A CASE STUDY CONDUCTED WITH NURSES

Student Authors

Authors **Kyasha Edmond**, industrial technology, **Cameron Brown**, industrial engineering, **Vinchessica Gray**, and **Nakia Taylor**, industrial technology, are all students at Purdue University. They share an interest in lean initiatives, particularly in improving health care systems. The team participated in this research as part of the Louis Stokes Alliance for Minority Participation (LSAMP), an undergraduate research foundation funded by the NSF. Edmond, the primary author of this article, began development of this research in 2011.

Mentors

E. Shirl Donaldson is a recent PhD graduate student and postdoctoral fellow in the College of Technology at Purdue University. Upon completing her master's degree, Donaldson began working in her family-owned manufacturing firm. In addition to operating a manufacturing firm, her family has owned other small companies. As a doctoral student, she functioned as a teaching and research assistant in areas of the technology department and the engineering department. Donaldson served as cochair of the Technology Graduate Student Advisory Council (TGSAC) and was an active mentor for undergraduate students in LSAMP. Today, Donaldson continues to mentor students and is conducting her own research in entrepreneurship and diversity.

Abstract

The implementation of lean methods in a health care setting is difficult when nurses are inadequately informed about lean techniques, principles, and the intent of these when applied in health care. To aid in communication amongst health care officials and ease of workplace transformation, there is a need for a supplemental lean education program that is tailored to the needs of nurses. The high-level objective of this research project is to identify and eliminate waste in health care facilities to ultimately save the facility (public-, private-, or government-owned) money without compromising customer satisfaction. The ultimate goal of this project is to develop an introductory presentation and documentation material to help inform nurses about the importance of implementing lean techniques and principles. In this article, current inefficiencies in nurses' work processes are identified. An inventory of their current knowledge base and learning outcomes is developed through discussion-based interviews.

Edmond, K., Brown, C., Gray, V., & Taylor, N. (2013). A case study conducted with nurses: Insight into the implementation of lean principles and techniques in a medical setting. *Journal of Purdue Undergraduate Research*, 3, 38–43. <http://dx.doi.org/10.5703/jpur.03.1.06>

Keywords

health care, lean, six sigma, waste

Henry Kraebber is recognized nationally as a leader in manufacturing engineering technology education through his teaching and service. His professional focus is on manufacturing education related to the integration and improvement of manufacturing operations and information systems. Kraebber also is a Regenstrief Fellow. He is an active leader in his department and has participated on committees that serve the College of Technology in the Mechanical Engineering Technology (MET) and Manufacturing Engineering Technology (MFET) degree programs.

A CASE STUDY CONDUCTED WITH NURSES:

Insight into the Implementation of Lean Principles and Techniques in a Medical Setting

Kyasha Edmond, Cameron Brown, Vinchessica Gray, and Nakia Taylor, Industrial Engineering/Technology

INTRODUCTION

In the context of production practices “lean” is a system of techniques and activities used in service operations and manufacturing settings. The techniques and activities differ according to the application at hand, but they have the same underlying principle: the elimination of all non-value-adding activities and waste from the business (ASQ, 2013). Lean encourages a constant search for improvements. This will help identify and eliminate waste in health care facilities to ultimately save the facility funds without compromising customer satisfaction (Kim, Spahlinger, Kin, & Billi, 2006; Brandao de Souza, 2009).

Our research observed the quality of processes and services in health care to help identify the waste associated with different processes. Health care quality in this context is the extent to which health services provided to individuals and patient populations improve the desired health outcomes. The care should be based on the strongest clinical evidence and provided in a technically and culturally competent manner with good communication and shared decision making (PeerPoint Medical Education Institute, LLC, 2012). Adopting a lean culture will enable and prepare nurses to participate in the transformation of their workplace (Spear, 2005). Nurses may be reluctant to participate in procedural changes in policy and method if they are not aware of the purpose behind them and the ideal outcome (Waring & Bishop, 2010). The ultimate goal of this project is to develop a presentation and/or documentation material to help inform nurses about the importance of implementing lean techniques and principles. To achieve this goal, an inventory of current knowledge base and learning outcomes must be developed. For this study, a directed discussion held with Indiana University Health Arnett

Hospital (IU Health Arnett) enabled the gathering of information about lean applications in their facility. IU Health Arnett is a fairly new hospital that has adopted some lean techniques in order for their hospital to run more efficiently and effectively (Figure 1).

Engaged throughout this process were nurses and members from their lean team who have had an opportunity to become certified in lean and Six Sigma. According to the American Society for Quality (ASQ), Six Sigma is a fact-based, data-driven philosophy of quality improvement that values defect prevention over defect detection. This philosophy aids in identifying and eliminating waste that may contribute to overall success of the organization. It drives customer satisfaction and bottom-line results by reducing variation and waste, thereby promoting a competitive advantage. It applies in all areas where variation and waste exist, and every employee should be involved (ASQ, 2013). For this study, nurses shared how their Six Sigma training has allowed the implementation of

Figure 1. IU Health Arnett hospital in Lafayette, Indiana, opened in 2008 and has adopted a number of lean techniques.

Figure 2. Ninety-five percent of most operations are considered waste. In this study, eight wastes were identified that may contribute to inefficiencies in a medical setting.

improvements throughout their work environment. To help identify the connection between lean in manufacturing and applying lean in health care, our research team compared the eight wastes typically used in manufacturing and the daily processes in a medical facility. There are eight terms that are typically used to identify waste in a manufacturing setting (Dennis, 2007). The following examples describe how they may express themselves in a medical facility:

Excess Motion

A nurse realizes that a patient needs more towels for his or her afternoon bath. The nurse walks to the storage station located on the floor, but the towels the nurse needs are not there. Now the nurse must take time away from the patient to locate necessary materials that should have been one step away.

Delay or Waiting

A patient has scheduled an appointment for 4:30 p.m. Upon arrival, the patient has to fill out necessary paperwork for his or her medical records. The patient completes the paperwork at 4:40 p.m. and has to wait for the medical team to process the information for the visit. The patient does not see the doctor until 5:00 p.m.

Conveyance or Transportation

This waste is related to moving parts, subassemblies, and finished goods. It occurs because of poor workplace layout, poor workflow, location of suppliers, and the medical facility's location in relation to the patients.

Correction or Defects

All the costs associated with making and correcting defective products or services constitute a waste. This

includes the material, time, energy, and distraction associated with dealing with the problem. Defects are often related to the waste generated by not having standardized work processes or underutilizing the skills of the workers.

Overprocessing

This is a subtle form of waste that relates to overdesign or giving the patient more than he or she values. For example, during the start of a patient's visit to the hospital personnel require him or her to fill out paperwork. As the visit progresses, the patient is informed that he or she must travel to another room or location to begin diagnosis and testing. Upon arrival at the new location, the patient is asked to fill out more paperwork. The patient notices that the information required is the same as from the start of the visit. This can be considered over-processing because the patient's information was replicated multiple times, instead of being delivered to all departments involved during the visit.

Overproduction

This waste deals with producing products that do not sell. An example of this waste in a medical setting is having more nurses on staff than necessary. They produce services to their patients, and overstaffing may cause unnecessary confusion in role delegation or task completion.

Inventory

Centralized storage locations provide the ease of identification of location, but not ease of access. If storage materials are not readily available, a nurse may need to leave his or her patient to grab only what he or she needs or to restock materials.

Knowledge Disconnection

A knowledge disconnection inhibits the flow of knowledge, ideas, and creativity, creating frustration and missed opportunities. For example, if a nurse switches shifts during a patient's visit and it is not communicated that the patient's bed sheets have already been changed and turned down, the process may be completed again. This lack of communication may contribute to more waste in time and motion, which creates an unnecessary frustration.

PURPOSE AND RESEARCH QUESTION

An interest in applying lean principles and techniques to industries other than manufacturing drove the development of this study. The purpose of the present study is to gain an understanding of nurses' current knowledge of the inefficiencies in the workplace and the alignment of that knowledge base with a lean application. The research question asked how lean principles and techniques could be implemented in a medical setting with nurses.

METHODS

Through multiple avenues of communication, the team was able to conduct valuable discussions with nurses and administration at IU Health Arnett to gain their perspectives about methods and improvements being made in their work areas. A directed discussion and survey analysis held with active health care employees and nurses of IU Health Arnett and nurse shadowing describes the current procedures to identify areas for modification. A survey and analysis inventory taken during this time helps to generalize nurses' prior knowledge of lean. Analyzing this inventory identifies various methods and processes that need improvement in a medical setting.

In this study, raw data collection began by distributing surveys to nurses at IU Health Arnett. The lists of interview questions asked:

- Has the medical facility you work in adopted a program or initiative to help improve efficiencies? Please describe.
- How efficient are the programs or methods in the medical facility? Please describe.
- What areas in the medical facility need improvement?
- Have you ever attended an introductory or training seminar to express improvements, efficiencies, or changes in the workplace? Which seminar? How long? Where?
- Have you made any personal implementations toward improving efficiencies? Please give an example.

Next, data coding and analysis determined which of the survey responses were related to lean principles based on the literature reviewed and a foundational study. The foundational study, which included discussion-led survey interviews, provided a guideline to adopting the methodology. The questions from the survey aided in identifying inefficiencies in the workplace, as described by each nurse during interviews. Three lists were created to categorize data. List 1 applies lean application to the discussion responses; list 2, which is compiled from the interviews, is used to determine each nurse's current knowledge; and list 3 is a comparison of the current dataset to the participant responses. Because interviews were conducted with the hospital's lean team and nursing managers, the data responses to each discussion question reflected a collection of attitudes versus an actual representation of each nurse's perspective. It is also important to recognize the variety of nursing departments. Most of the inefficiencies identified were relative to

specific nursing departments. For example, nurses in pediatrics have a different set of processes than nurses in trauma. No specifying department makes a standard educational supplement difficult to create or implement.

Ultimately, it was determined how prior knowledge and what the nurses understand regarding lean can be combined and applied in order to reduce the eight wastes that lean initiatives target.

RESULTS

Table 1 describes the lean principle applied to each participant response. It lists the lean terminology to describe waste, the participants' current knowledge of the inefficiencies in the workplace, and the participants' responses to discussion questions. Each column corresponds to the list used for data analysis. List 1 describes the lean application, list 2 describes each nurse's current knowledge base, and list 3 is the participant response. For example, the first row applies wait time/delay, knowledge disconnection, and standardization as waste. Those wastes identify with the electronic medical records (EMR) systems, and the participant responses in the next column reflect where the lean application was drawn.

Observations Made

The data analyzed through interview and discussion questions provided a broadened scope for identifying inefficiencies in the workplace. The similarities identified amongst all discussion were EMR record-tracking systems, increased need for employee motivation and involvement, storage, increased telemetry safety, patient streamlining, and recovery room call response time. Examples of the current knowledge base and lean application include the following:

- The EMR systems allow the nurses to record each patient's data. When the technologies that the data are recorded on are not interoperable, there are decreases in quality and standardization and increases in wait time/delay.
- When the purpose of a new standard or training program implementation is not communicated effectively, a knowledge disconnection occurs. This contributes to each individual nurse's lack of motivation and decreased involvement in workplace transformation.
- Not having a standard storage inventory system creates motion and increases wait time/delay. This is the time identified away from the patient and spent restocking inventory or searching for it.

Lean Application (8 Waste)	Current Knowledge Base	Participant Response	Analysis
knowledge disconnection, wait time, delay, standardization	electronic medical records (EMR)	<ul style="list-style-type: none"> Information available is difficult to chart the same way and retrieve the same information across various technologies No standardization in medical record keeping and training on technologies Medical recording is like a chili recipe (everyone puts their own twist) 	The responses showed that nurses need to determine the commonalities among the data for all patients and then focus on their standardization practices.
knowledge disconnection	employee motivation and involvement	<ul style="list-style-type: none"> Increased suspicion for staff who haven't received prior education The benefit of lean needs to be made apparent to staff Many say, "I don't buy into lean" and "This is a threat to me." It is each manager's job to focus energy on problem and initiative Lean is not for everybody 	These responses lean more toward introducing lean techniques in the workplace. There would be a definite benefit of using change management in order to get workers on board. The comment stating lean isn't for everybody reveals the fact that management needs to educate employees on the positives of lean initiatives.
motion, wait time/delay, conveyance, inventory, standardization	storage	<ul style="list-style-type: none"> Physical Therapy transportation needs to be more efficient, and adding nurse and competitors into PT rooms would really decrease nurse time Nurses' servers are little cabinets that contain commonly used items (e.g., alcohol, swab cups, Band-Aids, and med cups). Currently, we do not have these. It is a long walk back to the storeroom to get supplies if you run out of your supply in your pocket. 	There is a need for both a centralized storage and/or kits that are strategically located throughout the facilities. This response shows that lean initiatives hold value in the eyes of staff, especially when issues are so visible during daily routines.
knowledge disconnection, wait time/delay	safety (telemetry)	N/A	N/A
wait time/delay, standardization	patient streamline	<ul style="list-style-type: none"> Throughput Patient admitted to bed must wait 4 to 5 hours; patients aren't where they need to be after admittance; problems identified in testing-bed availability—patient on the right floor Used to be "no wait" ER Did not anticipate growth 300 beds, not enough to accommodate 130 to 160 patients a day Rooms are the same size 	These responses show some of the constraints that lean initiatives and implementers have to overcome. Fixed structures, funding, and requirements are issues here that call for creative procedures to be implemented.
wait time/delay	recovery room calls	N/A	N/A

Table 1. Current knowledge base and lean application. *N/A = less than one response or no further discussion. **Though standardization is not a type of waste, it is listed as a lean application in this table.

Table 2 compares the inefficiencies in the workplace described by nurses during interviews and discussion. The inefficiencies identified occur in both the recent and the foundational study. This chart shows the similarities and differences between each study.

CONCLUSIONS: OBJECTIVE INTERPRETATION OF FINDINGS AND DISCUSSION

This article presented the current inefficiencies in nurses' work processes. Those inefficiencies include EMR, employee motivation and involvement, storage, safety (telemetry), patient streamline, and recovery room calls. In

order to accommodate inefficiencies identified in this study, the scope should be modified to specify department and host interviews with the actual nursing staff. This would allow a data sample that is more true to identifying the inefficiencies they see daily. This standard, modification, and educational supplement for those processes will aid in workplace transformation.

The scope of the study should be narrowed to specify department and inefficiency. Once each has been specified, the lean modifications and educational supplement can be created to improve inefficiencies. The biases identified were

Issues	Current Knowledge Base-Recent Study	Current Knowledge Base-Foundational Study
EMR	X	
Employee Motivation and Involvement	X	
Storage	X	X
Safety (Telemetry)	X	
Patient Streamlining	X	
Recovery Room Calls	X	
Method of Examination		X
Patient Preparation		X

Table 2. Comparison of current knowledge base recent and foundational studies.

a result of the sample type and size. The type of sample needed will describe each active nurse in a specified department. This specification will help to narrow scope by providing ease in identification of waste.

During the study, the data represented a high-level response to interview questions. Each participant in the study was either nursing manager or lean team director. This means each person provided a collection of attitudes about his or her daily processes versus the individual perspective from active nurses. Although a high-level response was received, when a comparison between the foundational and recent study was made, storage waste occurred in both studies. Ultimately, narrowing the scope will aid in proper data collection, identify the root cause of inefficiencies, and help to determine if the storage waste problem is universal.

The recommendations for future studies include specifying health care department, modifying sample type, and increasing sample size. By implementing the latter in the study, proper identification of inefficiencies and lean application can be made.

Future Work

Creating instructional training for health care facilities and examining other types of medical facilities will contribute to the expansion of the system of this

research. These medical facilities, private-, public-, and government-owned, will be studied in the next phase of the project. This will aid in identifying common inefficiencies across the organization and work toward the betterment of the health care system as whole.

ACKNOWLEDGMENTS

Thank you to Dr. Henry Kraebber, Dr. E. Shirl Donaldson, research participants, and the Louis Stokes Alliance for Minority Participation (LSAMP) staff.

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