



Examining the impact of health information systems on healthcare service improvement: The case of reducing in patient-flow delays in a U.S. hospital

Jun-Ing Ker^a, Yichuan Wang^{b,*}, Nick Hajli^c

^a Industrial Engineering Program, Louisiana Tech University, Ruston, LA 71272, USA

^b Newcastle University Business School, Newcastle University, UK

^c Faculty of Management, University of Tehran, Iran

ARTICLE INFO

Keywords:

Health information systems (HIS)
Patient-flow delays
Kaizen method
Process improvement
Healthcare

ABSTRACT

The impact of Health Information Systems (HIS) on healthcare service improvement is well known; however, there has been a limited amount of research regarding the HIS payoff and how this has influenced the quality of patient care. By focusing on Kaizen, this study investigates the possibility of reducing patient-flow delays of outpatients using the HIS. By using a six-step Kaizen method, the root causes of patient-flow delays in the outpatient surgery process were first identified, followed by the development of potential solutions and implementation plans. Afterwards, the role the HIS has on the outpatient surgery process and the economic impact it can have on patient care operations were analyzed. The findings of this study indicate that the adoption of HIS has great potential to not only minimize the chaos and disorder in the outpatient surgery unit but also lead to a reduction of time and cost in relation to patient flow.

1. Introduction

In response to the Patient Protection and Affordable Care Act (PPACA) which was brought into law by the U.S. Federal Government in 2010, healthcare organizations began to look for new opportunities in order to help them reduce the cost of healthcare without sacrificing the quality of patient care. However, one of the main struggles that healthcare organizations faced when trying to control rising healthcare costs was the hospital's inability to manage patient-flow (Alliance for Health Reform, 2012), especially in outpatient surgery (Cardoen et al., 2010; Lee and Yih, 2014). Paper's report (2011) breaks down the cost of healthcare services and illustrates that outpatient surgery accounts for a large proportion of healthcare service categories and remains the most expensive outlay in the overall outpatient visit service. Amongst the surgery operations recorded, 65% were performed as outpatient procedures, with 35% being completed as inpatient procedures. According to the Health Care Cost Institute's report (HCCL, 2014), outpatient surgery per capita spending in U.S. hospitals accounts for 61.9% (\$526 per capita) of outpatient visits, with this figure rising at a considerable rate since 2010.

In outpatient surgery, patient-flow delay is often caused by issues with surgery scheduling, patient overcrowding, as well as the mass of patients queuing. A delay like this has such a significant impact as it is one of the most cost intensive areas in a hospital. These delays, in turn,

result in an increase in patient dissatisfaction and lower the quality of care (Lee and Yih, 2014; Min and Yih, 2010). In the past, Health Information Systems (HIS) have proven to be an effective tool to address these issues (Kim et al., 2016; Lucas et al., 2013; Mantzana et al., 2007). Many researchers recognize the benefits of incorporating HIS into clinical practices (e.g. Agarwal et al., 2010; Bhattacharjee et al., 2007); however, research has shown that healthcare organizations do not fully know how to measure the HIS payoff and are unable to quantify the effects of HIS (Jones et al., 2012). To date there has been little attempt to improve a hospital's understanding of how to deploy HIS within their healthcare organization in order to achieve an efficient patient-flow and how to evaluate its consequences: e.g. how much time or cost is saved? Does HIS work effectively? (Ammenwerth et al., 2003; Devaraj et al., 2013; Ker et al., 2014a; Yusof et al., 2008).

We seek to fill this gap by employing a six-step Kaizen framework developed by Kato and Smalley (2011), then take a step-by-step approach to improve patient-flow delays by implementing an HIS in an outpatient surgical unit at Louisiana State University Health Sciences Center (LSUHSC) at Shreveport, Louisiana. This study primarily focuses on the solutions to patient-flow delays at outpatient surgical suites and cancellations caused by pre-operative patient bottlenecks in the outpatient surgical unit.

In the next section, the previous literature relating to the effects of HIS and Kaizen in healthcare will be analyzed. Section 3 details the

* Corresponding author.

E-mail address: yi-chuan.wang@newcastle.ac.uk (Y. Wang).

cases used in this research along with the research methodology used. In Section 4, the application of the six steps of Kaizen to the case study will be discussed with the results of the process improvement being presented. The practical implications of this implementation and the final verdict of its success will be given in Section 5.

2. Literature review

2.1. Impact of HIS on patient-flow

HIS refers to “a computer system aimed at providing a paperless environment that covers all aspects of the hospital's operation such as clinical, administrative, and financial systems” (Nilashi et al. 2016, p. 244). It can be observed that the adoption of HIS has certainly improved the quality of the healthcare service through a number of salient benefits, such as cost reduction in care delivery, medical error prevention, and clinical outcome improvement, all of which have been identified in existing HIS literature (Agarwal et al., 2010; Bhattacharjee and Hikmet, 2007; Bhattacharjee et al., 2007; Goh et al., 2011; Ker et al., 2014a; Mantzana et al., 2007).

HIS has the potential to fill the growing need for healthcare managers to improve the efficiency of clinical workflow and patient flow (Devaraj et al., 2013; Ker et al., 2014a; Zheng et al., 2011). Patient flow is recognized as a key factor influencing hospital productivity and utilization (Devaraj et al., 2013). If patient flow is delayed by an inefficient stay and administrative operation process, the cost of healthcare will undoubtedly increase and the quality of care will diminish (Neil, 2003). Van Oranje-Nassau et al. (2009) suggest that the adoption of HIS with the use of RFID technology can eliminate human error in the healthcare sector. In recent studies, the effective use of an emerging HIS and the incorporation of big data analytics enabled hospitals to take prompt action in reducing delays in clinical workflow and patient flow (Wang and Hajji, 2017; Wang et al., 2016, 2017).

The existing literature provides substantial evidence that investing in HIS can offer the opportunity to redesign patient flow and as a result transform existing health service processes. Nevertheless, the approach healthcare organizations must take to deploy HIS and evaluate how HIS will actually payoff in the long run still remains unclear. In the following sections, we will discuss how to apply the Kaizen method from an operations perspective in healthcare to justify the investment in HIS.

2.2. Kaizen in health care

Kaizen, a Japanese business philosophy, is a concept that underlines the core principles of obtaining continuous improvement which involves everyone in the organization. Kaizen is a series of policies that continually utilize incremental changes in an operation or business using the method: plan, do, check, and act (PDCA), in order to boost quality and efficiency (Kato and Smalley, 2011). The Kaizen method utilizes a specific set of technical problem-solving tools that have the potential to impact both production and employee performance (Ker et al., 2014b). This method mainly focuses on the activities that identify and quickly remove the unnecessary elements of a particular process in the value stream, making it an effective approach when companies need help in achieving lean manufacturing.

Kaizen methods have been widely applied to numerous operations and production processes in the manufacturing industry (e.g. García et al., 2013, 2014; Glover et al., 2014; James et al., 2014; Ker et al., 2014b). In the healthcare system, the introduction of lean manufacturing methods have become the latest trend (Ker et al., 2014a; Lee and Yih, 2014; Van Essen et al., 2012). In particular, Kaizen, one of the most effective lean manufacturing methods around, has become a method of considerable interest to the healthcare operation field (e.g. Iannettoni et al., 2011; Jacobson et al., 2009). With the intention of improving healthcare quality, some healthcare organizations have adopted the Kaizen approach to accelerate patient-flow and efficiently

manage the healthcare service. One of the advantages of using Kaizen is that it lays the foundations for using the specific steps when conducting Kaizen policies in practice (Kato and Smalley, 2011).

Two of the best practices that used the Kaizen method to help improve healthcare performance will be now discussed, revealing not only the potential benefits but the impact this method could have on the entire healthcare system. First reported by The New York Times in 2010, the Seattle Children's Hospital introduced the Kaizen approach to improve patient care via a series of continuous small changes to the supply systems (Weed, 2010). Seattle Children's Hospital started to use the continuous performance improvement (CPI) to examine every aspect of a patient's stay, from the moment they arrived until they were discharged. By using this improvement the average waiting time regarding various surgeries reduced from 25 days to around 1 to 2 days, whilst addressing inefficient drug distribution systems helped to save \$3.5 million in expenses in relation to the expansion of the hospital's surgical suites thanks to an increase in the number of surgeries they could perform.

Another institution that used the Kaizen method to help improve its healthcare performance was the Department of Emergency Medicine in the Vanderbilt University Medical Center (Jacobson et al., 2009). Here they created a continuous quality improvement (CQI) program, focusing on a suggestion-based model by means of a Kaizen cycle. CQI allowed Vanderbilt University Medical Center to empower all members of staff and departments to submit their “Kaizen Initiatives (KIs)” through a web-based Kaizen tracker application. This program resulted in over 400 changes occurring within their emergency department system, driving improvements concerning operational change and information dissemination regarding current standard operation procedure (SOP).

Furthermore, previous research has primarily focused on the adoption of the Kaizen methods in healthcare services (see Table 1 below). The organizational and operational benefits of adopting the Kaizen method are evident from these studies; for example, one recent study indicated that healthcare delivery systems could be dramatically improved through the use of Kaizen events, which in turn would boost the efficiency of day-to-day operations, the staff scheduling, and time utilization. For that reason, the incorporation of Kaizen into various sectors of the healthcare system has proven to be an effective approach in establishing low-cost high-quality healthcare services.

3. Methods

3.1. Case setting

The purpose of this case study is to examine the impact of the Kaizen method in relation to healthcare service improvements at an outpatient surgical unit in the case hospital. The LSUHSC is a public healthcare center pertaining to one of the largest hospital systems in the United States. In 2013, LSUHSC had more than 450 licensed inpatient beds, treating around 450,000 outpatients and 20,000 inpatients, while also dealing with about 2500 deliveries, approximately 1000 major surgeries, and 600 minor surgical procedures. LSUHSC serves a large proportion of Louisiana's underinsured, uninsured, and low-income populations. This strain on the States healthcare system highlights the urgent need for cost-effective healthcare services as well as the enhancement of effective and efficient healthcare operations.

3.2. Research design and approach

The epistemological foundation of this study is based upon the interpretivist paradigm with the case study method being used here being highly appropriate for interpretivist research. Darke et al. (1998) and Walsham (1993) suggested that this method is well suited for understanding how IT-related innovations interact with organizational contexts. As the purpose of this study is to understand how HIS has the

Download English Version:

<https://daneshyari.com/en/article/7255754>

Download Persian Version:

<https://daneshyari.com/article/7255754>

[Daneshyari.com](https://daneshyari.com)