Classification of Waste in Hospitals

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INTRODUCTION

The health care industry today is a complex web of ever-changing relationships among patients, physicians, hospitals, insurers, employers, communities, and government. A combination of factors, including the emergence of intense, dynamic competition (and consolidation) and increasing expectations of demanding patients, has generated a challenging environment for hospitals. Today, spending on health care in the United States has risen to $1.3 trillion, which almost equals 14.5% of the United States GDP. The cost of providing health care in OECD countries ranges from 7% to 9% of GDP (Folland, Goodman & Stano, 1997) and is expected to rise due to the aging population, an increasing number of chronic health conditions, soaring drug costs, and costs of new technology. With health care costs continuing to rise faster than general inflation, a theme that resonates throughout the health care field today and receives increasing attention from policymakers, academia, and industry is the necessity to contain costs without compromising quality of care. Here we interpret the quality of care as how cost effectively the hospital organizes its resources to meet the medical requirements of its patients.

Hospitals have to focus their efforts on identifying and eliminating waste of all forms if they are to succeed in today's competitive landscape. A recent study by the Murphy Leadership Institute (Murphy, 2003) concluded that wasteful work consumes more than 35% of hospital employees' time. This wasteful work includes activities such as completing multiple forms for the same task, filing inefficient shift-to-shift departmental reports, waiting for medications, and searching for misplaced records. Jimmerson warns that the actual amount of waste in health care lies closer to 60% (Panchek, 2003).

In this chapter, we briefly review principles of lean philosophy for improving performance and then present a classification of waste that is relevant to hospital management. This classification is aimed at directing hospital initiatives toward understanding and controlling waste in its health care delivery processes. Through several examples from real-life hospital case studies that we have investigated, we trace much of the waste to various types of variability (both natural and artificial) and offer prescriptions to control variability. We then provide some guidelines for streamlining processes and show how this would benefit various stakeholders. We conclude the chapter with some directions for further research.

BACKGROUND

Since the 1980s, hospitals have borrowed concepts and ideas that have helped transform manufacturing industries for decades. These include ideas from total quality management, lean thinking, and six sigma approaches. Although there are some overlaps among these principles, in this chapter, we focus primarily on lean principles and their applications in hospitals.

Lean Thinking in Hospitals

Toyota Production System principles, popularized by Womack, Jones, and Roos (1990) as lean production concepts, have helped turn around many manufacturing firms. Although Womack and Jones (1996b) state that the principles of lean production can be applied equally in every industry around the globe, the adoption of lean principles has largely remained limited to the manufacturing industries, and there is sparse evidence to suggest the effective "crossover" of these principles to nonmanufacturing settings. However, some recent research holds promise for the transferability of these principles to the service sector; in particular, to the health care sector. Lean patient care is all about creat-

ing more value for patients through the elimination of all nonvalue-adding steps in the health care delivery process. Wysocki (2004), Miller (2005), and Weber, Jimmerson, and Sobek (2004) have documented initiatives highlighting how lean thinking is helping to transform hospitals around United States.

In the following sections, we investigate how waste manifests in hospitals and offer prescriptions for its reduction/elimination.

MANIFESTATION OF WASTE IN HOSPITALS: CLASSIFICATION, REASONS, AND CURES

Drawing on the vast literature that exists on the Toyota Production System (Liker, 2004; Monden, 1993; Womack & Jones, 1996a; Womack et al., 1990), we offer a classification of waste, highlighting how waste propagates in hospitals. This classification is expected to assist both hospitals and other players in the health care value chain in their pursuit of the elimination of waste.

Waste Classification

Ohno (1988) identified and popularized the notion of seven wastes in manufacturing that include overproduction, waiting, unnecessary transport or conveyance, over-processing or incorrect processing, excess inventory, unnecessary movement, and defects. We provide a revised classification of waste that adapts each waste in Ohno's classification to fit the health care context.

1. **Over-servicing.** This waste identifies situations in which patients are being processed or served at a stage earlier or faster than their actual needs in subsequent stages. This is a symptom of patients being pushed through the system. Such an approach appears logical and cost-effective when batching economies or other constraints due to poor coordination are present. However, this push approach often creates greater congestion and larger queues. For instance, in many of the hospitals we have studied, patients scheduled to have surgery in the morning session in a theater were all requested to arrive between 6.45 and 7.15 A.M. Our investigation found that this practice was followed to allow anesthetists to complete their preassessment of patients prior to the commencement of surgery on the first patient. This practice is largely motivated by their need to be physically present in the theater for the complete duration of surgery, poor information transfer of patient medical records between surgeons and anesthetists, and the pressure from surgeons to ensure fast turnaround between surgical cases. As a consequence, there is a glut of patients undergoing preoperative assessment much ahead of their scheduled need, overburdening the subsequent stages resulting in chaotic movement of patients, staff, and information and long wait times.
   Another example of over-servicing is when diagnostic tests are performed much ahead of their actual requirement, causing redundancies and wastage of resources. In addition, requesting more diagnostic tests than what is required for accurate assessment, is an example of over-servicing patients.
2. **Waiting.** In hospitals, one can observe two kinds of waits—one experienced by patients and another by staff and doctors in the system. Under lean philosophy, both of these waits are categorized as waste. Patient waits correspond to poor service and are undesirable. Resource waits result in reduced utilization and increased costs for the hospital. Hospital practices focus on minimizing the wait for doctors and its staff and resort to batching strategies, which result in higher waits for patients. Lack of coordination across stages also results in excessive patient waits and doctor waits. Patient waits have other costs that are normally not well recognized by hospitals. For instance, you need more room to hold them, more resources to engage and monitor them, and more resources to progress them through the system.
   To improve performance on this measure, hospitals need to understand the implications of queuing and the causes and costs of congestion. Little's law from queuing theory provides a useful framework, illustrating the linkage between average patient wait time, the average number of patients in progress, and patient throughput rate.
3. **Unnecessary transport or conveyance.** Historically, hospitals have been designed by specialty rather than around the patient. As a result, we often find patients who are in the middle of their treatments moved a long distance, creating