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Improvement Cymru Academy Toolkit Guide

Using Measurement for Improvement

Introduction

Measurement plays an important and supportive role within improvement and can aid in a number of ways, such as focusing improvement efforts, helping to identifying if the changes made to a process have resulted in progress towards a specific aim, as well as identifying if a change has been sustained (Provost and Murray 2022). It is an important part of all improvement projects and can be used in all aspects of the improvement journey.

It is included in the Model for Improvement methodology, which consists of two components: the planning, which are the first three questions and the doing which are Plan, Do, Study, Act (PDSA) cycles. (See our Model for Improvement Toolkit Guide here for more information). The second question asks: 'How will we know that a change is an improvement? This question focuses on measurement for improvement and choosing the right measures. Measurement has a role throughout improvement efforts; firstly, in providing evidence of the problem that you are working to resolve, in the 'do' phase of the Plan Do Study Act (PDSA) cycle when the change ideas are tested and data is collected and in the 'act' phase when the data is analysed to determine next steps. See our Testing Changes Toolkit Guide here for more information.

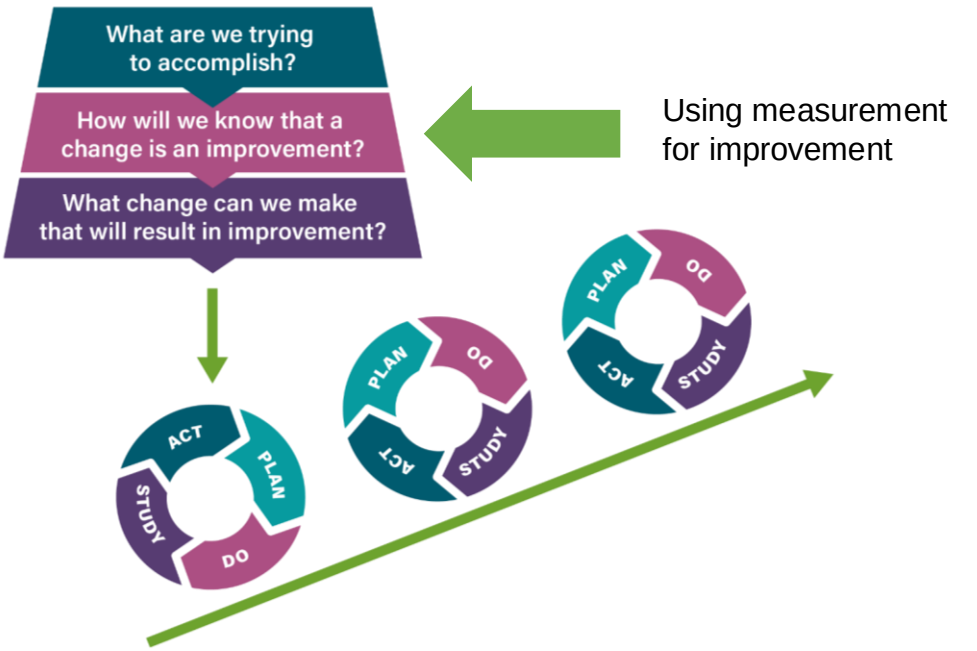

Diagram: Illustration of the Model for Improvement (*Improvement Cymru, 2023*)

Rationale

Measurement can play several roles within an improvement initiative:

1. **Helps to shape decision-making.**
   Using measurement for improvement helps to shape decision-making and will help to inform choices using an evidence base. It can help you to be more proactive in decision-making by looking at trends, opportunities, and risks within the data.

2. **Foster a culture of Continuous Improvement**
   Continuous improvement relies on data-driven decision-making and provides a feedback loop for you to reflect on both qualitative and quantitative data to continuously improve. It also helps you to take a proactive problem-solving approach by helping you to identify and solve issues, rather than just reacting to them. (See our Culture of Continuous Improvement Toolkit Guide here for more information.)

3. **Assess the Quality and Safety of Services**
   Within healthcare, data can help assess the quality of care a patient receives and the performance of a service, both quantitatively and qualitatively. See our Data Collection Toolkit Guide here for more information. Data not only provides evidence that a project has reached its overall aim but can also act as a pulse giving an indicator that the project is on track to reaching its overall aim.

4. **Transparency and Accountability**
   Using data for improvement helps to create transparency that ensures actions and decisions are visible to relevant stakeholders. Data allows you to compare your performance with targets and when this falls short, it triggers an accountability mechanism that facilitates investigation into why that has

happened. Accountability relies on evidence and therefore without data, accountability becomes subjective and less effective.

5. **Communicative tool**
   Data can be used as a communication tool as the voice of the process and the value of the process to the patient. Depending on which stakeholder group you are engaging with, will depend on what data you may want to display to them.

6. **Change Management**
   Using measurement for improvement can help with the human side of improvement to create buy-in. See our Human Side of Improvement Toolkit Guide here for more information here. By using data, staff can see the evidence of a problem especially when both quantitative data and qualitative data is used. It can also help to manage resistance; as staff seeing the progress that is being made, are more likely to embrace change and come on that journey with you. See our Change Management Toolkit Guide here for more information.

Background

Measurement in improvement has its roots in manufacturing and is one of the key aspects of Edward Demings System of Profound Knowledge which promotes the understanding of variation. Identifying the type and amount of variation within a process is important to ensure we focus on and respond correctly to our data. See our Understanding your System Toolkit Guide here for more information.
Measurement for improvement in healthcare has its roots in the Model for Improvement, which was developed by Associates for Process Improvement in the USA over 30 years ago. This model provides a structured framework for achieving an aim by testing of change ideas through PDSA cycles.

When to use measurement?

Measurement can be used at any stage of the improvement journey. Collecting baseline data allows you to understand the current state by showing the current level a process operates at. By quantifying the performance of your system, you can identify areas that need improvement and set your aim. See our SMART Aims Toolkit Guide here for more information.

Collecting data at regular intervals over the course of your project will help you to track your progress over time. This can help you analyse and evaluate the impact of your change ideas and ensure that improvements are sustained. After the project it is important to ensure that you still collect 'just enough' data to monitor the process. See our Implementation Toolkit Guide here for more information.

How to use?

Below is a description of how measurement may be used to support improvements:

To Identify a problem

Once you and your team have identified the problem that you are going to improve you will need data to evidence your problem. This may be in the form of qualitative and/or quantitative data which can help support stakeholder buy in. Both forms of data may provide very different emotive responses when creating buy in and maybe used individually or collectively to support an improvement initiative. See our Understanding your problem Toolkit Guide here for more Information.

Understand your system

When a problem has been identified with the use of data, you may need to collect more data to help stakeholders understand the system and explore the problem further. This may also involve stratifying the data in order to find patterns and links within it. As you understand your system, data may also be used as a prioritisation tool and plotted into charts such as Pareto charts.

Create your Family of Measures.

In Improvement, there are three types of measures that you can use to understand and measure your improvement efforts collectively known as the family of measures. See our Family of Measures Toolkit Guide here for more information.

These measures are:

Outcome measure: This is the overarching measure of the project and is linked to the aim of the project and the impact of the problem. There should be a link between the outcome measure and the patient or customer.

Process measure: These are a set of measures used to deliver the outcome measure. These measures are linked to your change ideas.

Balancing measures: These are the unintentional consequences that can positively or negatively affect other parts of the system.

Data collection

A data collection plan should be agreed on identifying areas such as what, where, who and when. See our Data Collection Toolkit Guide here for more information. Within the measurement plan an operational definition should be agreed on for each of the measures identifying what is going to be measured and the process that will be used to measure it. See our Measurement Plan Toolkit Guide here for more information. This enables the data collection to be repeatable.

Collecting baseline data

- Collecting baseline data is a fundamental step in any improvement process. It involves measuring the current state of a system or process before any changes are made. This data serves as a reference point to compare your new data against when testing your change ideas. Data within improvement should be plotted over time in the form of a run chart or Statistical Process

Control (SPC) chart which has the advantage of visually showing how the process performs. See our SPC Toolkit Guide here for more information.

Sampling data

Sampling is a technique used to understand and improve processes without the need for exhaustive data collection. It's particularly useful when dealing with large populations or processes where full-scale analysis is impractical. The key is to select a representative sample that can provide reliable information about the whole.

Common methods include:

- Random Sampling: Every member of the population has an equal chance of being selected.
- Stratified Sampling: The population is divided into subgroups, and samples are taken from each subgroup.
- Systematic Sampling: Selecting every nth item from the population list.
- Judgement sampling: Select useful samples for learning about process performance and the impact of changes.

Visualising your data

Choosing the right chart is crucial for effectively communicating the data collected during quality improvement initiatives. Different charts serve different purposes and can highlight various aspects of the data. Here's a guide to help you select the most appropriate chart for your needs:

- Run Chart: Useful for displaying performance data over time. It helps identify improvement in processes. See our Run Chart Toolkit Guide here for more information.
- Control Chart: Like a run chart but with added control limits. It's used to determine if a process is stable and predictable over time.
- Pareto Chart: A bar chart containing a line chart that shows which factors are more significant. It's based on the Pareto principle, which states that a small number of causes often lead to a large portion of the effect. See our Pareto Toolkit Guide here for more information.

- Histogram: Displays the distribution of data and helps identify the central tendency, variation, and shape of the data set.
- Scatter Plot: Used to determine the relationship between two variables. It can help in identifying correlations or patterns.

When selecting a chart, consider the following:

- **The nature of your data**: Continuous, discrete, or categorical.
- **The goal of analysis**: Identifying trends, understanding distribution, pinpointing causes, etc.
- **The audience**: Choose a chart that your audience can easily understand.

The right chart can not only convey the right message but also reveal insights that might not be apparent from raw data.

Analysing your base line data

Using measurement over time has the advantage of visualising how continuous data performs, as well as identifying the amount and type of variation present within a process.

You need to understand what the data is telling you. This should include the type and amount and type of variation within the data. See our Understanding Variation Toolkit Guide here for more information. The centre of the data should also be considered to see if it's at an appropriate level for the process, discussions with subject matter experts and/or guidelines maybe sought to confirm this. See our Measures of Central Location Toolkit Guide here for more information.

Data should be analysed and shape further decisions such as key areas to focus on and explore further. This Collect-Analyse-Review of data is known as the CAR cycle. (*NHS England, no date*)

Separating the overall sample into subgroups known as stratification may help to focus your efforts on key areas that require improvement. Separating a sample into these subgroups within healthcare is often referred to as subgroup analysis. Stratifying your baseline data can help you to understand your system and help you

identify the root cause of the problem you need to address. See our Toolkits under the heading ‘Understand your system’ here for more information.

Testing your theories of change

Data captured from testing your theories of change via PDSA cycles should be compared against the baseline data. Like the baseline data this is often collected over time to identify if your test of change has affected your process performance and resulted in an improvement. Testing change ideas through PDSA cycles is an iterative process and can result in the decision of adapting, adopting or abandoning PDSA cycles. See our Testing Changes Toolkit Guide here for more information.

Analysing your theory of change data

Analysis of your PDSA data includes identifying whether your ‘new’ data shows any signals of non-random variation acquired from your PDSA cycles. This has shown that your process has statistically changed and is not due to chance. See our Run Chart Toolkit Guide here for more information.

Monitoring sustaining

Data should be continually gathered and the performance measured and monitored to ensure the performance of the process is maintained. See our Implementation Toolkit Guide here for more information. This measurement can also form the basis of the baseline data for future improvement projects.

Helpful Tips.

When collecting data, you should:

1. **Start Small**: Begin with a pilot project to refine your data collection and analysis before scaling up.
2. **Engage Stakeholders**: Involve key stakeholders from the outset to gain their buy-in and ensure the data collected is meaningful to them.

3. **Use Technology**: Leverage technology to automate data collection and analysis where possible.
4. **Keep It Simple**: Avoid overly complex measurement systems. Simple, straightforward metrics are often the most effective.
5. **Be Transparent**: Share data openly with your team. Transparency fosters trust and a collective effort towards improvement.
6. **Celebrate Success**: Recognise and celebrate improvements, no matter how small. Positive reinforcement encourages ongoing efforts and commitment to quality improvement.

What Next?

Once you have established a robust data measurement system and used it to drive initial improvements, the next steps involve:

1. **Scaling Up**: Expand successful quality improvement initiatives to other areas or departments. See our Spread and Scale Toolkit Guide here for more information.
2. **Continuous Monitoring**: Regularly review data to ensure sustained improvements and to identify new opportunities for enhancement.
3. **Training and Development**: Invest in training for your team on data analysis and quality improvement methodologies.
4. **Innovation**: Encourage innovative approaches and use of advanced analytics to further enhance quality improvement efforts.

Further Reading

Improvement Cymru Academy. (2023). Family of Measures. Available at: https://www.youtube.com/watch?v=oYrD5CWNu10. (Accessed: 9 Aug 2024)

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Provost, P. and Murray, M. (2022) *The Healthcare data Guide- Learning from data for Improvement. Hoboken: John Wiley & Sons, Inc.*

NHS England. (No date). Available at: https://www.england.nhs.uk/improvement hub/wp content/uploads/sites/44/2017/11/How-to-Guide-for-Measurement-for-Improvement.pdf. (Accessed: 16 July 2024).

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