Quality and Safety Learning Corner

The Lens of Profound Knowledge

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LEARNING OBJECTIVES

- Describe the four components of Deming's system of profound knowledge
- Explain how to use the lens of profound knowledge in the healthcare quality improvement
- Describe relevant tools used in the lens of profound knowledge

INTRODUCTION

Quality of care and patient safety are the highest priorities for healthcare organizations. At the heart of any organization's quality of care is building capacity for quality improvement. Dr. W. Edwards Deming, the father of quality improvement, suggested that subject matter knowledge is not sufficient for managing healthcare, and it must be complemented by "profound knowledge." While healthcare professionals are subject matter experts in the areas of medical practices, such knowledge alone is inadequate to produce improvements in the delivery of health care. Deming's profound knowledge is a management theory that provides a framework for improvement and transformation of a system.

The system of profound knowledge consists of four components that interact with each other: appreciation for a system, knowledge about variation, theory of knowledge, and psychology (Fig. 1). The system provides a lens of theory for understanding and optimizing the system in which we work. The following paragraphs will focus on explaining each of the four components with examples from the healthcare setting.

APPRECIATION FOR A SYSTEM

"Every system is perfectly designed to get the results it gets." Dr. W. Edwards Deming[1]

A system is defined as an interdependent group of items, people, or processes working together toward a common purpose.[2] The prerequisites for achieving a common purpose are as follows: [3]

1. Stating and sharing a clear aim with the team. Without aim, there is no system.
2. Balancing each component of the system, as an action in one part will affect other parts of the system. This involves improving the overall system performance, not just the performance of individual components.
3. Focusing on the processes rather than the outcome, as the better the process is understood, the better the outcomes are.

Healthcare systems are complex in nature, if not the most chaotic and complex in comparison to other industries. The system cannot be simply understood by knowing each individual component but rather by knowing all components, their relationships, and the feedback loops.[4] Appreciation of the system means that we step back and see the full picture and understand the various items and processes of the system. A useful way to accomplish this is by visualizing the systems through flow charts. Flowcharts provide a systematic visual display of systems by dissecting them into their basic units, relations, and feedback loops. They offer a systematic display and enable a shared understanding of the system's problems and gaps.[5]

As an example, Sandhu et al published an improvement project to improve patient safety and decrease preoperative delays for diabetic patients undergoing ophthalmology surgery.[6] A flow diagram was created through several meetings with frontline staff to understand the baseline system. They were able to reduce complexity of the system, cost and adverse events. The flow diagram shows the two protocols, the initial (previous) protocol, and the new protocol.[6]

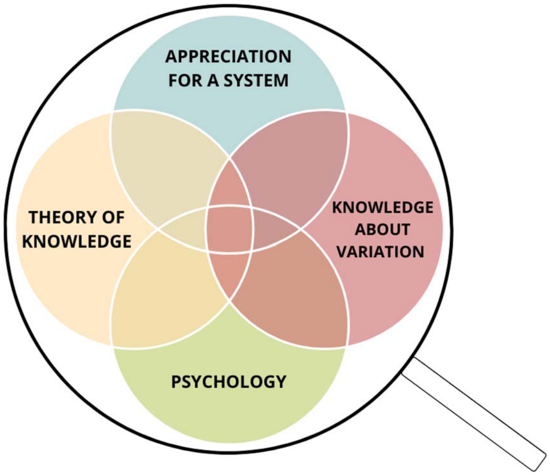

Figure 1. Profound knowledge as a lens.

KNOWLEDGE ABOUT VARIATION

"Uncontrolled variation is the enemy of quality." – Dr. W. Edwards Deming[7]

This component is related to data analysis and interpretation. The recommended reporting method is plotting data over time (e.g., day, week, or month) instead of using an aggregate summary (before and after).[8] While aggregate data are useful for judgment, the added value of plotting data over time relies on the ability to understand variations and measure the impact of interventions.

In any system, there are always variations in processes and outcomes. Minimizing outcome variations is a vital concept in quality improvement and systems management. An example of variation in healthcare includes reduced inpatient discharges over the weekends compared to the weekdays, leading to prolonged length of stay, reduced hospitals efficiency, and higher costs.

The tools used to understand variation are run and control a control chart. There are two types of variations: common cause variations and special cause variations. Common cause variations are deeply embedded in the DNA of the system and affect every component, process, and outcome. On the other hand, special cause variations arise due to very specific circumstances.[9] It is important to highlight that common cause variation means that the process is stable rather than good or bad.

Run charts and control charts are graphs of data over time that distinguish between common and special cause variations (Table 1, Fig. 2).[8] Both charts show measurements on the y-axis plotted over time (on the x-axis). A run chart is composed of data over time and a calculated median, a goal, or target line can be added as well. The control chart shows in addition to the medial/center an upper and lower control limit lines. The control limits are calculated according to the type of data. Special cause variations are identified if any of the following is met:

1. One data point outside the control limits (upper or lower)
2. A trend: six or more increasing or decreasing points.
3. A run: eight or more consecutive points on either side of the center line.

THEORY OF KNOWLEDGE

"Knowledge comes from theory." – Dr. W. Edwards Deming[10]

This lens describes how we gain knowledge and learn by applying theories. Theories are built on current knowledge from past experiences of trial and error, and without them, we cannot make predictions about what might happen. Team members of an improvement project suggest interventions and changes based on their predictions of hypotheses or theories. From a quality improvement perspective, improvements are due to changes; however, an improvement due to a certain change might not be replicable in different settings due to contextual variables. Those hypothesis and theory-based interventions require testing and validation. If an intervention fails to lead to predicted improvement, the reasons for failure need to be analyzed to refine our theories.

The Plan-Do-Study-Act (PDSA) cycle, a theory developed by Walter Shewhart and later proposed by Deming, is a popular model for learning through the lens of the theory of knowledge.[11] This learning model begins with forming a theory and making a prediction that a certain change will lead to improvement (plan), applying the change (do), then assessing the effectiveness of this change in the local context (study), and finally adopting or abandoning the change. Learning and refining predictions are built into PDSA cycles. The plan and do cycles include the prediction (theory testing planning. After applying the prediction, observations are made, the theory is studied and validated.

Table 1. Main differences between common and special causes of variation

Common Causes of Variation	Special Causes of Variation
Inherent within the system	Arise due to specific circumstances
Predictable	Unpredictable
Stable process over time	Unstable process
Different outcome but not significantly different	Significantly different outcome
Minimized by improvement or redesign in processes	Eliminated by finding the specific circumstance and preventing its recurrence

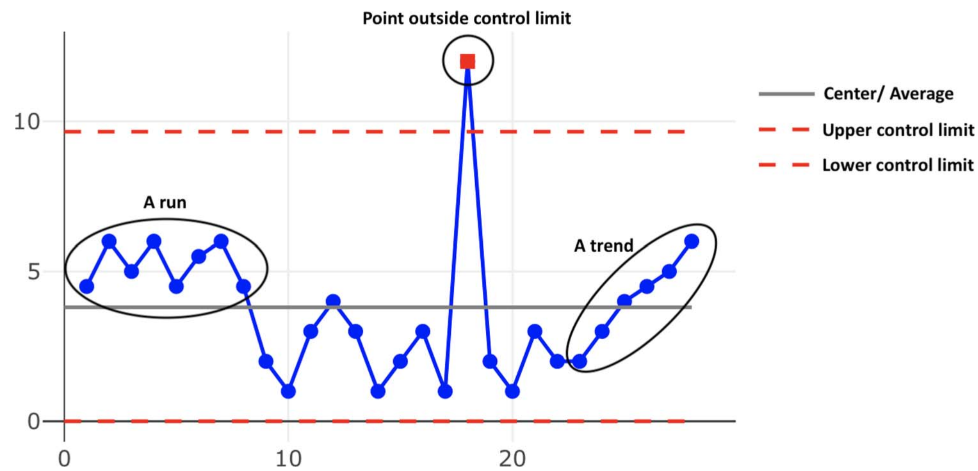

Figure 2. Rules for identifying special cause variation in control charts.

For example, a project aimed to reduce the rate of no-shows in clinics predicted that the main reason for no shows related to communication factor. The theory was confirmed by patient survey that showed that one third of patients did not receive text messages about their follow-up appointments.[12]

PSYCHOLOGY

"Psychology helps us to understand people, interaction between people and circumstances, interaction between a manager and his people and any system of management." – Dr. W. Edwards Deming[9]

Systems are made up of processes and people, so it is obvious that managing people is a major part of systems management. This component is based on what motivates people. According to Herzberg's two-factor theory, there are two factors for work satisfaction: motivators and hygiene factors.[13] Motivators i.e., growth, advancement, work itself, recognition, and achievement are the main drivers of job satisfaction. While hygiene factors i.e., policies, salary, work conditions, and supervision) do not affect satisfaction, they must be met to avoid dissatisfaction. Deming argued that people are born with motivators (intrinsic motivators), and management systems substitute them with hygiene factors (extrinsic motivators), such as school grades and merit systems.

Managers need to predict how their own team members will respond to changes, have a plan for how to deal with different responses to changes, and know their team members' motivators and needs.

SUMMARY

The theory of profound knowledge complements the subject matter by providing a lens that enables us to understand and improve the healthcare systems we manage. The four components of this lens are interdependent, not independent.

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