Focusing Quality Improvement Efforts through Lean Six Methods in Health Information Technology

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ABSTRACT

The translation of healthcare quality into meaningful and actionable strategies requires use of a holistic, rigorous, and well-organized approach to quality improvement. The framework established through Lean Six Sigma (LSS) has increasing relevance for use within healthcare organizations, particularly for design and redesign of health information technology (HIT). This article presents the central framework of LSS with primary consideration of health information technology (HIT) applications and quality improvement. Through use of statistical principles and methods typically found in statistical quality control, healthcare organizations can begin to understand how HIT applications can facilitate achievement of quality and efficiency-related goals and objectives.

Keywords: *Health Information, Lean Six Sigma, Quality Improvement, Process Reengineering, Strategy, Systems Design*

INTRODUCTION

Healthcare systems are complex entities with highly interdependent processes with outcomes dependent upon the extent to which designers have considered the linkages, resources, and roles of those influencing and using the system. Yet variability throughout the system can wreak havoc on leaders and managers intent on establishing a system with sufficient stability to reliably provide the type of care needed in order to meet these broad goals. Variable demand for services, variable availability of productive inputs, and variable quality of inputs can lessen the healthcare organization's ability to adequately plan for and deliver the type of healthcare services needed to provide care that is both customer focused and business sensitive.

The achievement of quality healthcare through health information technology (HIT) is a broad goal for any healthcare organization. The challenge for healthcare organizations lies in the translation of these goals into strategies that efficiently address a diverse and competing set of demands. The translation requires establishment of measurable objectives and use of methods that allow the organization

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to determine the optimal means of achieving objectives. The translation of this broad goal into strategy should ideally prevent errors in decision-making, not only related to the design of and investment in new systems, but also in the redesign of existing systems and processes.

The idea that HIT has the potential to improve healthcare performance is reflected in large scale efforts to develop strategies and resources to increase utilization of HIT (United States Government Accountability Office (GAO), 2005a). Over the past few years, several countries, including Canada, Denmark, New Zealand, and the United States, have developed national-level strategies to leverage HIT to improve efficiency and quality of care (United States Government Accountability Office). Strategic goals established through these types of initiatives are ultimately effective to the extent that they are translated into action.

Exhortations to achieve quality goals or exceed industry benchmarks are meaningless if the organization can neither define quality nor uncover the causes for failure to meet some specification or exceed specifications that other organizations are apparently achieving. Similarly to Wheeler's (1993) observation of error-prone decision-making behavior in leadership, it is the thinking that some course of action (say, HIT implementation) is the answer to a particular problem without truly understanding what the problem is in the first place. Organizations could be making costly errors by missing key opportunities for improvement if an organization either jumps to the conclusion that HIT is the solution without understanding the problem or fails to observe that HIT could be the solution because changes in processes that would benefit from HIT are not detected.

Through use of statistical principles and methods typically found in statistical quality control, healthcare organizations can begin to understand how HIT applications can facilitate achievement of quality and efficiency-related goals and objectives. Coupling rigorous inquiry about the relationships between inputs, outputs, and processes with organizational commitment and support to the process of inquiry within a robust improvement framework inquiry would be one means of spanning and translating broadly stated goals into meaningful objectives and the Lean Six Sigma (LSS) program is an ideal framework that incorporates this approach to quality improvement. Because the program is process focused, the use of the program in analyzing HIT applications that influence the process of care is particularly attractive. This paper provides a brief introduction to LSS and the define-measure-analyze-improve-control (DMAIC) framework, discusses utilization of the program in terms of healthcare and health information technology, and concludes with the key implications for HIT design and redesign with respect to use of LSS.

LEAN SIX SIGMA

Background

Lean Six Sigma (LSS) is a structured and parsimonious quality improvement program with tremendous potential to facilitate quality improvement efforts within and between healthcare organizations. The program includes a top-down management system that emphasizes the importance of culture, measurement and improvement goals (George, 2002). Brett and Queen (2005) describe the program as "the latest evolutionary step in the history of manufacturing that marries Henry Ford's Lean Flow manufacturing process of the early 1990s with the Six Sigma process created by Motorola Corp. in the 1980s" (p. 58) with use of "techniques to increase speed and reduce waste and process complexity, while employing processes to improve quality" (p. 60). The focus of Six Sigma is the reduction in the variability of quality characteristics to levels in which defects are exceedingly unlikely (Montgomery, 2001).

The LSS program draws from several prominent strategic and statistical quality control methods and frameworks. In its identification of project identification, for example, George (2002) notes that the Program makes use of "balanced scorecard" (p. 133) concepts and classifications. From this particular per-