



## Examining pathways to safety and financial performance in hospitals: A study of lean in professional service operations



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### ABSTRACT

Healthcare operates in a complex professional service environment that faces challenges in delivering high quality and affordable care – a set of goals that some healthcare professionals believe are incongruous. To consider opportunities to achieve these important outcomes, this study examines the relationships among comprehensive lean orientation, internal integration, patient safety, and financial performance. This study draws on the professional services operations (PSOs) literature stream to explain and offer a means of addressing the complexity of healthcare delivery. Grounded in dynamic capabilities, this study develops a model for improving financial performance and patient safety in hospitals. Using structural equation modeling, the model is tested with survey data from 211 acute care hospitals in the USA that are matched with data from two other sources – objective patient safety data from the Centers for Medicare and Medicaid Services and objective net income data from the American Hospital Directory. Results indicate that although a comprehensive lean orientation has a direct and positive impact on patient safety, it impacts financial performance indirectly through internal integration. The results have major implications for enhancing patient safety and financial performance in healthcare service organizations, and improving operations in PSOs more broadly.

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### 1. Introduction

Patient safety and financial performance have been the focus of increased attention in healthcare (Li and Benton, 2006; McFadden et al., 2009). The Institute of Medicine views patient safety as “freedom from accidental injury,” and claims that medical errors are responsible for about 98,000 deaths annually (IOM, 2000, p. 4). However, a recent study (James, 2013) reports that the number of deaths associated with preventable medical errors are actually substantially higher – closer to 400,000 deaths per year. This makes medical errors the third leading cause of death, behind heart disease and cancer. As a result, reducing medical errors – keeping patients safe – is receiving substantial attention from hospital executives given the serious adverse impact of these errors on patients and the notion that many such errors are preventable (IOM,

2000).

The escalating cost of delivering care is another key challenge that has put pressure on the healthcare industry (Li and Benton, 2006). Healthcare spending, which currently stands at approximately 17% of Gross Domestic Product (GDP), or nearly \$3 trillion, will account for nearly 20% of GDP, or approximately \$4.3 trillion, by 2020 (Kaiser Family Foundation, 2014). This has caused some to suggest that any discussion of healthcare improvement ought to include the topic of reducing cost (Hwang and Christensen, 2008). Hospitals are a major contributor in the “healthcare spending category,” as they account for approximately 40% of total spending, making them an important target for cost reduction efforts (CMS, 2011). As such, it is not surprising that healthcare payers, such as private insurance companies and the US federal government (the Center for Medicare and Medicaid Services – CMS), have imposed tighter controls and reduced reimbursements to hospitals, thus squeezing margins (MPAC, 2012).

To improve patient safety and financial performance, many healthcare organizations have implemented quality initiatives such as lean process improvement. This may be because empirical studies in other operational contexts provide evidence of the

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effectiveness of lean in reducing lead times, improving space utilization, increasing throughput, improving quality, and increasing financial performance (Shah and Ward, 2007). As such, lean is expanding beyond traditional manufacturing processes into professional services operations (PSOs) in areas like healthcare, insurance, and accounting (Lewis, 2000; Apte and Goh, 2004; Shah et al., 2008; Berwick et al., 2008; LaGanga, 2011; Fullerton et al., 2014). However, in healthcare, some believe that lean concepts, such as standardizing processes and eliminating waste, will reduce professionals' autonomy and limit their ability to make the best decisions for patients and provide safe care (Graban, 2009). These concerns over the effectiveness of lean in hospitals are amplified by studies that have failed to find significant relationships between process improvement and either financial performance or customer satisfaction (Douglas and Fredendall, 2004). Other studies provide evidence that quality initiatives may increase hospital acquired infections, a common measure of patient safety (McFadden et al., 2015). A recent comprehensive literature review of 177 articles found weak empirical evidence that lean improves healthcare quality (see Dellifraigne et al., 2010).

Contributing to this problem is the fact that lean is often misunderstood (Lewis, 2000). Many hospitals implement lean with a narrow focus on eliminating waste and improving financial performance (Dahgaard et al., 2011; Dellifraigne et al., 2010). However, lean emphasizes a comprehensive view that includes quality management principles and customer focus (Shah and Ward, 2007). To obtain the benefits of lean in PSOs, waste elimination must be embedded in a context of quality management and value creation for patients that proliferates throughout the organization (Mazzocato et al., 2010). A comprehensive implementation of lean has been shown to be useful in other PSO contexts such as accounting practices (Fullerton et al., 2014). Comprehensive lean orientation can improve firm performance by developing shared knowledge structures among service providers regarding how work ought to be executed (Goodale et al., 2008). For example, Boone and Ganeshan (2001) showed that departmental experience increases engineers' productivity because service providers develop a common knowledge and skill set. Thus, a comprehensive lean orientation provides a means to increase management's influence over service providers, a challenge in law firms, managed care organizations, and other PSOs (Harvey, 1990; Heineke, 1995; Lewis and Brown, 2012). Following theory, this study conceptualizes lean in a holistic manner and argues that a comprehensive approach is necessary to achieve both patient safety and financial performance in hospitals.

To address the patient safety and financial performance dilemma, this study draws on the professional services literature (Abbott, 1988; Goodale et al., 2008; Lewis and Brown, 2012) to highlight the complexity of healthcare delivery and describe the role of integration in linking a comprehensive lean orientation to financial performance. Healthcare delivery is a professional service characterized as "complex, customized and reliant upon the knowledge and expertise of the server" (Heineke, 1995, p. 255). In this environment, linking disparate professionals is useful in achieving high levels of hospital performance (Nembhard et al., 2009; Boyer and Pronovost, 2010; Dobrzykowski and Tarafdar, 2015). Integration can unlock improved performance for PSOs such as insurance services organizations where loosely coupled independent adjusters and legal professionals need to share information about claims (Apte and Goh, 2004). Likewise, integration can coordinate the work of architects, electrical, mechanical and civil engineers in multi-disciplinary engineering PSOs where productivity is often hampered by service process and project variation (Boone and Ganeshan, 2001). These engineers may individually perform at a high level in their work to create drawings, technical

specifications and cost estimates, but unless those individual, workplace outcomes are integrated, organizational-level performance may suffer (Bala, 2013). Integration is particularly important for PSOs employing lean given that alignment and coordination among multiple functions has been shown to be key to improving financial performance (Fullerton et al., 2014). Therefore, the PSO literature stream appears to be useful in conceptualizing a model linking comprehensive lean orientation, integration, patient safety, and financial performance.

The model is tested using a matched dataset from three sources comprised of primary survey and secondary archival data collected from 211 acute care hospitals in the USA. Primary data are used to measure hospitals' lean orientation and integration practices, while secondary data are used to measure patient safety (patient safety indicators from CMS) and financial performance (net income from the American Hospital Directory). The study contributes to the healthcare operations literature by providing important insights into the effectiveness of lean in improving both patient safety and net income, a topic that is still much debated in the literature. This study also contributes to the PSO literature by providing insights into the key roles of comprehensive lean orientation and integration in addressing the unique characteristics facing PSOs: 1) high customer contact and customization, 2) high service process variation, and 3) substantial external influences on service providers (Lewis and Brown, 2012).

## 2. Comprehensive lean orientation in healthcare

Some researchers and practitioners view lean production narrowly with a primary focus on eliminating waste and non-value-added activities. However, more recent perspectives argue that lean should be approached comprehensively as a philosophy or way of thinking, which includes a set of guiding principles grounded in total quality management, continuous improvement, and customer relationship management (Shah and Ward, 2007; Mazur and Chen, 2008; Poksinska, 2010; Holden, 2011; Longoni et al., 2013). A critical component of lean is to identify and eliminate waste from the customers' perspective, and thereby deliver exactly what customers want, on time and defect-free (Nelson-Peterson and Leppa, 2007; Poksinsk, 2010; Holden, 2011; Mazzocato et al., 2010). Lean has its roots in the Toyota Production System and is based on a set of quality practices focusing on maximizing customer value (Mazzocato et al., 2010; Holden, 2011). Womack and Jones (1996) were among the first to propose the application of lean thinking to service industries, specifically to healthcare.

"The most pressing task of healthcare [delivery] is to make care effective and affordable" (Coye et al., 2009, p. 126). While it is commonly accepted that the current trajectory for cost is unsustainable (Hwang and Christensen, 2008), there is less consensus regarding where to focus improvement efforts. "Medicare Part D spending [covering pharmaceutical drugs] is estimated to be about \$51 billion in 2009," (Dicken, 2009, p. 3) and is expected to rise. Health insurance premiums increased by 131% from 1999 to 2009 (National Coalition on Health, 2009) and are likely to increase. These facts lead some to focus improvement efforts on the upstream or middle portions of the healthcare delivery supply chain, such as the medical device, equipment, biotech pharma, and claims administration firms. See Fig. 1.

When considering downstream professional services, which include healthcare professionals, hospitals, clinics, home health agencies, and patients (Ford and Scanlon, 2007; Sinha and Kohnke, 2009), some argue against reducing costs based on quality concerns. However, hospital care and physician and clinical services account for more than half of total healthcare spending in the USA,

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