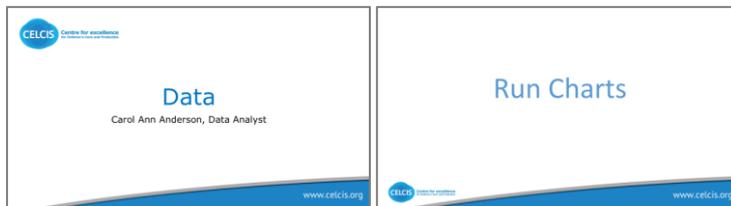


Date: August 2020

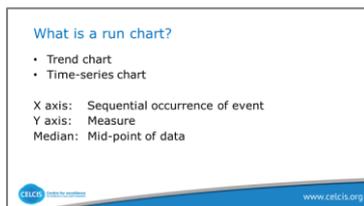
Title: Data

Speaker: Carol Ann Anderson, Data Analyst, CELCIS

You are watching a webinar about the PACE programme from the delivery team in CELCIS, at the University of Strathclyde. PACE is a Quality Improvement programme aiming to reduce drift and delay in permanence planning for looked after children. These webinars were recorded in the spring of 2020, so please be aware that key changes in legislation, guidance and practice may have occurred since this time.



This webinar on data will be focusing on run charts. Run charts allow you to study variation in data over time, and understand the impact of changes or measures. A run chart may also be known as a trend chart, or time series chart.



The run chart is made up of an X axis which is the horizontal axis, a Y axis, which is the vertical axis, and a median, which is the middle point. The X axis records sequential occurrences of events, i.e. the date of a permanent recommendation or an agency decision maker date. The y axis is from measurement, for example, number of weeks from the last date accommodated to the date of a permanence recommendation. The median is the midpoint of data, i.e. there's 50%, greater and 50% less, we use a median for improvement to allow us to measure all children's journeys.



Here is an example of a run chart.

Firstly it has a title, but what are we actually looking at, in this run chart. As I previously mentioned, we have the axis; the x axis date is a sequential occurrence, in this case it's the date of the permanence recommendation. Note the dates are at all in date order. The y axis measurement, is in weeks, we are measuring the weeks from last accommodated to the permanence recommendation.

Every blue dot on the chart represents a child. The orange line along the middle is the median, the median in this occasion is 52 weeks. This is our baseline prior to starting the improvement journey. The green line indicates the date in which PACE started, what we want to see over time is an improvement for those children who have went through this process as we start carrying out tests of change. This allows you to visualise change before and after the start of PACE.

**Why use a run chart?**

- Understand variation in data
- Simple way to make performance visible
- Show the impact of change:
  - is change an improvement?
  - is improvement sustained?

Run charts allow you to visually understand the variation in your data; point above or below median, it's consistent; and there's a lot of variation. It's a simple way to make performance visible. As they say, a picture paints a thousand words.

It also shows the impact of change, that change is an improvement, or that an improvement has been sustained.

**Why use a run chart?**

Data for improvement, not data for accountability

Use for:

- individual tests of change
- effects of tests of change

I'm mindful that you're all working on an improvement project; therefore the data's for improvement and not data for accountability. Run charts can be used for individual tests of change, to record improvement from that

particular test and/ or to determine the effects of a test for change. Is it working? Do we need to abandon it? Or do we need to make changes to that test?

Reading a run chart  
Use your eyes, what can you see?

Probability based non-random signals of change

Four rules:

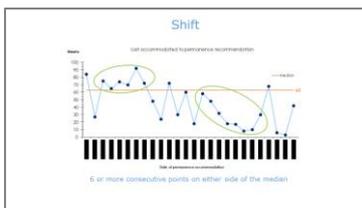
- A shift
- A trend
- Too many or too few runs
- An astronomical data point



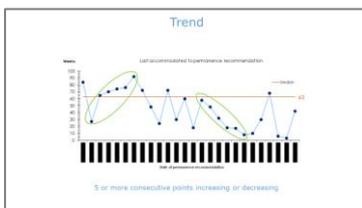
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A run chart it's a visual.

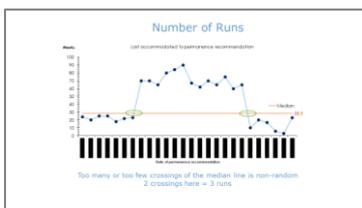
So looking at it, what does it tell you? What can you see? You need to interpret the chart. So how do we do that? There are four useful rules with run charts to determine if a change has led to an improvement: a shift; a trend; too many or too few runs; an astronomical data point. Let's look at some examples.



A shift is six or more consecutive points, either all above or below the median. Values that fall in the median neither add to nor break a shift. Skip values that fall in the median and continue counting.

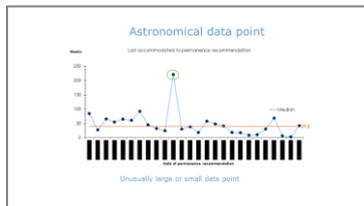


A trend is five or more consecutive points all going up or all going down. If the value of two or more successful points is the same, ignore one of the points when counting values do not make or break a trend.



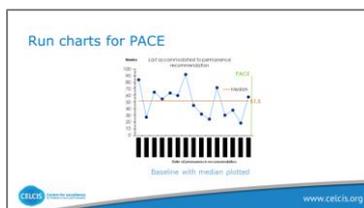
Number of runs: a run is a series of points in a row on one side the median. A non-random pattern or signal of changes, is indicated by too few or too

many runs or crossings of the median line. A run is a series of points in a row, on one side of the median. Some points fall right on the median, which makes it hard to decide which run these points belong to. An easy way to determine the number of runs, is to count the number of times the link connecting data points, crosses the median and add one.



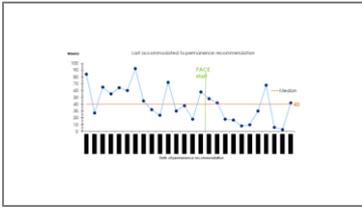
Astronomical data point: the rule aids in detecting unusually large or small numbers. An astronomical data point is one that is obvious. Something that anyone studying the chart would agree is unusual. That's also cause for caution. Every data set will have a high and low data point. This does not mean the high and low are astronomical. As we can see in this example, with the green circle around it, this is an astronomical data point. It's extremely high, outwith the other data that's recorded here.

Where is it way too far? What's happening here? You might want to look closer at this child, could it be a data input error? Is it correct? If so, why? Question what the data is telling you. The data is the starting point or trigger to improvement. The data will help you identify what part of the process you need to review.



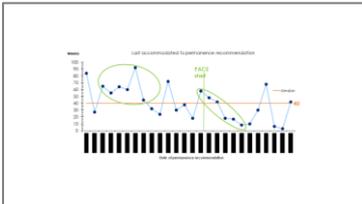
This is how we use run charts for PACE.

First try and establish a baseline to get a sense of how long things currently take. You'll need 10 or more data points to calculate the median if you want to use probability based rules. A common error is to continue adding data points and not recalculate the median. Record the date that your improvement journey started, indicated here with the green line, the start of PACE.



Add data points as more children pass milestones.

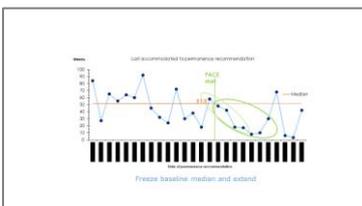
Any signals of change in that data?



Firstly, we have a shift – remember, six consecutive points above the median.

As PACE started, we're seeing a downward trend, five or more consecutive points that are all going down.

As we've added more children, we recalculate the median which has reduced from 51.5 weeks to 40 weeks. This is a reduction of nine weeks. However, we shouldn't compare medians in this way, they are for use within the chart rather than to compare between them.

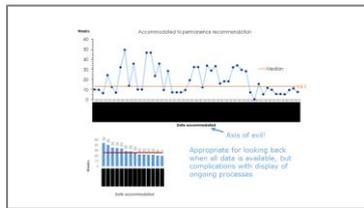


Now we can see that the first shift disappears, but the trend is still there and now an additional shift has started to develop.

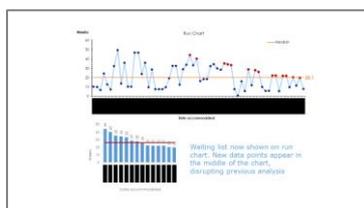


Complications: we're trying to measure things that are in the process of happening, completely intuitive to order data by start of process, because you're looking at the next child that comes along.

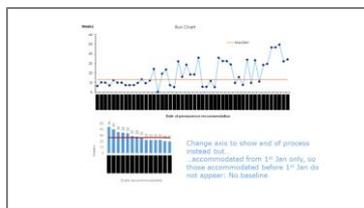
However, some of the processes we're looking at are very long. So we captured those passing key milestones as they happen, rather than waiting and look back. It looks like improvement, but it's an incomplete picture. Let me explain further.



Those children that were on the waiting list, were on the bar graph below, are now contained in the run chart identified by the red squares.

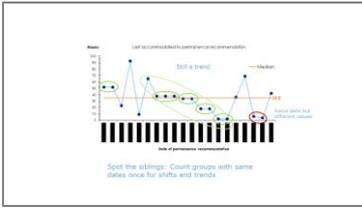


By adding those children to the run chart, they now appear in the middle of the chart, which has disrupted previous analysis.

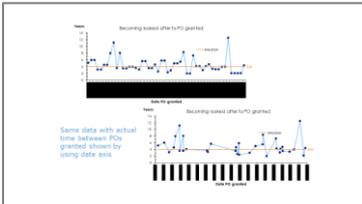


If we now change the x axis, which is the horizontal axis, from date accommodated to the date of the permanence recommendation, which is now showing the end of the process instead.

Measuring the end of the process to the beginning; we now know when the permanence recommendation was made, so how long has it taken from the date the child was accommodated? They've dealt with some cases hanging around in the system quite recently, so these appear at the right of the chart. That axis is set up to list the permanence recommendation in date order, sequential.



Another note is regarding sibling groups; on this run chart that are six groups of siblings. There is a trend which contains four sibling groups. For shifts and trends, count groups with the same date once.



Finally, how making a slight change to an axis can have a very different outcome.

Both these run charts contain the same data, which is the time from becoming looked after to a permanence order being granted. Altering the date axis has a significant impact on how a run chart looks.

The example here, the bottom run chart is not easy to read. Alter the date axis and, as you can see from the run chart at the top, it has had a significant effect and is clearer to read.

This concludes the data webinar on run charts.

I hope this has given everyone a basic guide on how to create a run chat, how to add further data to a run chart, run chart rules, and some of the pitfalls.