IMPLEMENTATION OF LEAN MANAGEMENT IN FAMILY PRACTICE TO DECREASE OVERALL CLINIC VISIT TIME

by

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ABSTRACT

Variations in the patient rooming process have created inefficient practices for staff in a clinic setting. Negative impacts from these variations have been correlated with increased patient wait times, delayed patient care and decreased patient satisfaction. Through patient complaints with frustrations in delayed care and wait times, this scholarly project found discrepancies in the patient flow process. Variations existed within several primary care patient settings based on individual provider training and personal habits, style, and preferences. Utilizing Lean Management ideals to improve rooming and throughput were strongly indicated within recent healthcare journals as a means to reduce waste and improve efficiency in patient care processes. Developing interventions based on Lean Management principles discovered in the literature review will be outlined for execution. Following implementation of interventions, a follow up time study will be completed to compare to the original data, as well as repeat patient satisfaction surveys. This scholarly project expands nursing knowledge by addressing the gaps in past studies by examining throughput in an outpatient clinic setting, potentially decreasing patient wait times, delays in care and increasing patient and provider satisfaction.

CHAPTER ONE

Introduction

Concerns with patient throughput in emergency rooms and acute care settings have been a topic of discussion for the past few decades due to negative impacts on quality of care, patient outcomes and facility management. Optimum patient throughput has been looked at as a national issue with an increase in patients seeking care in the emergency room. Overcrowding causes reduced quality of care, delay in patient care, prolonged stays, and stressful work environments. Streamlining patients in emergency departments has reduced wait times, length of stay, and patients leaving without being seen (Liu et al., 2019). According to the Institute of Medicine (2017), patients in the emergency room are complex, costly and time consuming, producing a negative effect on patient flow, efficiency, and productivity in this system.

Although numerous studies have shown streamlined throughput to decrease efficiency in emergency room and hospital settings, few studies have been conducted to show throughput as an issue in an outpatient clinic setting. Through patient complaints with frustrations in delayed care and wait times, this scholarly project found discrepancies in the patient flow process. Variations existed within several primary care patient settings based on individual provider training and personal habits, style, and preferences. In a 2017 white paper, The Institute for Healthcare Improvement discussed patient flow as hospital wide with improving outcomes and the patient experience by reducing variations in flow to streamline overall patient throughput. This study set a theme for looking at throughput in other areas in healthcare to improve the efficiency in

patient flow with similar issues. Further research is needed to establish inefficiency with throughput in outpatient clinic settings and streamline the patient flow process.

Statement of the Problem.

Variations in the patient rooming process have created inefficient practices for staff in a clinic setting. Negative impacts from these variations have been correlated with increased patient wait times, delayed patient care and decreased patient satisfaction.

Background and Need. A microsystem assessment was completed in a large family practice clinic in a northwestern facility associated with the local hospital. During the assessment, the patient population associated with the clinic was observed, looking at patient flow during appointment times. Patients were followed and timed from the time of patient check in, through the appointment, until patient check out, noting all activities that occurred within the patient rooming process. This assessment identified variations in wait times for patients, lengthy total appointment times, and slower than desired throughput. The provider care teams followed had similar appointment times for each patient, either 15- or 30-minute time slots. However, the assessment identified an average total time of 50 minutes per patient appointment on a typical day. Each area that was observed had different patient rooming processes and communication styles. The variations with the different practice styles led to discrepancies in throughput for patient appointments and overall times the patient stayed in the clinic.

Early research on patient throughput occurred primarily in emergency rooms and acute care settings. Limited information is available to guide quality improvement

initiatives aiming to improve patient flow in an outpatient clinic setting. This scholarly project expands nursing knowledge by addressing the gaps in past studies by examining throughput in an outpatient clinic setting, potentially decreasing patient wait times, delays in care and increasing patient and provider satisfaction.

Purpose of the Scholarly Project. The purpose of this scholarly project is to analyze throughput to improve efficiency in clinic patient flow in a primary care clinic setting. The primary care clinic assessed showed high overall appointment times, long wait times by patients to see the nurse or provider, and variations in steps by different care teams. Long wait times and longer appointment times not only dissatisfied patients but caused the clinic to be behind in patient appointments and care, for example: ordering diagnostic tests and referrals. Principles for improving efficiency in throughput could help decrease the overall patient appointment time, reduce delays, and increase patient satisfaction.

Significance of the Field. In the assessment of a large primary care practice decreased efficiency and effectiveness of the patient throughput process in the outpatient clinic setting was seen. In reviewing the literature available, there is a gap in the research done to streamline patient flow in an outpatient clinic setting. Further studies on the effects of streamlining the patient process for outpatient clinics is needed.

Definitions.

- A3: Lean Manufacturing tool to outline ideas, plans and goals through out a process.

- Bottleneck: One process in a chain of processes that has limited capacity and reduces the capacity of the whole chain.
- Clinic Team: The staff that take care of the patient in a day; provider, nurse, assistant.
- Effectiveness: Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit.
- Efficiency: Avoiding waste, including waste of equipment, supplies, ideas and energy.
- Healthcare System: Organization that provides medical needs to target populations.
- Lean Management: An approach to manage an organization in incremental changes to improve efficiency.
- Life Expectancy: Average time a person will live.
- Non-Value-Added Time: Any step that does not add to the finish product.
- Outpatient Clinics: A place to receive medical care that does not require time in the hospital.
- Patient Flow: Movement of patients through a healthcare facility.
- Process Utilization: Calculating time with the number of resources being devoted to an area.
- Quality of Care: Healthcare services that achieve the desired health outcomes.
- Rooming Process: The steps of getting the patient through an appointment.
- Standardizing: To bring into conformity with a standard to assure consistency.
- Throughput: The amount of materials or items passed through a system or process.
- Value-Added Time: Time spent that improves the outcome of a process.

- Value Stream Mapping: Lean manufacturing technique used to document, analyze and improve the flow of information or materials.
- Workflow: Sequence of process through which a piece of work moves to completion.
- 5S Method: A Lean Manufacturing technique that results in a well-organized workplace with visual goals and order.
- 5 Whys: Analyzes a process by asking "why" 5 times to find the root cause of a problem.

Limitations. The limitations of this project include lack of provider and staff by-in to change practices in streamlining patient flow. The provider practices assessed all used different processes to room patients and utilize patient flow in different ways. In review of the literature, limited studies have been conducted, specifically in primary care clinics, implementing principles to streamline and improve patient flow.

Ethical Considerations. With inefficiency in throughput, patients have expressed negative experiences with care received in the outpatient clinic. Negative experience can lead the patient to not seek needed care at their providers office, this has adverse effects on the patient's health outcomes and the clinic outcomes. Patients who are not seeking care due to a negative experience could see worsening of their chronic or acute conditions. Unsatisfied patients that do not return to the clinic decrease the number of patients seen, affecting the revenue of the clinic.

Literature Review

Based on the theme of examining the rooming process to improve patient care and the patient experience a systematic literature review was conducted. Databases searched included ProQuest, CINAHL, PubMed, Cochrane, Web of Science, and EBSCO complete. The key word used were patient flow, throughput, patient process, patient rooming, Lean Management, Lean healthcare, patient flow in the emergency room, patient flow in outpatient clinics, and patient flow in primary care. The literature review included research article and studies done from 2015 through 2020 and was limited to studies related to healthcare clinics and emergency room processes for patient throughput. Articles not related to the clinic, outpatient or emergency departments were excluded. References from key articles were used to further explore the subjects of throughput and waste reduction techniques as related to effective processes resulting in efficient patient movement within a healthcare setting. As themes of successful patient processing and throughput emerged sixteen peer review qualitative, quantitative, or mix-method articles were selected for detailed examination and synthesis. Three distinct themes emerged from the review: 1) inconsistent process utilization, 2) the importance of value stream mapping and 3) refinement of processes to improve rooming and throughput.

Inconsistent Process Utilization. Sattler, Morrison, Powell, and Steele (2019), in a quantitative study of 2,896 patients in an emergency room requiring diagnostic testing noted the cumulative downstream effect of inefficient processes applied to the first patient of the day. The first delay of a given day in any aspect of the patient processing, produced a reactive cascade of delays in diagnostic testing and patient throughput. The

authors determined that all steps in the progression of the patient visit influenced the time to diagnostics testing, analysis, and wait times which affected the efficiency of patient treatment and referral (Sattler et al., 2019).

In a mixed-method study Alloubani et al. (2019), investigated delays in patient care and the correlation to patient satisfaction surveys for 187 patients in an outpatient oncology pain clinic. As the patient population in the clinic increased by 14%, the added volume strained the ability of staff and patient flow processes within the clinic. The wait times for patients to be seen were prolonged and linked to lower patient satisfaction scores. Specifically, oncology patients requiring providers to address pain issues experienced extended times in the waiting and exam rooms. The authors established that delays in the patient and the provider achieving the goals for the clinic visit correlated to a negative impact on the patient health outcomes and lower patient satisfaction scores (Alloubani et al., 2019).

Improta et al. (2018), in a mixed method study, focused on patient flow and efficiency in a national relief hospital and a level II emergency room, that managed more than 94,000 patients per year. The emergency room was the main source of care and revenue for the hospital in South Italy. The study was conducted in order to determine ways to streamline the increased patient flow without overloading the healthcare staff. Improta et al. (2018), conducted a thorough study of patient complaints and outcome analysis which detected constant overcrowding of the emergency room and was linked to excessive patient delays in care, increasing patient mortality, and erratic and inefficient use of resources by employees.

Patient dissatisfaction associated with extended waiting times and the lack of staff efficiency was observed in a quantitative study by Duska, Mueller, Lothamer, Pelkofski, and Novicoff (2015). The study was conducted in an outpatient academic Gynecologic Oncology Clinic. The authors were able to associate the lack of availability for patients needing infusions on the unit significantly impacted patient satisfaction and efficiency of staff to provide adequate care to patients (Duska et al., 2018). Consistency of the patient flow process was deemed critical to ensure safe and timely infusions for oncology care. The authors determined that because the patient was managed in separate care areas for each phase of the appointment and that transition between each step was not consistent or timely, the time to infusion was delayed (Duska et al., 2015).

Sayah et al. (2015), in a mixed-method study, sought to improve overcrowding and ambulance diversion in a medium-sized emergency room by initially expanding the emergency room structure. Increasing poor patient satisfaction, long waiting times, ambulance diversions, patients leaving without being seen and a staff culture of accepting inefficient processes were still noted even after increasing the physical space of the emergency room. Savah et al. (2015), utilized patient satisfaction and delayed patient care to analyze a more streamlined process for patients through the emergency room. Although the emergency room increased the physical space, the same number of employees were still being used to manage the department and patient flow. Restricted budgets prevented additional staff from being hired to address the same number of patients being seen in a larger space. Although more rooms were available to house patients coming, the same timeframe was seen with being able to bring patients back by a

staff member and be seen by a provider. Hospital metrics and patient satisfaction score continued to fall, the authors looked improving patient flow and the establishment of a rapid assessment unit (Savah et al., 2015).

Hitti et al. (2017), conducted a quantitative study designed to look at waiting times and overcrowding in a large tertiary care center in Lebanon with an annual patient load of 49,000 patients. The authors determined that forty-five percent of patients seen in the low acuity unit of the emergency room required plain radiographic imaging (Hitti et al., 2017). The radiology section of the facility was selected for the analysis and patient flow improvement by focusing on the turnaround time of radiology studies. While the radiologist were not able to read films at a faster rate, by addressing the patient flow steps from admission, to the input and acknowledgement of the radiology order, and the transportation of the patient to radiology, the wait times were streamlined improving outcomes and patient satisfaction (Hitti et al., 2017).

The Importance of Value Stream Mapping. The use of value stream mapping was a tool utilized by authors Rutman, Stone, Reid, Woodward, and Migita (2015), in a quantitative study designed to decrease emergency room wait times. The authors used the tool of value stream mapping to depict patient interaction in order to understand patient flow within the emergency room. The results of the value stream mapping were studied in order to locate points of delay, non-value-added activities, or redundancies. Mapping each process step from arrival until the care was complete, became a visual tool for identifying non-value-added activities for events a patient or employee experienced. The

non-value-added steps identified when analyzed were the used as the focus areas for process improvement (Rutman et al., 2015).

Alloubani et al. (2019), in a mixed method study, highlighted the significance of utilizing the value stream mapping tool to visualize workflow and patient throughput. Use of value stream mapping enabled the identification of non-value-added activities. Based on observation, important preliminary time stamps were collected including: an initial total clinic time, registration time, time the provider saw the patient, waiting time and mean clinic times per visit (Alloubani et al., 2019).

Value stream mapping was utilized as a key tool for the identification of waste and the development of tightly integrated steps for improving process efficiency in a mixed-method study by Improta et al. (2018). The authors used the tool to detect bottlenecks in the workflow and underscore the most time-consuming activities, such as: diagnostic examinations, triage code assignments and counseling. The discovery of superfluous activities led the authors to redesign operations based on primary performance measurements related to waiting times and service delivery (Improta et al., 2018).

In order to decrease patient wait times in a Gynecological Oncology Outpatient Chemotherapy, Duska, Mueller, Lothamer, Pelkofski, and Novikoff (2015), documenting the current process state as an important first step in process improvement. The authors in their qualitative study used the value stream map to detail the event location, personnel, information technology requirements, and alternative pathways to reveal variability in the chemotherapy clinic. The authors followed patients through the appointment process to

document inconsistencies, periods of waste, and noted specific times from patient registration to administration of infusion medications. Once the waste and unnecessary delays were identified process improvement step were redefined and the authors achieved a decrease in total provider wait time, rooming of infusion patients, time to administration of infusion medications, and total mean wait time for patients (Duska et al., 2015).

Hitti, et al. (2017), noted that value stream mapping, in addition to its use as a tool for pinpointing waste, could be used to facilitate teamwork by bringing together front-line and management staff to achieve a common continuous process improvement goal. The project teamwork that occurred using value stream mapping empowered front-line staff to participate in problem solving and adapting workflow. The employee participation became a catalyst for continuous quality improvement initiatives as the staff mapped and used timestamps to discovered delays in turnaround times. When revised processes were initiated, due to the employee participation, the authors found staff support for the newly designed workflow (Hitti et al., 2017).

In a study done for a busy cardiac catherization lab with 25,579 patient cases per year, the researcher had a goal of improving turnaround times was the subject of a quantitative study by Agarwal et al (2016). Value stream mapping was chosen to establish a consistent view of the workflow in order to identify the causes of delays. Areas evaluated were absence of necessary supplies and materials, information/communication flow, the time elapsed at each step, and potential redundancies in the processing. Identification of bottlenecks and deficiencies in

communication and materials were used to guide the redesign to enable the lab to run on time, based on quality measures and time constraint expectations (Agarwal et al., 2016).

In a mixed-method study, Poksinska, Fialkowska-Filipek, and Engstrom (2017), compared the patient satisfaction scores of 23 Swedish primary care outpatient clinics using Lean management techniques. The authors used value stream mapping to assess patient flow, the registration, the physician appointment process, duplication of work, and delays in patient care (Poksinska, et al. (2017). Specifically, the mapping identified a higher patient demand at the beginning of the week which was adversely affected by lower levels of staffing affecting delays in waiting and appointment times. The ability to see a clear portrayal of the inverse relationship of providers and staff to patient demand facilitated the correction of the problem (Poksinska et al., 2017).

Value stream mapping reveals the day-to-day operations of the facility to understand the multiple areas of delay, inefficiency, and waste. The current flow state map is designed to create new and better processes that are portrayed on a future state value stream map. The use of value stream mapping with this project can show the facility the wasteful steps in a process and create ideas to eliminate non-value-added activities in an inefficient system.

Refinement of Processes to Improve Rooming and Throughput. In a quantitative study, Patey et al. (2019), sought to improve patient flow and efficiency in a large emergency room for 80,709 patients by implementing a pragmatic emergency management platform using a series of collaborating interventions composed of seven parts. An initial independent external review assessed the organization and function of

the current state of the emergency room looking at total patient visits, arrival to provider time, patients left before being seen, and the overall length of stay per patient. Once initial baseline data was established, Lean Management and patient centeredness education and was provided to all emergency room staff. Utilizing Lean Management principles several improvements were made to the workflow process. A rapid assessment zone was established using an underused waiting area to maximize accessibility and ambulatory patient throughput.

To decrease patient to provider time, Patey et al. (2019), established dual triaging with a nurse and provider to improve the initial assessment of patients and standard triage order sets were created for nursing staff to utilize when providers were unavailable. Action-based capacity protocols were put in place to facilitate patients to additional care areas when the patient demand exceeded the capacity of the emergency room. Regular performance reporting was initiated to continually monitor for improvement. Following the interventions, patient to provider time decreased from 104 minutes to 42 minutes, overall length of stay decreased from 199 minutes to 134 minutes, and patients who left without being seen decreased from 25.7% to 4.6% (Patey et al., 2019).

Sattler, Morrison, Powell, and Steele (2019), in a quantitative study, sought to improve patient throughput in an academic medical center emergency room requiring diagnostic testing for 2,896 patients. An organizational goal, using the Plan Do Study Act tool, was established to reduce the time from patient arrival to procedure initiation in the radiology department with the use of a new care delivery model. Incorporating the new model started with optimizing the patient tracking board by adding more patient

information and triaging priority cases. A charge nurse role was created to manage the flow of patients, define, and disseminate staff roles and reevaluate scheduling of current staff to stagger arrival times. A dashboard was created to continuously look at performance measures and focus groups were initiated to constantly evaluate day-to-day events. Following the interventions, the overall patient arrival to procedure time decreased from 25 minutes to 15 minutes (Sattler et al., 2019).

In a qualitative study, Kanamori et al. (2015), implemented a 5S intervention program in a healthcare facility in Senegal. 21 healthcare staff were interviewed following a three-phase implementation program of the 5S method. Phase 1 introduced the 5S method in workshops, training staff to apply the 5S method on nine units of the facility. Phase 2 implemented 5S practices on the nine units including cleaning the external and internal spaces, eliminating unwanted items, placing labels and indications on items or areas, and setting and sorting documents and records. Phase 3 included conducing meetings to assess the progress of the 5S methods on each unit and gather feedback to further improve the areas.

Subsequent interviews of staff revealed improved orderliness of each care area, fewer unwanted items, improved direction in each area, and improved staff motivation (Kanamori et al., 2015). Utilizing the same 5S method implementation study, Kanamori et al. (2016), conducted a parallel qualitative study looking at patient satisfaction following the implementation of the 5S method. Pre and posttest surveys were administered to 1,300 patients and caregivers, which demonstrated an increase in

satisfaction with staff communication, explanation of illnesses or procedures, and an overall increase in patient satisfaction (Kanamori et al., 2016).

In a mixed-method study, Simons et al. (2015), evaluated the patient safety culture and behavior of healthcare professionals in a radiotherapy institute using Lean principles over three years. The mixed method study used quantitative data from workshops on safety climate, surveys on safety culture, safety awareness and behavior report from an incident reporting software data system. Structured interviews with the staff were conducted to augment the comprehension of the quantitative data. The two workshops were provided in the three-year period on the Manchester Patient Safety Framework, educating staff on a mature safety culture including pathological, reactive, bureaucratic, proactive, and generative safety. Two Surveys (or posttests) were distributed to the staff three times during the three-year period to assess comprehension on safety climate and patient safety awareness and behavior. Reports from an incident reporting system were reviewed and mined for root causes of misses or near missed errors from 2004 to 2013. Increased scores from staff on patient safety were seen by 2013 based on the post tests. The number of patient level error misses decreased by 27% and the number of near misses decreased by 50%. Following staff interviews, the authors detailed reports of enhanced: a) innovation speed, b) increased intention to solve problems, c) support and facilitation for improvement processes promoted by management, d) opportunities to discuss and solve problems in the multidisciplinary setting, e) success in problem solving, and f) focus on process improvement between the professional groups (Simons et al., 2015).

Zibrowski, Shepherd, Booth, Sedig, and Gibson (2019), in a qualitative study, interviewed nurses and physicians in two emergency rooms in Canada. Using the grounded theory methodology, a semi structured interview format was established to probe the environment before and after Lean principles were applied. Lean interventions included physical reconfiguration of the space, organization of patient flow, clinical workflow for physicians and nurses, and opportunities for restructuring the emergency room. Following the staff interviews it was noted that overcrowding after the triage process forced patients to be a placed in chairs instead of beds, making privacy impossible. Arranging the patients in chairs also intensified the work of the nurses and physicians due to the need to seek space for the patient when privacy was required, thus wasting time that could have been used for patient care. The hospital leaders adopted an open concept design with zones for patients waiting for different stages in care, diagnostic imaging, assessment, or treatments. The areas were sectioned off to ensure the privacy of the patient and named according the stages in care. Subsequent interviews revealed the emergency room space effective in patient privacy and efficiency in workflow (Zibrowski et al., 2019).

In a quantitative study, White, Yun, Lev, and Raja (2017), applied Lean management methods to improve patient flow by reducing transport time and decreasing waste. The research conducted on patients requiring plain films radiology in an academic emergency room serving 110,000 patients. A time management study observed the intervals in minutes between the order placement and procedure completion. Following the time assessment of the current process, a new design for a technologist-based

transport system was formulated, replacing the single-server transport system. In the new design a technologist not currently performing a study would locate and transport the next patient to the queue. The average radiology transport time decreased from 28.7 minutes to 20.6 minutes using the Lean principles (White et al., 2017).

Naidoo & Mahomed (2016), in a quantitative study on the impact of Lean principles utilized to decrease patient wait times in an emergency room in South Africa that served 200,000 patients annually. The emergency room consisted of three consulting rooms, a nursing assessment station, a four-bed emergency room cubicle, and a waiting area. A time method study was completed noting times for patients through check-in to discharge. A 5-why and A3 assessment tool were used to define waste and delays in the emergency room rooming process. Interventions applied to the emergency room included: a) pre-consultation screening tool, b) a modified patient triage system for nursing staff, c) standing orders, d) reorganization of patient flow using a one way entrance and exit to facilitate movement for patients and staff, e) a call bell system was installed to alert staff to patient arrival, f) lunch and tea breaks were staggered for doctors and nurses and g) a “follow up” slip was created for education to the patient at discharge. Following implementation of the interventions, the overall cycle time decreased from 75.8 minutes to 67.34 minutes and efficiency trends over the emergency room cycle times increased by 20% (Naidoo & Mahomed, 2016).

Efficiency in the healthcare setting can decrease patient wait times, decrease cost, and increase patient satisfaction. Although much of the research in this literature review did not occur in a primary care clinic setting the correlation is apparent. The systemic

literature review demonstrated improved wait times and efficient patient flow processes were established through the use of analysis and visualization of the current state of the facility and the implementation of reorganized and standardized interventions (Patey et al., 2019; Kanamori et al., 2015; Poksinska et al., 2016; Alloubani et al., 2019; Improta et al., 2018; Rutman et al., 2015; Simons et al., 2015). Several authors found improved overall clinic times, improved patient to provider times, and improved patient satisfaction with the implementation of Lean principles (Zibrowski et al., 2019; Duska et al., 2015; Agarwal et al., 2016; White et al., 2016; Naidoo & Mahomed, 2016; Hitti et al., 2017; Kanamori et al., 2015). Successful application of the Lean Management principles in the preceding literature review demonstrates the potential for improved outcomes of a service with Lean principles in patient throughput. It is the intent of this author to use the exemplars within the research and by applying Lean Management models to streamline and improve productivity in patient flow.

Methods

Introduction. Based on variations that had been identified while exploring issues of patient dissatisfaction, prolonged wait times and extended appointment times, a microsystem assessment was completed. The assessment confirmed there were significant discrepancies in wait times for patients, lengthy total appointment times, and slower than budgeted timeframes for total clinic throughput. The average total time for throughput was measured at 50 minutes per-patient appointment on an average volume day. Approaches to rooming processes and communication styles varied with each

provider and clinic rooming staff. The variations in clinic processes were attributed to the inconsistencies in throughput and overall times the patients stayed remained in the clinic (Alloubani et al., 2019).

Purpose. The purpose of this scholarly project is to analyze throughput to improve efficiency in clinic patient flow in a primary care clinic setting. The primary care clinic assessed showed high overall appointment times, long wait times by patients to see the nurse or provider, and variations in steps by different care teams. Long wait times and longer appointment times not only dissatisfied patients but caused the clinic to be behind in patient appointments and care, for example: ordering diagnostic tests and referrals. Principles for improving efficiency in throughput could help decrease the overall patient appointment time, reduce delays, and increase patient satisfaction.

Project Development. The potential of improving the primary care clinic throughput as a project was originally identified through the use of a microsystem assessment. During the microsystem assessment, a value stream map was created depicting the current state of the rooming process. Patients from six primary care provider offices were followed and timed from the time of patient check in, through the appointment, until patient check out, noting all activities that occurred within the patient rooming process. Provider one had an average appointment time of 62 minutes, average nurse intake time of 5.5 minutes, an average patient wait time for the provider of 27.25 minutes. Provider two had an average appointment time of 37 minutes, average nurse intake time of 10 minutes, and an average patient wait time for the provider of 14

minutes. Provider three had an average appointment time of 42 minutes, average nurse intake time of 8 minutes, and an average patient wait time for the provider of 12 minutes. Provider four had an average appointment time of 46 minutes, average nurse intake time of 7 minutes, and an average patient wait time for the provider of 18 minutes. Provider five had an average appointment time of 53 minutes, average nurse intake time of 10 minutes, and an average patient wait time for the provider of 19 minutes. Provider six had an average appointment time of 55 minutes, average nurse intake time of 9 minutes, and an average patient wait time for the provider of 27 minutes (Alloubani et al., 2019; Rutman et al., 2015; Hatti et al., 2017; Duska et al., 2015).

Once areas that could benefit from process improvement were defined through the microsystem analysis, a literature search was done to identify ways in which the clinic processes could be streamlined. The use of Lean principles to improve patient processing, known as throughput, was strongly indicated within recent healthcare journals as a means to reduce waste and improve the efficiency of a patient care episodes (Polsinska et al., 2016; Alloubani et al., 2019; Improta et al., 2018; Rutman et al., 2015; Duska et al., 2015; Agarwal et al., 2016).

The use of the VSM depicts the current state of the clinic rooming and clinic process, including times for each step, to identify points of delay, non-value-added activities, and redundancies in the rooming and clinic processes (Rutman et al., 2015). While conducting the VSM the project improvement team conducting the evaluation must scrutinize any instances of delay that have the potential to affect the clinic flow and throughput. Common issues in healthcare throughput include: a) patient scheduling issues

such as patients scheduled in the wrong appointment time slot or with the wrong provider based on the reason for the healthcare visit, b) late arrivals to the scheduled appointment, c) inconsistent rooming processes, d) missing or inconsistent placement of supplies necessary for the appointment, e) lack of appropriate written or verbal orders for lab or diagnostic work, and f) poor clarity of the roles and expectations for the nursing and support staff (Alloubani et al., 2019; Duska et al., 2015; White et al., 2016; Naidoo & Mahomed, 2016; Improta et al., 2018).

As the VSM results are analyzed new processes for the future state of the clinic throughput process have been developed. The new processes constructed are done by using representatives from each discipline working on this project. The proposed changes are diagramed using a future state VSM which depicts processes and interventions that are added to or removed from the rooming and clinic throughput process. The changes are based on commonalities in the providers preferences and techniques known to add value in terms of achieving streamlined practices as defined within the literature review sourced for this project (Alloubani et al., 2019; Duska et al., 2015; White et al., 2016; Naidoo & Mahomed, 2016; Improta et al., 2018; Hitti et al., 2017; Rutman et al., 2015).

Exemplars of Future State Value Stream Mapping. The following is an exemplar of the future state VSM from the clinic used in this scholarly project.

1. The patients would be provided with an arrival time that is ten minutes earlier than their appointment time to ensure the patient was properly registered and checked-in at the time of the appointment (Alloubani et al., 2019).

2. A standardized room set up would be established to implement in all provider rooms. Standardizing the room set up ensures staff moving from different areas know where to find necessary supplies (Zibrowski et al., 2019).
3. A perforated standard discharge form would be created to provide a written standard order set for nursing staff to utilize in-between patient appointments, as well as, provide patients leaving the clinic detailed instructions for their future appointment time and follow up care (Naidoo & Mahomed, 2016).
4. As a part of the discharge process a format would be constructed to:
    a. ensure patients are scheduled for their next appointment
    b. are scheduled for the correct time slot based on anticipated purpose of the follow-up appointment to ensure providers are allotted the appropriate timeframes for care.
5. Continuous improvement monitoring of the implemented interventions shall be built into the process changes to include follow up time studies, regular performance reporting, and evaluation of patient satisfaction score in order to determine if the changes achieved the goals (Patey et al., 2019).

Target Population. This project was completed in a large family practice clinic in a northwestern facility associated with the local hospital. During the assessment, the patient population associated with the clinic was observed, looking at patient flow during appointment times. Patients were followed and timed from the time of patient check in, through the appointment, until patient check out, noting all activities that occurred within the patient rooming process.

Instruments. The scholarly project described herein utilized tools from Lean management principles to assess and implement standard processes and waste elimination to improve throughput. Lean applies the concept of eliminating steps in a process that do not add value to the service (Cohen, 2018). Five steps are used to determine wasteful tasks and improve throughput.

1. The first step is to assess the system, identifying what patient's needs are in a process.
2. The project team utilizes a value stream map (VSM) to visually depict what the necessary steps are to complete the process from beginning to end, including the actual time it takes to complete the steps.
3. Change ideas are generated from the team to design a future state VSM depicting a streamlined process.
4. Deployment of the interventions found from the future state VSM with identification of individuals responsible for each task. During this phase the team experiments with the interventions through multiple testing and implementation trials to develop the best outcome for a future process.
5. The fifth step will be used to continuously look for improvement opportunities by measuring and analyzing the outcomes of the change processes (Cohen, 2018).

Specific tools utilized by Lean principles include the 5S method. 5S is derived from the Japanese Seiri (sort), Seiton (set in order), Seiso (shine), seiketsu (standardize), and Shitiske (sustain). The 5S method follows these five steps to clean and organize a

system by ensuring employees fully understand their workplace by incorporating collaboration and standardization (Cohen, 2018).

Takt Time is another tool applied using the Lean principles. Utilizing time cycles to gather specific data on the time it takes to complete a task and applying that time to find the ideal interval to complete the process. Takt Time, specifically, is the time available to do the work, divided by the volume of work to complete (Cohen, 2018). The Takt Time is a useful tool to ensure the facility matches the demand with capacity for that process.

Proposed analysis. Following implementation of the interventions, a follow up time study will be completed to compare to the original data collected (Alloubani et al., 2019; Improta et al., 2018; Rutman et al., 2015; Duska et al., 2015). The collected quantitative data will be analyzed using a Statistical Package for the Social Sciences (SPSS) software. Standard descriptive statistics will be used to describe study participants and outcomes. Group differences will be examined using standard psychometric methods.

In addition to quantitative data, qualitative data will be employed comparing patient satisfaction scores from the last 6 months prior to embarking on this project. Initial patient satisfaction scores examined indicated dissatisfaction with the current process and discontent with long waiting times during the appointment. Follow up patient satisfaction surveys will be administered to gage patient satisfaction with the new interventions and patient wait times (Poksinska et al., 2016; Alloubani et al., 2019; Simons et al., 2015).

Clinical Nurse Leaders (CNL) Roles. The CNL roles directly related to this project which includes the mandate that CNLs are accountable for the outcomes of patient care through coordination and evaluation of the delivery of care for the patient populations. Although all roles are important to encompass as a nurse leader, specific roles of a CNL in association with this project include mass customization, client and community advocate, and a steward of the environment and health and material resources.

Through the use of evidence-based practices to assess the current microsystem of the clinic patient population in order to identify patterns and variances, and generate interventions to meet the needs of the patients, mass customization of care can be associated with the precepts of this project (AACN, 2007). Evaluating the current microsystem of the primary care facility, noting variances in the practice styles of providers and rooming staff that created increased wait times for patients, and added to long overall appointment time's parallels with idea of customization. Further association with the specific role can be displayed by generating interventions to improve and standardize the rooming process to decrease overall appointment times.

As a client and community advocate the CNL is able to act as an advocate for the patients in providing holistic care and education. Addressing the patient's satisfaction with the clinic wait times and total time the patient is in the clinic supports the patients concern for wasted time in the clinic while improving the overall healthcare system. Appraising the patient's satisfaction measures engages the patients in their care and creates a sense of partnership with their healthcare facility. As a CNL promoting the

project, the collaboration with the patients and the staff demonstrations advocacy for the patient population associated with the clinic.

Utilizing tools to assess the microsystem of the current healthcare environment such as value stream mapping and Lean management principles correlate with the role being a steward of the environment and health and material resources. In addition to utilizing process improvement tools, generating interventions to standardize the rooming process and improve direct nursing care provides an agent of change in a fluctuating environment. The use of resources to facilitate change such as Lean management encourages staff to continuously monitor for improvements in their care area. This ensures the facility is always looking for improvements and ways to better patient care.

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