Five Ways to Incorporate Systems Thinking into Healthcare Organizations

Patricia Trbovich

Healthcare is a complex system that involves high risk to patients, clinicians, manufacturers, and other stakeholders. Clinicians process inordinate amounts of data and synthesize these inputs to make critical decisions that affect patient health and safety. The unprecedented advancement in medical technology during the past half-century has contributed substantially to healthcare’s expanding complexity. Consequently, clinicians have more knowledge to synthesize, tasks to perform, and processes to manage than ever before. The delivery of care often is overly complex and unstandardized, thereby reducing rather than increasing safety. For example, new devices are being implemented in medical practice at an astounding pace, requiring clinicians to continuously expand their breadth of knowledge and expertise. Consequently, a main cause of adverse events is misuse of medical devices. Variation in medical devices among hospitals (and within a given hospital) is a key cause of these adverse events. Design improvements and standardization of equipment have been suggested as ways to reduce errors.

Although new technologies usually are advantageous for the patient, health professionals often encounter difficulties in using devices. Furthermore, current healthcare systems are not designed to support the care of complex patients, such as populations with chronic conditions requiring care management across multiple providers and services. In 2005, a joint report from the National Academy of Engineering and Institute of Medicine advocated the extensive application of systems thinking to improve the delivery of healthcare. Systems thinking centers on the dynamic interaction, synchronization, and integration of people, processes, and technology. By gaining an understanding of the dynamics among people, processes, and technology, systems thinking aids in recognizing how to intervene (e.g., focusing on changes to device design, clinician training, and/or clinical practice) in the system successfully. Moreover, systems thinking helps identify the critical relationships and connections often missed or undervalued that are pivotal to a successful implementation effort.

If the high-risk healthcare industry focuses on an enhanced application of systems-thinking approaches, it will benefit from opportunities to reform the care delivery system by reducing unnecessary complexities and unexplained practice variations. This article describes five ways in which systems thinking can be incorporated into healthcare organizations. Rather than providing an exhaustive list of information, this report is meant to serve as a starting point for exploring how to integrate systems thinking.

1. Apply a Holistic Approach to Solving Problems

Difficulties in solving problems often stem from the fact that they do not occur in isolation, but rather in relation to each other. Yet,
these problems often are studied in isolation. The highly fragmented healthcare system has not kept pace with the unprecedented rate at which medical technology has been advancing in the previous half-century. Healthcare organizations lack a systematic, holistic approach to addressing the issues surrounding delivery of care, thus leading to fragmented solutions that do not address the problem as intended and introduce new, unintended issues—in other words, sometimes the cure is worse than the disease. Systems thinking identifies the elements of a system, captures task dependencies, and outlines how work tasks need to be sequenced, coordinated, and synchronized. That which may appear to be an isolated problem within a healthcare organization actually may be part of an interconnected network of related issues, and systems thinking can help in recognizing this dynamic.

In essence, systems thinking consists of looking at the whole instead of the parts. Many problems come from unmet or unknown user needs. Ultimately, a system should satisfy the needs of all its stakeholders, including users, operators, administrators, maintainers, funders, acquirers, developers, suppliers, and the general public. Despite one’s best intentions, attempting to solve complex issues without a systems-thinking approach can lead to unintended consequences. With systems thinking, healthcare organizations learn how the parts of their organization interact rather than how they perform independently.

2. Define Approaches to Evaluating and Understanding System-Wide Effects

A systems-thinking approach can help decode complexities within an healthcare organization and use this understanding to design and evaluate interventions that maximize system performance and patient safety. Without a systematic framework to consider possible intended and unintended effects, the less obvious effects of an intervention may be missed at the design or evaluation stage. Furthermore, the design and evaluation of system-wide interventions require a comprehensive assessment of the contextual factors that can inform whether an intervention was successful. Thus, given the complex relationships that exist in all healthcare systems, a shift in the approaches used to design and evaluate interventions is needed. Traditional approaches (e.g., randomized controlled trials) that focus on linear cause-effect relationships among particular variables and are carried out in limited areas during a short period of time must be supplemented with a systems-thinking approach. Such an approach can iteratively identify the interdependence among variables for which effects often are distantly related to the initial intervention implementation. That is, the effects of an intervention may increase, plateau, or decrease over time. Therefore, interventions designed to affect the behavior of individuals necessitate assessing the effects of the intervention over a long period of time, in order to avoid drawing incorrect conclusions.

A systems-thinking approach requires collaboration among diverse stakeholders in the health system, who work together to design and evaluate innovative interventions. Given the complexity and diverse nature of the interventions being introduced in the healthcare setting, organizations must use mixed methods to provide scientifically rigorous, practical, and actionable results and interventions. A systems-thinking approach typically involves multiple complementary methods to address both fundamental and practical research questions. Core systems thinking methods of evaluation include 1) clinical trials/field evaluations involving human patients that study safety, efficacy, and clinical utility of the health intervention; 2) systematic reviews that critically appraise relevant research to understand the relative effectiveness of an intervention and how it compares with other similar interventions; 3) economic analyses that examine the cost effectiveness of interventions and potential associated cost savings to the healthcare system; and 4) process evaluations that address adequacy of intervention implementation and evaluate how the interventions are operating.

Healthcare organizations must understand what works, for whom, and under what circumstances. To do so, organizations must 1) understand and model the system-wide implications of interventions, 2) select/design interventions, and 3) use mixed evaluation methods that address system-wide issues.

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3. Identify and Nurture Great Systems Thinkers

In any good system-improvement initiative, individuals who exhibit strong leadership traits often lead changes in practice and foster adherence to performance standards. Without necessarily being in a job position that provides them with formal authority, such individuals share knowledge, challenge boundaries, and build consensus. They are the systems thinkers within organizations who involve other people in the task of challenging the status quo. Collectively, they ask questions such as, “Why do we continue to do what we do the way we do it?” They ask the provocative questions needed to protect the future of the healthcare organization, ensuring that processes will improve in the future. In sum, systems thinkers exhibit the following characteristics:

- Acute awareness of the current system (i.e., knowing the current workflow processes and standards in the healthcare organization)
- Appreciation of the patterns and structures behind events
- Willingness to challenge the current system boundaries
- Ability to speak to players at all levels of the hierarchy (i.e., stronger focus on connection rather than autonomy)
- Understanding how system elements are linked
- Understanding how relationships play out before making a decision
- Conceptualizing the attributes of an improved and successful system state
- Possessing the courage and energy to challenge the status quo and seek improvements

An important consideration to note is that “organizational systems thinking” competence transcends that of individual systems thinkers. That is, an organization’s ability to identify opportunities for systems thinking and identify champions for realizing these opportunities can matter as much, if not more, than an individual’s specific systems-thinking traits. Systems thinking is a property of an organization (e.g., an organization can display and have a reputation for high-quality systems thinking), whereas
the systems-thinking abilities of individuals depend on the organization’s commitment to fostering systems thinking.

Organizations must bring together different stakeholders, from different vantage points, who understand different parts of the system to collectively identify issues that individually none of them would identify. To increase systems thinking within an organization, individuals must be trained to think systematically. The most important task of a systems thinker is to create more systems thinkers.

4. Apply a Proactive Approach To Identify Leverage Points

A key component to incorporating systems thinking into a healthcare organization is to identify possible leverage points. Leverage points—places that are most effective in resolving problems—exist within each healthcare organization’s structure. Far too often, healthcare organizations wait until an incident occurs to retrospectively identify problems in their systems. Although investigating incidents that have already occurred is important to limiting incidence of errors (i.e., reactive approach), proactively identifying potential risks to build resiliency into systems and creating systems that tolerate errors is equally if not more important. The reactive approach often attempts to prevent systems from failing in the same way that they failed previously rather than trying to prevent failure entirely, thereby focusing on making people or systems less fallible.

Conversely, the proactive approach focuses on containing damaging effects of errors that will inevitably occur because people and systems are fallible. Furthermore, the reactive approach typically leads to recommendations focused on the need for oversight and people-oriented solutions (e.g., increased vigilance). The proactive approach, on the other hand, leads to system-oriented recommendations such as the need for system reform and evidence-based standardization and regulations. Systems thinking can help healthcare organization create resiliency in systems by concentrating on conditions under which healthcare providers work and by proactively establishing defenses to avert errors or mitigate their negative effects.

A systems-thinking approach encourages healthcare organizations to recognize situations as specific patterns of events rather than isolated events. Within each pattern of events, areas in the system (i.e., leverage points) exist for which small changes can have considerable positive ramifications. The most effective leverage points are not always obvious. For example, increased oversight and vigilance often are touted as the best ways to avoid errors in healthcare. The best interventions, however, may be to design a behavior-shaping constraint that prevents the undesirable user action altogether and/or to train clinicians on human limitations and cognitive biases. Although focusing on human limitations, rather than increasing oversight and vigilance, may appear counterintuitive, it may be the most useful approach. Systems thinking can help identify leverage points within a healthcare system, thereby allowing the most effective change to be realized.

5. Create a Culture of Systems Thinking

To reap its benefits, systems thinking must become an integral part of the practices within a healthcare organization. The result of a great systems-thinking project is not identifying a set of cause-effect relationships; instead, it’s culminating a new capacity for reflective dialogue, deep insight, and shifting entrenched mental models. The ultimate objective of a systems-thinking approach is to build a safe environment in which all stakeholders can discover the hidden consequences of their collective actions and challenge their thinking. Willingness to learn and shift mental models within an organization is essential to this approach.

Understanding an organization’s history of improving the quality of healthcare is critical to building a systems-thinking culture. That is, how has the organization responded to implementation initiatives in the past? Does the organization have a tendency to disseminate innovative but unproven interventions? Does the organization support efforts to pursue evidence-based interventions? These are
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Important questions to answer because flawed, biased, or incomplete data can lead to implementation of interventions that are ineffective or even dangerous to patients.

Has systems thinking been applied previously within the organization? If so, what was the reaction? Some organizations may have previously implemented system-wide interventions that appeared to be promising in the beginning but resulted in modest or no benefits. Such experiences can produce patterns of behavior within the organization that create resistance to change. Learning from prior experiences can result in small changes that, over time, have the potential to create a tipping point. Outcomes of systems-thinking interventions depend on many factors related to patients, providers, and organizations, and these factors remain poorly understood. Thus, the complexity of healthcare and the dearth of evidence on how the interaction of system components influence outcomes provide a strong rationale for conducting incremental changes to evaluate quality and safety interventions whenever feasible. Exercising caution is advised; “draining the ocean” is not necessary. Changes and improvements can be made by looking for small victories in specific places. Stories demonstrating the valuable effect of systems thinking on patient outcomes can be crucial to achieving buy-in among key players.

Conclusion

During past 30 years, the continuing development and application of systems thinking has enabled unprecedented growth in fields as diverse as engineering, ecology, and economics. With increased emergence of complexity, these fields have used a systems-thinking approach to 1) comprehend the relationships among elements within a system and 2) design and evaluate system-level interventions. Systems thinking can provide similar high-level benefits in the delivery of healthcare.

Thus, by providing an overview of key systems-thinking concepts, the current work encourages exploration of how these concepts can be used to improve the delivery of healthcare. For this to happen, organizations must understand and appreciate the power that systems thinking can bring to redesigning and improving the quality and services within healthcare environments. By applying a systems-thinking approach, healthcare organizations will operate more successfully and effectively by identifying and resolving health-system challenges.

References

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