Making data count
Health and Wellbeing Conference

13th March 2019

Thomas Nicholas, Senior Improvement Analyst
Aims for today

1. Demonstrate the **limitations of popular methods** of measurement e.g. two point data comparisons and RAG

<table>
<thead>
<tr>
<th></th>
<th>Apr-18</th>
<th>May-18</th>
<th>Jun-18</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>96</td>
<td>94</td>
<td>96</td>
<td>↑</td>
</tr>
</tbody>
</table>

2. Provide an introduction to different types of **variation** and explore how to react to each

3. Introduce **other helpful approaches** to assist your decision making and **resources** to help you
### The importance of focus

<table>
<thead>
<tr>
<th>CQC Domain</th>
<th>Indicator</th>
<th>Previous Period</th>
<th>Previous Value</th>
<th>Latest Period</th>
<th>Latest Value</th>
<th>Difference</th>
<th>Trend over previous period</th>
<th>Trend - APR 2017 onwards</th>
<th>2017/18 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Care - Friends and Family Test - Would Recommend</td>
<td>January 2018</td>
<td>95.27%</td>
<td>February 2018</td>
<td>95.76%</td>
<td>0.49%</td>
<td>▲</td>
<td>2017/18 Average</td>
<td>95.36%</td>
<td></td>
</tr>
</tbody>
</table>

**Is an increase from 95.36% to 95.76% important or distracting narrative?**

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**Caring**

7. Family and Friends Test (FFT) (data up to February 2018)

7.2 The Trusts 'Would Recommend' for Friends and Family returns increased to 95.76% for February 2018 from 95.36% in January 2018. The percentage of patients who stated they 'Wouldn't Recommend' decreased to 0.85% in February 2018 from 1.07% in January 2018.
The importance of focus

<table>
<thead>
<tr>
<th>Key Highlights</th>
<th>Previous Year</th>
<th>Previous Month</th>
<th>In Month</th>
<th>Target</th>
<th>Change</th>
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<td>10.0%</td>
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<tr>
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<td></td>
<td></td>
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<tr>
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<td>13.0%</td>
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<tr>
<td>Sickness has increased by 0.3%</td>
<td>2.2%</td>
<td>2.2%</td>
<td>2.5%</td>
<td>3.3%</td>
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Remained the same?
The importance of focus

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Decreased by 0.2%?

Or have we remained the same?
The importance of focus

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Increased by 0.3%?  
Will we miss the target in future?
Introducing John and Mary
Now John comes back...
Mary arrives at 18:50

John asks, why have you arrived 10 minutes early?

Minutes

Days
Mary arrives at 19:00.

John asks: yesterday you arrived at 18.50 – why have you arrived at 19:00 today?
Mary arrives at 19:05

John asks: yesterday you arrived at 7pm – why are you late?
Mary arrives home at 18:55.

John: Yesterday you arrived at 19:05, why are you early today?
Thoughts on the John & Mary story?

Minutes

Days
The anatomy of an SPC chart

Time series line chart with 3 reference lines

≈ 99% of data

20 plus data points for a robust analysis
SPC rules: special cause variation

**A single data point outside the process limits**

**Two out of three points close to the process limits**

**Shift of points above / below mean line**

**Run of points in consecutive ascending / descending order**
If there is special cause

Run of points in consecutive ascending / descending order
In control but unacceptable variation (common cause variation)

Redesign the system
Why is 7 points significant?

Considering a random system with 50% chance of improvement and 50% of decline (e.g. based on a coin toss)

A trend of 2 has the probability of 25% occurrence (one in four)

A trend of 4 has the probability of 6.25% occurrence (one in sixteen)

A trend of 6 has the probability of 1.56% occurrence (one in sixty-four)

A trend of 7 has the probability of 0.8% occurrence (one in one hundred and twenty-eight)
Strong evidence base

Bristol, Shipman, lessons

Mohammed A Mohomed, K K

During the past century, mankind has achieved great success in many areas of life, but in industry, the drive to meet minimum standards is also a core concern in clinical settings. There are fundamental and profound changes that have taken place in health care, using six sigma and mortality rates after paediatric UK mortality rates in older general practitioners and cows. Shipman; success rates of is treatment; neonatal deaths; pn disease in primary care; and neck of fenn.

Common-cause and specific

Consider a process such as W MAM’s signatures are shown. Although these signatures were made by hand, and the same identical. However, although

League tables are frequently used to depict comparative performance in sport and commerce. However, when used in the context of health care, they can be misleading. League tables are based on statistical comparisons of summary data, which can be misleading.

Summary points

League tables are an established technique for displaying the competitive ranking of organizations in terms of their performance.

League tables pose a dilemma: how to compare performance while not distorting the data or distorting the data.

Control charts, used for monitoring and control of processes, can control the performance of organizations. They are useful for comparing quality or outputs from different systems, whereas control charts are more useful for comparison of units within a single system, such as the NHS.

Control charts avoid stigmatising “poor performers” and promote the use of a systems approach to quality improvement.

The popularity of such league tables suggests that they are easily interpreted and valued by subscribers, whose main aim is to gain competitive advantage. When they were introduced in a modified form in 1997, they sparked a euphoria...
Key elements of a SPC dashboard

- Appreciation of variance over time
- Highlighting special cause and its nature
- Period of concern
- Period of improvement
Key elements of a SPC dashboard

Narrative support that supports SPC theory

Summary icons and a top level summary view

Comment

This indicator records 85% in May 2018 and is demonstrating common cause variation.

<table>
<thead>
<tr>
<th>Variation</th>
<th>Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Cause</td>
<td>Common Cause</td>
</tr>
<tr>
<td>concern High</td>
<td>hit target</td>
</tr>
<tr>
<td>Low</td>
<td>consistently hit target</td>
</tr>
<tr>
<td>Note/investigate High</td>
<td>Hit and miss target subject to random</td>
</tr>
<tr>
<td>Low</td>
<td>Consistently fail target</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jun-18</th>
<th>Target</th>
<th>Variation</th>
<th>Target Capability</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Sickness absence</td>
<td>4.4%</td>
<td>3.5%</td>
<td>F</td>
<td>Shift change in August 2017 showing increase in sickness - staff survey review indicated.....</td>
</tr>
</tbody>
</table>
Changing the conversation

### Workforce Dashboard

<table>
<thead>
<tr>
<th>Month</th>
<th>Mandatory training compliance (Target: &gt;90%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-17</td>
<td>82.9%</td>
</tr>
<tr>
<td>Jun-17</td>
<td>84.0%</td>
</tr>
<tr>
<td>Jul-17</td>
<td>85.4%</td>
</tr>
</tbody>
</table>

What’s your impression of performance?

### Mandatory Training

Target (> 90%)
SPC gives more perspective?

What’s your impression of performance?
Commentary must align

2.2 The Committee noted the improvement in sickness absence management rate which on 12 month period is currently 3.9%, this is above the Trust target of 3.5% but after an upward trajectory the Committee was pleased to see the reduction. In

Was there an improvement in May

Was there an increase in June

Monthly sickness absence increased to 4.35% in June, while the rolling 13-month rate increased to 4.38%. The Trust target is 3.5%.

Data source: FirstCare  Date range: Jul 16 – Jun 18
Beware the 12 month rolling average

It’s hard to spot change in a 12 month rolling average

Every month 10 out of 12 (83%) parts of the data are the same

And the month leaving might be as significant as the month arriving
Different messages

- **Sept 17** – concerning 6 month rise
- **Jan 18** – same level as Sep
- **Apr 18** – on the rise again

**Rolling 12 Month % Sickness Absence Rate**

- **Sept 17** – improvement
- **Jan 18** – concern
- **Apr 18** – No change

**Staff Sickness in month**

- **Upper process limit**
- **Mean, 3.49%**
- **Target, 3.5%**

Presentation title
Pie chart vs pareto

Which is easier to digest information quickly?
Example sickness reason pareto

Ambulance trust

[Diagram showing Pareto chart for ambulance trust with categories like Gastrointestinal problems, Other known musculoskeletal problems, Back problems, etc.]

All Ambulance Trusts

[Diagram showing Pareto chart for all ambulance trusts with similar categories as above]
Triangulate data

Staff survey

Sickness reasons

Concerns have been raised with the FTSU Guardians

Those concerns with a bullying and harassment element to them
Sample Case 1
Staff survey run charts

Percentage of staff experiencing harassment, bullying or abuse from patients, relatives or the public in the last 12 months

Provider | Sector Average
---|---
2013 | 29%
2014 | Median
2015 | Median
2016 | 27%
2017 | Median

Percentage of staff experiencing harassment, bullying or abuse from staff in the last 12 months

Provider | Sector Average
---|---
2013 | 31%
2014 | Median
2015 | Median
2016 | 24%
2017 | Median
Add…

Concerns raised with the FTSU Guardians

- Concerns have been raised with the FTSU Guardians

- Those concerns with a bullying and harassment element to them

- Percentage of staff experiencing harassment, bullying or abuse from patients, relatives or the public in the last 12 months

- Percentage of staff experiencing harassment, bullying or abuse from staff in the last 12 months

NHS Improvement
Add...

Sickness reasons

Percentage of WTE days lost due to sickness by reason in combined acute/ community trusts (August 2017 to July 2018)

Sickness reasons for all combined acute/ community trusts

33 | Presentation title
Sample Case 2
Staff survey run charts

Percentage of staff experiencing harassment, bullying or abuse from patients, relatives or the public in the last 12 months:

- **Provider**: Median 26%
- **Sector Average**: Median 24%

Percentage of staff experiencing harassment, bullying or abuse from staff in the last 12 months:

- **Provider**: Median 21%
- **Sector Average**: Median 19%
Concerns raised with the FTSU Guardians

- Concerns have been raised with the FTSU Guardians
  - Median line graph showing trends from 01/07/2017 to 01/07/2018.

- Those concerns with a bullying and harassment element to them
  - Median line graph showing trends from 01/07/2017 to 01/07/2018.

Percentage of staff experiencing harassment, bullying or abuse from patients, relatives or the public in the last 12 months:

- Median line graph showing trends from 2013 to 2017.
- Median line graph showing sector average from 2013 to 2017.
Add…

Sickness reasons

Percentage of WTE days lost due to sickness by reason in community trusts (August 2017 to July 2018)
Free SPC tool: frontline staff

https://improvement.nhs.uk/resources/statistical-process-control-tool/

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### SPC Tool

<table>
<thead>
<tr>
<th>Organization/Name</th>
<th>Sam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team/Name</td>
<td>Sam</td>
</tr>
</tbody>
</table>

Maximum number of measures: 60

Start date: 06/01/18

Include weekends: Yes

Planned duration: 100 Days

Recording line: 18:00

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### Sam - Sam daily performance, starting 06/01/18

#### Summary Statistics

- Mean observation: 58.58
- Average moving range: 12
- Three sigma: 0.82
- Upper control limit: 54.657
- Upper moving range limit: 101

This type of chart (SPC) allows us to identify statistically significant changes in data. The dotted lines (process limits) represent the range in which we expect the data to fall if the variation is within expected limits, i.e., normal. There are a number of rules we can use to identify when the process is out of control.

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### Sam - Sam Moving Range, starting 06/01/18

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Interventions Annotation

- [2A030399]: Commence green cleanse
- [2A030299]: Return to more normal diet
- [2A030209]: Return from holidays
- [2A030399]:經營

Please enter a date and a select comment for recalculating the process limits.

- 2A030099
- 2A030299
- 2A030699

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Print | Save | Clear | Reset

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[Image of SPC tool form and chart with annotations]
https://improvement.nhs.uk/resources/making-data-count/
Now take a few minutes to discuss these different presentations.

- Do you often see data presented in either style?
- Which did you like/dislike?
- Which was the most useful?
- Which prompted the most useful conversation with your colleagues?

Scenario for analysts

Scenario 1: Understanding variation

The assistant director of performance had come to see you to discuss the graphical charts on the board and requested your input.

Successful outcomes

<table>
<thead>
<tr>
<th>Month</th>
<th>Outcome 1</th>
<th>Outcome 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2017</td>
<td>80%</td>
<td>85%</td>
</tr>
<tr>
<td>Feb 2017</td>
<td>75%</td>
<td>82%</td>
</tr>
<tr>
<td>Mar 2017</td>
<td>87%</td>
<td>88%</td>
</tr>
<tr>
<td>Apr 2017</td>
<td>90%</td>
<td>91%</td>
</tr>
<tr>
<td>May 2017</td>
<td>95%</td>
<td>93%</td>
</tr>
</tbody>
</table>

Examine the data and think about the answers you might give now and what you might have said in the past.

Have you ever arrived at work an hour late because your train broke down or there was a strike? These are examples of "spatial cause" variation – the event that caused you to be late is already understood. In other cases the reason for unexpected variation may need to be investigated.

While SPC has its roots in manufacturing, increasingly SPC is being used in healthcare. By recognising which type of variation you are dealing with, you can take the best action to deliver improvements.

There are countless examples of SPC being used to demonstrate improvements in patient care. SPC also has an important role in clinical governance and avoiding harm.

The science and theory that underpins statistical process control

Dr Thomas Woodcock, Information Management Lead for C-Level, NorthEast London, describes the science and statistics that underpin the analytical approach called statistical process control (SPC). The science behind SPC provides a powerful way to drive improvements in any organisation.
What do you want to do now?