

# Improvement science for Quality Improvement

## Overview

Improvement science is an applied science founded by [W. Edwards Deming](#). The focus of improvement science is on proposing, studying, and applying methods for changing systems with the aim of achieving better results than the current system is producing.

Deming's four concepts: appreciation of a system, understanding variation, the theory of knowledge, and the psychology of change, can be applied to improve the performance of processes, systems, organisations, and communities.

Quality Improvement requires the proper application of improvement science – improvement methods and tools are combined with subject matter expertise to develop, test, implement, spread, and scale up changes that lead to improvement.



## The system of profound knowledge

The system of profound knowledge is a lens through which we can view our systems or problems to help us develop holistic understanding to lead effective change.

### Appreciation of a system (systems thinking)

A system is an interdependent group of items, people, or processes working toward a common purpose. Systems in healthcare can vary greatly in size and complexity. Systems may be straightforward, such as booking a follow-up outpatient appointment, or highly complex, such as a hospital's healthcare delivery system, where numerous departments, professionals, and technologies interact in multifaceted and dynamic ways.

If a system is not producing the desired quality of services or products, then the system must be changed and improved. The greater the understanding of the

system, the greater the likelihood a change idea will be generated that will result in an improvement. Tools such as process maps, Cause-and-Effect diagrams, and control charts can be used to understand a system and identify areas for improvement.

### Understanding variation

Variation refers to the measurable differences, fluctuations, or changes observed in a set of data or a process. In healthcare, it encompasses the inherent diversity in patient characteristics, care delivery processes, and patient outcomes. Understanding variation is central to understanding what is occurring within a system. The ability to answer the question 'do the two medication errors that occurred this month indicate an undesirable trend?' is grounded in Quality Improvement, and knowledge of variation is needed to ensure

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appropriate action is taken. Tools such as run charts, control charts and Pareto analysis gives us greater insight into the variation occurring within systems.

### Theory of knowledge

The Theory of Knowledge teaches us that knowledge is built on theories, and in order to validate them, these theories need to be tested. In Quality Improvement, making a change is like making a prediction – ‘Change X will result in an improvement in Y’.

Making decisions about which change ideas to implement should be based on data and evidence, rather than assumptions or guesswork. This starts with establishing a theory of change that outlines what we believe we need to do, (along with when, where and how we need to do it), to achieve the desired outcomes. We can then design tests to validate this theory. Tools such as Driver Diagrams and Affinity Maps

also aid in developing and visualising a Theory of Knowledge.

### Psychology of change (human side of change)

Understanding human motivation, behaviour, and psychological needs are key to understanding what is occurring within a system and crucial to successfully leading and managing improvement activities. The human side of change focuses on ideas, methods and tools to help integrate changes into the social system. It teaches us how to harness people’s intrinsic motivations to produce the desired outcomes and change, how to manage resistance to change and how to foster ownership of change through collaboration and co-design. Tools such as the partnering planning canvas and empathy maps can help us understand and relate to those who may be affected by a change to the system.

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### Important considerations

Although there are four components of the system of profound knowledge, they shouldn’t be applied individually. Improvement science is most effective when the focus is on how the components inform and interact with each other. For example, focusing only on the Theory of Knowledge without considering variation will not produce effective ideas for changing the system.

The ability to produce improvements is further enhanced when the System of Profound Knowledge is combined with subject matter expertise.

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### Additional resources

To learn more about Quality Improvement you can access the following resources:

- [SCV Quality Improvement Toolkit](#) (see Understanding variation, Theory of Change and Driver Diagrams resources)
- [Institute for Healthcare Improvement website](#)
- [NSW Clinical Excellence Commission Quality Improvement Tools](#)

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### References

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Langley, G. J., Nolan, K. M., Norman, C. L., Provost, L. P., & Nolan, T. W. (1996). The improvement guide: A practical approach to enhancing organizational performance. San Francisco: Jossey-Bass Langley

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