)

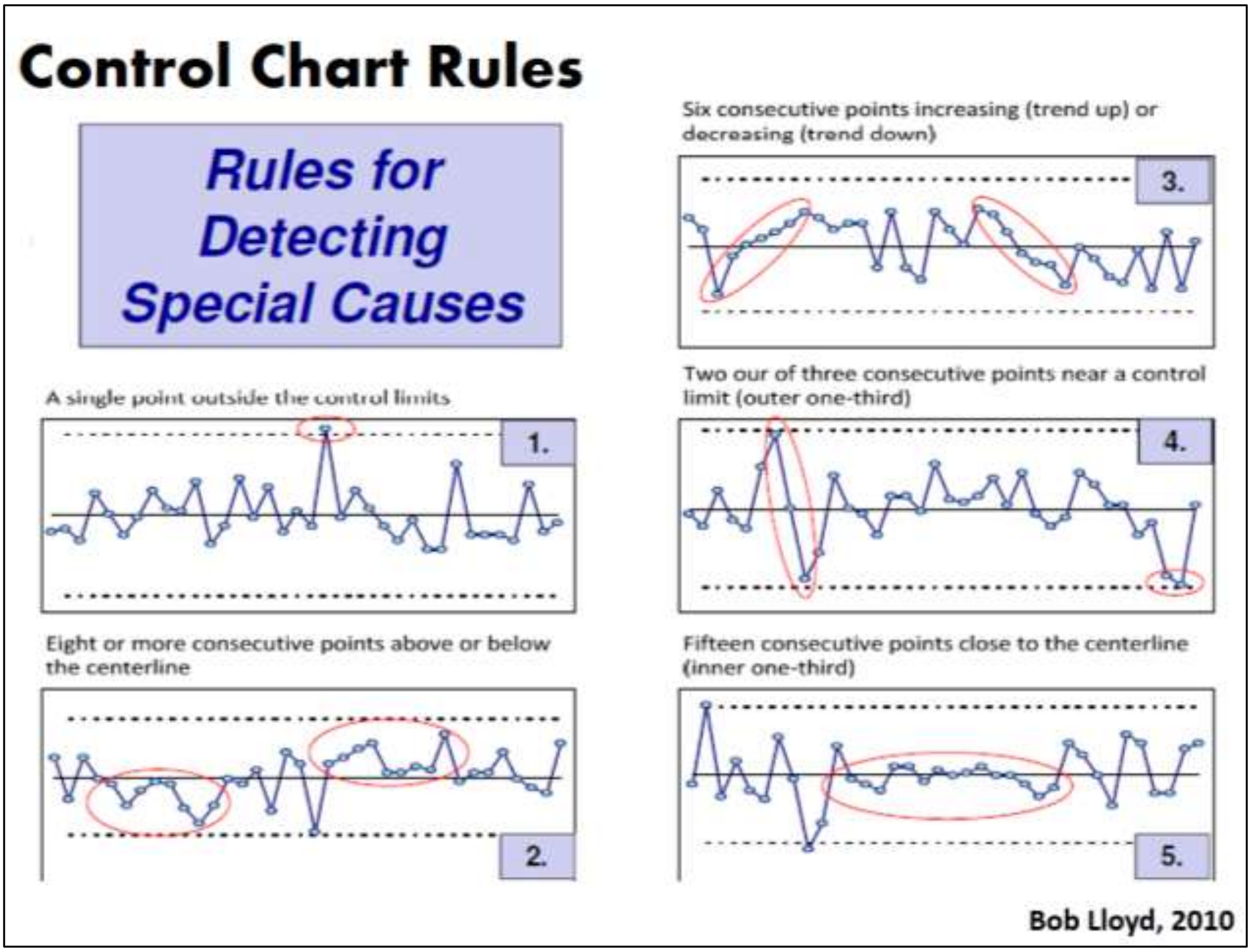
Control Charts/Shewhart Charts



- Shows data over time
- Centreline is the Mean (i.e the total values divided by the number of data points)
- Mathematically calculated upper and lower control limits show deviation from the mean. This goes beyond Run Charts to tell us whether variation in process is stable/in control or not.

Appendix 1: Run & Control Chart Rules[4]





[4] If you have not received training on these as yet and you are already part of a project, please talk to your QI coach

Table 3.4 Runs Rule Guidance—Table for Checking for Too Many or Too Few Runs on a Run Chart

Total number of data points on run chart not falling on median	Lower limit for number of runs (< than this is "too few")	Upper limit for number of runs (> than this is "too many")	Total number of data points on run chart not falling on median	Lower limit for number of runs (< than this is "too few")	Upper limit for number of runs (> than this is "too many")
10	3	9	36	13	25
11	3	10	37	13	25
12	3	11	38	14	26
13	4	11	39	14	26
14	4	12	40	15	27
15	5	12	41	15	27
16	5	13	42	16	28
17	5	13	43	16	28
18	6	14	44	17	29
19	6	15	45	17	30
20	6	16	46	17	31
21	7	16	47	18	31
22	7	17	48	18	32
23	7	17	49	19	32
24	8	18	50	19	33
25	8	18	51	20	33
26	9	19	52	20	34
27	10	19	53	21	34
28	10	20	54	21	35
29	10	20	55	22	35
30	11	21	56	22	36
31	11	22	57	23	36
32	11	23	58	23	37
33	12	23	59	24	38
34	12	24	60	24	38
35	12	24			

Table is based on about a 5% risk of failing the run test for random patterns of data.

Source: Adapted from Frieda S. Swed and Churchill Eisenhart.[7]

[7] Ibid.

In Health Care Data Guide, p80

Appendix 2: Control Chart Selection Guide