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# Forensic Patient Flow: An Imbalance Between Capacity And Demand

Versie J. Bellamy  
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FORENSIC PATIENT FLOW: AN IMBALANCE BETWEEN CAPACITY AND DEMAND

by

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Nursing Practice in

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University of South Carolina

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## DEDICATION

In honor of God, I would like to dedicate this manuscript to my mother, Mrs. Clara Jones, for her unconditional love, encouragement, support, and sacrifice throughout my being so that I could not only desire but have the courage to attain my goals and embrace a commitment to life-long learning. And, to my family and friends for believing in me. Despite the circumstances in balancing school, corporate demands, and life, you continued to remind me that “failure is not an option.” Your love, support, and encouragement remained consistent throughout this season of my life, and to you I am grateful. To my niece, Mikaela, and Goddaughter, Tristan Marie, for your love, prayers, and expressions of kindness throughout the journey. I look forward to spending more time together supporting your growth and development. Finally, to my executive team and colleagues for your unwavering support, trust, and loyalty throughout this endeavor. You reminded me why the need to complete this project greatly surpassed my educational goals.

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## ABSTRACT

**Background:** The United States (U.S.) has an ever-growing incarcerated population. The sheer volume of this population coupled with inefficient patient flow through the judicial and health care systems, create a large imbalance between the high demand for services and the capacity to deliver them. The delay in criminal defendants accessing mental health services is impacted by the lack of patient flow, which creates barriers to entering and exiting the forensic hospital system. The increasing demand for inpatient forensic services, coupled with a static supply of resources, warrants further intervention by treatment and service providers. Identifying and removing barriers to patient flow can reduce the imbalance between capacity and demand and result in lower wait times to access inpatient treatment and care.

**Purpose:** The purpose of this evidence-based quality improvement project was to identify barriers to the patient flow process that lead to inefficient treatment for forensic psychiatric patients and to implement a plan for removing those barriers.

**Methods:** A nonexperimental evidence-based quality improvement study was conducted at a forensic psychiatric hospital in the Southeastern region of the U.S. utilizing Lean Methodology and Plan-Do-Study-Act (PDSA) to identify barriers (communication, legal, active treatment, discharge process) to patient flow and improve timely treatment by reducing wait time and length of stay for forensic psychiatric patients.

**Results:** Statistically significant reductions in the forensic waitlist (51%) and wait time (50%) were achieved. During the study period, the average length of stay was reduced, and the number of admissions and discharges were increased.

**Conclusions:** Maximization of efficiencies within the forensic psychiatric hospital patient flow process, through the minimization and elimination of non-value-added waste (waiting, over-processing, defects and skills) resulted in a reduction in the waitlist and wait times due to improved patient flow. Such improvements increased the state's treatment capacity for defendants awaiting inpatient services at the forensic psychiatric hospital.

*Keywords:* forensic psychiatric hospital, patient flow, waitlist, wait time, quality improvement, lean methodology, plan-do-study-act.

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## LIST OF ABBREVIATIONS

BPH.....	G. Werber Bryan Psychiatric Hospital
DE .....	Designated Examiner
DIS .....	Division of Inpatient Services
DMH.....	Department of Mental Health
DNP.....	Doctor of Nursing Practice
FES.....	Forensic Evaluation Services
FRB.....	Forensic Review Board
IRB .....	Institutional Review Board
MUSC.....	Medical University of South Carolina
PDSA .....	Plan-Do-Study-Act
PPD .....	Purified Protein Derivative
QI .....	Quality Improvement
SCDMH .....	South Carolina Department of Mental Health
UofSC .....	University of South Carolina
SMI .....	Serious Mental Illness
SMI .....	Serious Mental Illness
SMI .....	Serious Mental Illness

# CHAPTER 1

## INTRODUCTION

Currently, the United States (U.S.) has the largest incarcerated population in the world with as many as 2.2 million adults incarcerated (Kennedy-Hendricks, Huskamp, Rutkow, & Barry, 2016). Research consistently shows that people with mental illness make up a large proportion of the incarcerated population (Kennedy-Hendricks et al., 2016; Prins, 2014; Steadman, Osher, Robbins, Case, & Samuels, 2009). Individuals with mental illness, and specifically those in the criminal justice system, have complex health care needs that are often difficult to diagnose and treat (Abram, Teplin, & McClelland, 2003). Consequently, the health care system is greatly challenged to meet the needs of this vulnerable population (Kennedy-Hendricks, et al., 2016). Lack of appropriate treatment leads to exacerbation of mental health conditions, extended lengths of stay in hospitals, and an increase in health care costs (Kennedy-Hendricks, et al., 2016). Therefore, it is imperative that these individuals receive timely and appropriate treatment.

### **Description of Problem**

Patient flow issues may be a significant barrier to receiving timely and appropriate treatment (Van Dyke, McHugh, Yonek, & Moss, 2011). The sheer volume of this population, coupled with inefficient patient flow through the health care system, create a large imbalance between the high demand for services and the capacity to deliver them. A review of the literature suggests that issues such as staff assignments, waitlist management, and patient triage may be barriers to patient flow (Elder, Johnston, &

Crilly, 2015; Lee, & Franc, 2015; New, 2013; New, Andrianopoulos, Cameron, Olver & Stoelwinder, 2013; Van Dyke, et al., 2011). Patient flow issues need to be identified and corrected so that the treatment needs of the population can be met and capacity and demand imbalance reduced.

### **Scope of Problem**

As previously noted, the U.S. has the largest incarcerated population in the world with as many as 2.2 million adults incarcerated (Kennedy-Hendricks, Huskamp, Rutkow, & Barry, 2016). The state of South Carolina currently has approximately 20,951 incarcerated adults. Of that population, approximately 3,500 are diagnosed with a serious mental illness (SMI) (State of South Carolina, Department of Corrections, 2016). In accordance with South Carolina law, South Carolina Department of Mental Health (SCDMH) is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by order and state statute. Currently, the SCDMH is unable to meet the requirements under SC state statute.

The forensic unit has a capacity of 230 beds. At any given time, an additional 70-100 people are awaiting psychiatric treatment for restoration to competency or long-term psychiatric rehabilitation at the SCDMH forensic hospital. With an average length of stay of 200 days on the forensic units, patients waiting for a bed languish in jail while their psychiatric condition deteriorates. Consequently, there is a serious imbalance between the demand for treatment and treatment capacity in SC.

Currently, there are no plans to increase bed or staff capacity. Without change, the patient waitlist will continue to grow and access to treatment will continue to be prolonged. At present, increasing patient flow through the DMH forensic hospital is the

optimal option to increase capacity and get these patients to needed treatment.

Importantly, identifying and removing barriers to patient flow could mean that capacity and demand mismatch could be reduced.

### **Best Practices to Address Problem**

Two evidence-based approaches to quality improvement will be used in this project. Lean methodology is an evidence-based practice improvement approach adopted from the Toyota Company (Moran, Burson, & Conrad, 2017; Sullivan, Soefje, Reinhart, McGearry, & Cabie, 2014; Zhu, Lu, & Dai, 2014). Lean methodology is based on two key tenets, respect for all people and continuous improvement (Johnson, 2013). Lean methodology uses data from a variety of sources including research studies, patient satisfaction surveys, and quality improvement initiatives to drive organizational change (Johnson, 2013). Applied to the health care system, lean methodology helps create maximum value for patients by reducing waste and waits, and optimizing clinical processes (Lawal et al., 2014). Lean methodology targets unnecessary intermediate processes and retains only those that add value (Zhu, 2014). Specifically, lean methodology uses process mapping to identify areas for analysis and intervention.

Plan-Do-Study-Act (PDSA) is part of the Institute for Healthcare Improvement Model for accelerating quality improvement in healthcare. It is the scientific method adapted for action-oriented learning (Institute for Health Care Improvement, n.d.). PDSA consists of a systematic series of steps for planning and implementing change. The process begins with the Plan step that involves identifying a goal, formulating a theory, and defining success metrics. The Do Step involves implementing the plan. During the Study step, outcomes are monitored to assess the validity of the plan and to monitor signs

of progress and success, or problems that arise. The last step, the Act step, integrates the learning generated by the entire process and can be used to adjust the goal, change methods, or to reformulate the plan (Institute for Healthcare Improvement, n.d., The W. Edward Demings Institute, 2016)

### **Statement of Purpose**

The overall purpose of this project is to use lean methodology and Plan-Do-Study-Act (PDSA) to identify barriers in the patient flow process that lead to inefficient treatment for forensic psychiatric patients and to implement a plan for removing those barriers.

### **PICOT Question**

In the state of South Carolina, for adult patients requiring psychiatric treatment in the legislatively mandated, inpatient forensic hospital (P), does the implementation of quality improvement, using lean methodology and Plan-Do-Study Act (PDSA) to remove identified barriers (inadequate allocation of forensically trained physicians and psychologists to provide forensic evaluations, inadequate waitlist management, and lack of a patient triage system) to patient flow (I), reduce the forensic waitlist by 25%, and reduce the time on the forensic waitlist by 50% (C)(O) compared to pre-intervention existing data, over a 4 month period (T)? The purpose of the literature search was to find relevant, peer-reviewed evidence related to the quality improvement initiatives of lean methodology and Plan-Do-Study-Act (PDSA) to remove identified barriers to patient flow.



Table 1.1  
*PICOT Question Components*

<b>Patient Population</b>	<b>Intervention</b>	<b>Outcome</b>	<b>Comparison/Time</b>
Adult patients requiring psychiatric treatment in the legislatively mandated, inpatient forensic hospital	Implementation of quality improvement, using lean methodology and Plan-do-Study Act (PDSA) to remove barriers to patient flow	Reduction in the forensic waitlist by 25%, and a reduction in the time on the forensic waitlist by 50%	Compared to pre-intervention existing data from 2016, over the same four-month period in 2017.

Melnyk & Fineout-Overholt (2015)

### **Definitions**

Lean methodology is defined as a quality-improvement method based on the Toyota Production System (Moran, Burson, & Conrad, 2017; Sullivan, Soefje, Reinhart, McGear, & Cabie, 2014; Zhu, Lu, & Dai, 2014). Applied to the health care system, lean methodology helps create maximum value for patients by reducing waste and waits, and optimizing clinical processes (Lawal et al., 2014). Lean methodology targets unnecessary intermediate processes and retains only those that add value (Zhu, 2014). Specifically, lean methodology uses process mapping to identify areas for analysis and intervention.

Plan-Do-Study-Act (PDSA) is a systematic series of steps for planning and implementing change. The process begins with the Plan step that involves identifying a goal, formulating a theory, and defining success metrics. The Do step involves implementing the plan. During the Study step, outcomes are monitored to assess the validity of the plan and to monitor signs of progress and success, or problems that arise.

The last step, the Act step, integrates the learning generated by the entire process and can

be used to adjust the goal, change methods, or to reformulate the plan (The W. Edward Demings Institute, 2016).

Serious mental illness (SMI) is a condition that affects “persons aged 18 or older who currently or at any time in the past year have had a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders). The condition has to be of sufficient duration to meet diagnostic criteria and must result in serious functional impairment that interferes with at least one major life activity such as interpersonal relationships, activities of daily living, work, and recreation (Development Services Group, Inc., 2016, p. 2).

Forensic is defined as relating to or dealing with the application of scientific knowledge to legal problems (Forensic, n.d.). “Forensic” mental health services are services provided by mental health professionals or agencies for use in court or otherwise in connection with a legal matter (Fitch, 2014).

## **Literature Review**

### **Search Process**

The literature search process began with a review of the informative literature search tutorials prepared by the University of South Carolina (UofSC), Thomas Cooper Library. The initial search was conducted for scholarly, peer-reviewed articles using CINAHL Complete, PubMed-Medline, Business Source Complete, Psyc INFO and Web of Science. In addition, Google Scholar, a web-based free resource was accessed; however, the evidence found was duplicative from previous searches of CINAHL Complete, PubMed and Business Source Complete. The Cochrane Library, Joanna Briggs Institute, EconLit, and Public Affairs Information Service International (PAIS)

were also queried; however, PAIS and EconLit did not produce any relevant articles. The primary databases used for the literature review were CINAHL, PubMed-Medline, Web of Science, and Business Source Complete.

### **Sources of Evidence**

A review of data bases is provided to further substantiate credibility of the literature search process. CINAHL is a global nursing and allied health database that indexes more than 3,000 journals, and comprises more than 2.3 million records dating back to 1981, including a complete coverage of English-language nursing journals and publications. The literature coverage includes health care books, nursing dissertations, conference proceedings, book chapters and standards of practice (Dearholt & Dang, 2012, p. 74).

Pub Med-Medline, is a premier worldwide database of biomedical literature that includes research, clinical practice, administration, policy issues, and health care services. PubMed searches Medline as well as articles that are not indexed in Medline and provides over 18 million references to journal articles in the life sciences with a focus on biomedical research. Medline provides a controlled vocabulary that allows for search precision through the use of Medical Subject Headings (MeSH) to eliminate irrelevant articles. PubMed also has clinical queries, with evidence-based filters for clinical categories and systematic reviews (Dearholt & Dang, 2012, pp. 74-75).

The Web of Science includes three indexes: Arts & Humanities Citation Index (1975 to present), Social Sciences Citation Index (1900 to present), and a Science Citation Index Expanded (1899 to present). The Web of Science indexes thousands of the most prestigious, high impact research journals in the world and has cited reference

searching and ways to refine and analyze the search results. Web of Science allows cited reference searching, a feature enabling tracking of how a work is cited after initial publication (UofSC, 2013).

The proposed intervention, Lean Methodology, was developed as a business model and adapted to health care settings. Consequently, the Business Source Complete database was queried. Business Source Complete offers full text articles and abstracts for the most important scholarly business journals, dating back as far as 1886 (UofSC, 2013). Several other data bases were accessed as follows: PAIS, Cochrane library, Joanna Briggs Institute, PsycInfo, and EconLit. However, the searches from these databases did not yield as much evidence with relevancy for the research initiative (UofSC, 2013).

### **Search Terms**

The first major search strategy is KEYWORD searching. Keywords are generated from the PICOT question (Melnik & Fineout-Overholt, 2015, p. 50). According to Dearholt and Dang (2012), the initial step in discovering evidence is selecting searchable keywords from the answerable evidence-based practice (EBP) question (p. 72). A literature search was conducted using the following key words: “quality improvement,” “lean methodology,” “lean management,” “Plan-Do-Study-Act,” PDSA, “Plan-Do-Check-Act,” PDCA, “Six Sigma,” “6S,” “waiting list,” “time,” “barriers,” “patient flow,” and “hospitals.” The initial broad search yielded many extraneous results that did not answer my study question. Therefore, the search mode, using the Boolean operators “OR” and “AND” in the following amalgamations was performed to narrow the search to obtain more relevant data: (Quality Improvement OR Lean management OR Lean Methodology OR PDSA OR “Plan Do Study Act” OR “PDCA,” OR “Plan-Do-Check-

Act,” Six Sigma OR 6S) AND (wait\* list OR time OR barriers OR patient flow) AND (hospitals OR Psych\*). The keywords or synonyms of keywords were also searched singularly to ensure the inclusion of relevant evidence. The change in search still yielded a limited number of articles. Finally, the search was expanded to include the combination of additional keywords as follows: (waiting lists OR Waiting time OR wait time) AND Veterans Administration; (waiting lists OR Waiting time OR wait time) AND emergency departments; (waiting lists OR Waiting time OR wait time) AND surg\*, (waiting lists OR Waiting time OR wait time) AND psych\* admission, (waiting lists OR Waiting time OR wait time) AND psychiatry, (waiting lists OR waiting time OR wait time) AND forensic, (waiting lists OR waiting time OR wait time) AND Canada, (waiting lists OR waiting time OR wait time) AND Britain, and (waiting lists OR waiting time OR wait time) AND England. The results of the refined search produced many articles; yet, the evidence failed to address the specific research question. However, additional evidence was found in non-forensic hospital settings to support the proposed evidence-based project.

### **Inclusion and Exclusion Criteria**

The initial search strategy identified thousands of articles that might be relevant to this project; however, it did not produce evidence regarding patient flow studies in forensic psychiatric hospitals. For that reason, the search was broadened to include relevant patient flow studies from other settings such as, tertiary hospital emergency departments, as well as business and industry. In addition, a final search was conducted to include studies focused on hospital departments that are known for their long waiting list and wait times. Those departments included the following: Veterans Administration,

emergency departments, surgery, psych admissions, psychiatry, forensic, Canada, Britain, and England.

To be included in the final selection for this project, articles had to meet the following inclusion criteria: (1) be available in full text or full text accessible through interlibrary loan; (2) be written in English language; (3) be published in scholarly, peer reviewed journals in the past 12 years; (4) meet the grade of A or B on The Johns Hopkins Hospital Evidence Level and Quality Guide in Dearholt & Dang (2012) for quality of evidence; and (5) directly address at least one part of the PICOT question. In addition to meeting inclusion criteria, articles were excluded if they only tangentially addressed aspects of the PICOT question so that clear conclusions could not be derived. Refer to Tables 1.2-1.3 for search results.

Table 1.2  
*Volume of Results*

<b>KEY WORDS &amp; COMBINATIONS</b>	<b>CINAHL COMPLETE</b>	<b>PUBMED MEDLINE</b>	<b>BUSINESS SOURCE COMPLETE</b>	<b>WEB OF SCIENCE</b>	<b>PSYC INFO</b>
Quality Improvement OR Lean Management OR “Plan do study act” OR PDSA OR six sigma AND wait*list OR time AND Psych*	34,930	125,820	21,638	28,220	156,914
Lean Management OR PDSA OR six sigma AND wait*list OR barriers OR patient flow OR time AND hospitals	31,431	58,268	16,322	47,561	59,831
Lean Management AND Patient flow	1	69	5	46	1

Lean Methodology AND Patient flow	2	114	1	26	0
Plan Do Study Act AND Patient flow	4	5	0	16	1
Plan Do Check Act AND Patient low	0	2	0	7	0
PDSA AND Patient Flow	1	17	0	15	1
PDCA AND Patient Flow	0	6	0	4	0
Six Sigma AND Patient Flow	0	199	3	4	3
6S AND Patient Flow	2	0	0	11	0
PDSA	44	266	12	61	33
PDCA	10	157	38	13	11
Six Sigma	122	16,388	832	265	58
Plan-Do-Check-Act	20	94	33	48	20
Plan-Do-Study-Act	111	802	11	198	52
Lean Management	47	1,517	691	467	110
Lean Methodology	46	8,230	75	172	40

Table 1.3  
*Keywords and Combinations*

<b>KEY WORDS &amp; COMBINATIONS</b>	<b>COCHRANE LIBRARY</b>	<b>ECONLIT</b>	<b>PAIS</b>	<b>JOANNA BRIGGS INSTITUTE</b>
Quality Improvement OR Lean Management OR “Plan do study act” OR PDSA OR six sigma AND wait*list OR time AND Psych*	47	1,227	2,387	0
Lean Management OR PDSA OR six sigma	802	4,230	3,829	657

AND wait*list OR barriers OR patient flow OR time AND hospitals				
Lean Management AND Patient flow	0	0	1	0
Lean Methodology AND Patient flow	0	0	0	0
Plan Do Study Act AND Patient flow	7	1	1	0
Plan Do Check Act AND Patient Flow	0	0	0	0
PDSA AND Patient Flow	0	0	0	0
PDCA AND Patient Flow	0	0	0	0
Six Sigma AND Patient flow	1	0	0	0
6S AND Patient Flow	7	0	0	0
PDSA	14	0	1	1
PDCA	9	9	0	1
Six Sigma	2	82	4	2
Plan-Do-Check- Act	4	4	13	0
Plan-Do-Study-Act	18	52	50	3
Lean Management	1	57	60	0
Lean Methodology	0	36	7	1



Table 1.4  
Key Word Combinations

KEY WORD COMBINATIONS	PubMed
Waiting list OR Waiting time OR Wait time AND Veteran Administration	189
Waiting list OR Waiting time OR Wait time AND Emergency Departments	932
Waiting list OR Waiting time OR Wait time AND Surg*	4,187
Waiting list OR Waiting time OR Wait time AND Psych* Admission	38
Waiting list OR Waiting time OR Wait time AND Psychiatry	353
Waiting list OR Waiting time OR Wait time AND Forensic	32
Waiting list OR Waiting time OR Wait time AND Canada	1,025
Waiting list OR Waiting time OR Wait time AND Britain	10
Lean Methodology	7

### Summary of the Evidence

The identification of current, high quality evidence to answer the PICOT question was the main priority of the literature review. Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Evidence Rating Scale in Dearholt & Dang (2012) was utilized to guide the appraisal of the level and quality of the evidence. The level of evidence is determined by the type of research design used; whereas, the quality is based on a critical appraisal of study methods and execution. Finally, the strength of the evidence is determined by the synthesis of level and quality of the evidence that results in each practice recommendation (Dearholt & Dang, 2012, p.83). The JHNEBP rating scale

provides five levels, ranging from highest to lowest (I-V) to determine the strength of the evidence. The guidelines for grading the quality of the literature range from A to C with “A” representing the highest possible grade and “C” depicting the lowest. In addition, A Measurement Tool to Assess Systematic Reviews (AMSTAR) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines were employed to facilitate the appraisal of systematic reviews (Dearholt & Dang, 2012; Newhouse, Dearholt, Poe, Pugh & White, 2005). A review of each database was conducted, followed by the elimination of duplicate articles. Next, each article was screened by reviewing the abstract and using the inclusion/exclusion criteria for potential inclusion in the literature table. A total of nine articles met all of the inclusion criteria. The remainder of the articles were rejected primarily for failure to meet the criteria for quality ratings and failure to address the PICOT question in a direct manner so that clear conclusions could be derived.

### **Literature Analysis and Synthesis**

The literature review showed that no research has been done on patient flow issues in forensic psychiatric units. Although there are large numbers of articles on patient flow issues in other hospital departments, the evidence is not strong. There were no Level II quasi- experimental trials on patient flow issues. The only Level II study with an A rating was a qualitative study. The literature review provided diverse, extrapolative studies that were relevant to the PICOT question; however, only nine met all inclusion criteria. The following table summarizes the level of evidence and quality grades of each of the 9 articles included in this project. Over 50% of the evidence is quality ‘A;’ most reviews identified were qualitative.

Table 1.5

*Evidence Level & Quality Rating of Selected Articles for Analysis*

	<b>Authors' Name &amp; Type of Study</b>	<b>Evidence Level Rating</b>	<b>Quality Rating</b>
1)	<b>Article 1:</b> Hung, D., Martinez, M., Yakir, M. & Gray, C. (2015). <b>Type of study:</b> Qualitative Study	III	A
2)	<b>Article 2:</b> Flynn, G., O'Neill, C., & Kennedy, H. G. (2011). <b>Type of study:</b> Quantitative and includes a naturalistic prospective observational study	II	A
3)	<b>Article 3:</b> Van Dyke, K. J., McHugh, M., Yonek, J., Moss, D. (2011). <b>Type of Study:</b> Qualitative	III	B
4)	<b>Article 4:</b> Sayah, A. Rogers, L., Devarajan, K., Kingsley-Rocker, L., & Lobon, L. F. (2014). <b>Type of Study:</b> QI Project	V	B
5)	<b>Article 5:</b> Popovich, M. A., Boyd, C., Dachenhaus, T., & Kusler, D. (2012). <b>Type of Study:</b> Literature Review & Quality Improvement	V	A
6)	<b>Article 6:</b> Taylor, M. J., McNicholas, C., Nicolay, C., Dari, A., Bell, D. & Reed, J. E. (2013). <b>Type of Study:</b> Systematic Review and Meta Analysis	IV	A
7)	<b>Article 7:</b> Valsangkar N. P., Eppstein, A. C., Lawson, R. A., BSEE, Taylor, A. N. (2017).	III	B
8)	<b>Article 8:</b> Dammand, J., Horlick, M., Jacobsen, T. L., Leg, R., Rock, R. L. (2014). <b>Type of Study:</b> Case Study	V	A

9)	<b>Article 9:</b> Michael, Schaffer, Egan, Little & Pritchard <b>Type of Study:</b> Qualitative/ Quality Improvement Project	V	B
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The literature identified facilitators to the use of Lean Methods. Themes included (1) leadership engagement of staff and management; (2) sensitivity to professional values and culture of medicine; and (3) perceived adequacy of resources to support the change effort (Hung, Martinez, Yakir & Gray, 2015, p. 104). The literature also showed that Lean methods can be successfully used in a hospital setting. One study showed increased efficiency in patient treatment through reduced wait times, greater efficiency in patient treatment as well as shorter walking distances for staff (Dammand, Horlyck, Jacobsen, Lueg & Rock, 2014).

The literature review indicated that patient flow issues may be a significant barrier to receiving timely and appropriate treatment (Van Dyke, McHugh, Yonek, & Moss, 2011). The literature review also suggests that issues such as staff assignments, waitlist management, and patient triage may be barriers to patient flow (Elder, Johnston, & Crilly, 2015; Lee, & Franc, 2015; New, 2013; New, Andrianopoulos, Cameron, Olver & Stoelwinder, 2013; Van Dyke, et al., (2011). In addition, key facilitators and barriers of Lean were addressed in the literature, indicating that the potential to improve health care delivery using lean methodology can be maximized by understanding early facilitators and barriers. Staff engagement and performance management sensitivity to the professional values and organizational resources were also found to be important for the introduction of Lean changes (Hung, Martinez, Yakir & Gray, 2015).

The resistance to standardization of practice as well as the staff time required for participation were found to be barriers to the implementation of Lean. It is suggested that due to the complexity of medicine, applying Lean methodology as created in other industry could present challenges in healthcare that would need to be anticipated early to have successful outcomes (Hung, Martinez, Yakir & Gray, 2015). Summarily, three themes as identified above provided for facilitators and barriers of implementing Lean in primary care. Quality improvement also provides recommendations for organizations attempting change (Dammand, Horlyck, Jacobsen, Lueg & Rock, 2014).

The literature documents the use of various Lean tools to include: the elimination of non-value adding activities, Kaizen tablets and Gemba mapping (Dammand, Horlyck, Jacobsen, Lueg & Rock, 2015). Although the literature found the successful implementation of Lean in a public hospital, there were several limitations to the research to include, the literature on Lean tending not to report positive examples and the studies of Lean not considering opportunity costs (Dammand, Horlyck, Jacobsen, Lueg & Rock, 2015).

In addition, the literature found that pre and post intervention analyses are used to describe system-wide process improvement aimed at optimizing the emergency department (ED) patient experience by expediting throughput and flow. EDs are operating at or above capacity and evidence is increasing regarding the capacity worldwide. Hospitals are experimenting to reduce ED crowding, yet little evidence or instructions exist on how to implement patient flow improvement strategies; specifically, the factors that facilitate or hinder implementation. One of the major barriers to implementation is staff resistance (Van Dyke, McHugh, Yonek & Moss, 2011). Quality

improvement (QI projects to develop volume-driven protocols, based on retrospective analysis of administrative data to improve early intervention and rapid treatment of stable patients in the ED also result in positive changes as a result of the implementation of such protocols which are useful to the ED as the volume and length of stay begin to increase (Popovich, Boyd, Dachenhaus & Kusler, 2012). The literature also found that QI projects using PDSA can be applied to improve wait times and patient satisfaction among primary care patients. Specifically, the implementation of one or more process improvements using the PDSA model for improvement, and evaluation of the impact on patient wait times, patient satisfaction with wait times, and overall satisfaction with the care experience resulted in patient satisfaction, positive medical practice outcomes and improved financial performance (Michael, Schaffer, Egan, Little & Pritchard, 2013).

Finally, the evidence found that systematic reviews are performed to address the application of quality improvement methodologies from the manufacturing industry to surgical healthcare. Such methodologies used are continuous quality improvement, Six Sigma, total quality management, PDSA and Lean Six Sigma. The most common endeavors are to decrease complications or improve outcomes. The literature suggests that QI methodologies from industry can be adapted for use in alternate settings and that a comparison of Lean with other management tools that are similar like Total Quality Management (TQM) is recommended for further study (Dammand, Horlyck, Jacobsen, Lueg & Rock, 2015). Summarily, based on the evidence, there is utility for Lean principles and PDSA in healthcare to improve efficiency in processes and engage staff in the process of designing and implementing improvement initiatives across the healthcare system.

## **Recommendations for practice**

Upon review of the literature, there is support that Lean Methods and PDSA are evidence-based approaches to facilitate quality improvement projects. However, there has been no effort to implement these methods in a forensic psychiatric setting; therefore, their effectiveness in the forensic psychiatric setting will need to be assessed. The proposed project will implement Lean methodology and PDSA to address forensic patient flow and waitlist management issues. Lean tools of A3 and process mapping will be used to identify barriers to patient flow. The PDSA cycle will be used to plan, implement, and assess change based on the identified barriers to patient flow.

## **Methodology/ Study Design**

The design and method of the evidence-based project should be aligned with its purpose and goals (Moran, Burson & Conrad, 2017). The design of the proposed study is non-experimental evidence-based quality improvement using Lean methods and PDSA (Moran, Burson & Conrad, 2017). The proposed study will assess the current state of waitlist management and review administrative as well as clinical processes that impact the flow and movement of patients in and out of the forensic unit. During the initial project implementation, Lean methods will be used to determine if additional barriers to patient flow exist. The next step is to implement the PDSA cycle. In the first step, a plan will be developed to reduce barriers to patient flow. Success metrics will also be identified in the first step. During the second step, the Do step, the plan will be implemented. During the third step, the Study step, outcomes will be analyzed to assess the validity of the plan and to monitor signs of progress, success, as well as any problems that arise. During the last step, the Act step, the learning generated by the process will be

analyzed and integrated. If necessary, the goals, change methods, and plan will be modified (Institute for Healthcare Improvement, n.d.).

### **Sample/Setting**

The representativeness of the sample determines the generalizability of the results of a study. Therefore, determining the sample size is significant to the data collection process and should be done early in designing the study (Melnyk & Fineout-Overholt, (2015). The sample in this study will comprise the forensic waitlist, forensic waitlist data, and data related to forensic admissions, discharges, and length of stay. To increase representativeness, the study will comprise the total population of waitlist and total sample of admissions and discharges over two consecutive years. Although the project will not involve research of human subjects, the proposal will be presented for an IRB review within the South Carolina Department of Mental Health prior to initiating the study.

The setting for this project is the South Carolina Department of Mental Health (SCDMH) forensic program at G. Werber Bryan Psychiatric Hospital (BPH). SCDMH, Division of Inpatient Services (DIS) is a 1500 bed, state operated, multi-hospital and long-term care (nursing home) system, comprised of two psychiatric and one addictions treatment hospital, and three nursing homes. Of the two psychiatric hospitals, the Columbia-based, G. Werber Bryan Psychiatric Hospital (BPH), a 482-licensed bed acute care facility, operates a 230-bed forensic division for the treatment of defendants in need of inpatient psychiatric services for competency evaluation, restoration and long term psychiatric rehabilitation. BPH also has 200 acute hospital beds for adults and a 51-bed hospital program for children and adolescents. Patrick B. Harris Hospital is an Anderson,



South Carolina-based, adult acute care psychiatric facility. Finally, Morris Village is a 100-bed acute alcohol and drug addiction treatment center. The long-term care facilities consist of three veterans nursing homes located in Anderson, South Carolina, Walterboro, South Carolina and Columbia, South Carolina. There is one general skilled nursing facility (SNF) located in Columbia, South Carolina. DIS employs nurses, doctors, pharmacists, social workers, activity therapists, chaplains, administrative and clinical support staff, and has a labor force of over 3000 to support the operations of the multi-hospital and nursing home system.

The evaluation, treatment and care of forensic patients is led by an interdisciplinary team of forensic psychiatrists, psychologists, social workers and nurses trained to address the clinical and the legal aspects of the forensic process. Forensic evaluation occurs in the outpatient Forensic Evaluation Services (FES) program. The treatment and care of the patients during the acute phase are provided at the BPH forensic facility. As the patient progresses and no longer requires the level of therapeutic security provided at the forensic facility, individual treatment and care needs are provided in the DIS facilities described above.

### **Theory Model for Planning and Implementing Change**

The framework chosen for this project is Deming's model, also known as PDSA, which is a systematic series of steps for acquiring knowledge for continual process improvement. This cycle is also known as the Deming Wheel, or Deming Cycle (Appendix A). The cycle begins with the Plan step. This involves identifying a goal or purpose, formulating a theory, defining success metrics and putting a plan into action. These activities are followed by the Do step, in which the components of the plan are

implemented, such as making a product. Next comes the Study step, where outcomes are monitored to test the validity of the plan for signs of progress and success, or problems and areas for improvement. The Act step closes the cycle, integrating the learning generated by the entire process, which can be used to adjust the goal, change methods or even reformulate a theory altogether. These four steps are repeated over and over as part of a never-ending cycle of continual improvement (The W. Edward Demings Institute, 2016). Deming's model is widely used across healthcare systems nationwide. It is also an easier concept to grasp which allows for frontline staff involvement to promote change throughout the organization. Another reason for selecting Deming's model is for its ease of incorporation into Lean methodology which is also broadly utilized in healthcare systems across the nation to promote process improvement change resulting in improved efficiencies in healthcare systems.

## **Feasibility**

### **Issues that Promote the Feasibility of the Evidence-Based Project (EBP)**

The South Carolina Department of Mental Health (SCDMH) is a multihospital and long-term care system that values the implementation of evidence-based practice because it leads to the highest quality of care and the best patient outcomes (Melnik & Fineout-Overholt, 2015). Moreover, SCDMH has affiliation agreements with over 60 colleges and universities to include medicine, nursing, and other allied health professions for training and knowledge acquisition through the use of its facilities for clinical placements. In addition, SCDMH is currently the recipient of grants that require the support of research and evidence-based practice at the clinical site. SCDMH also has staff trained in accessing electronic databases to facilitate the acquisition of evidence for

incorporation into practice. Finally, and most urgent to this project, as a legislatively mandated program of SCDMH, and in accordance with state law, SCDMH is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by court order and state statute. Currently, SCDMH is unable to meet the requirements under SC statute due to an imbalance between capacity and demand. According to Melnyk & Fineout-Overholt (2015), external pressure exists on healthcare providers to provide the most up-to-date practices and health-related information (pp.7-8). All factors addressed promote an atmosphere supportive of research and qualitative improvement initiatives. Summarily, SCDMH endeavors to support an increase in the development and application of a scientific body of knowledge which ultimately leads to the highest quality of care and best patient outcomes (Melnyk & Fineout-Overholt, 2015).

#### **Issues that Might Limit the Feasibility of the Evidence-Based Project (EBP)**

Although the organization's mission, values and the urgency of need facilitate the implementation of this project, there are factors to consider as potential barriers both internal and external to the organization. Organizational culture, time and limited evidence-based practice knowledge and skills across all levels within the organization represent barriers that can lead to resistance as well as the lack of evidence in the literature of success, specific to the waitlist management in the forensic psychiatric hospital setting (Melnyk & Fineout-Overholt, 2015; White, Dudley-Brown & Terhaar, 2016). Resistance to change can be mitigated by ensuring that all stakeholders understand the benefits of the project. The development of a white paper can be helpful in providing succinct communication about the project to stakeholders to facilitate an understanding of the issue, problem solve or make decisions regarding the project (Moran, Burson &

Conrad, 2017). Additionally, the political climate as evidenced by judicial requirements, budgetary restrictions and legislative mandates are potential barriers that exist outside of the agency's locus of control (White, Dudley-Brown & Terhaar, 2016).

### **Strategies to reduce barriers and increase support**

The plan to reduce barriers and increase support for this project is as follows: (1) prepare a white paper for senior leadership and other stakeholders to cast vision about the project and how it will benefit the organization by facilitating the organization's ability to perform the mission as required by statute; (2) develop a forensic leadership work group to facilitate the change by incorporating the project into the current infrastructure; (3) provide an orientation to staff about the project and request staff input in project planning to include identification of systemic issues using Lean methods; (4) request an ongoing list of staff concerns prior to and during project implementation, and address each of the concerns both verbally and in writing.

Summarily, successful project implementation begins and ends with effective communication and having a well-developed plan to address and overcome barriers. The identification of issues and barriers is part of the project monitoring process and can occur prior to or during implementation. Therefore, having a thoughtful project plan can avert most problems (Moran, Burson & Conrad, 2017).

### **Key Stakeholders:**

- Patients awaiting admission (high impact; high influence over project)
- South Carolina Mental Health Commission (high impact; high influence over project)

- SCDMH State Director and Senior Management (Deputy Directors of Inpatient Services (project manager), Administration and Community/Outpatient; Agency Medical Director; Chief Financial Officer (CFO); General Counsel; Division of Inpatient Services (DIS) Medical Director) (high impact; high influence over project)
- DIS Executive Staff (Administrator/Controller; Medical Director; Chief Nursing Officer; Performance Improvement Director & Risk Manager; Director of Organizational Planning and Human Resources (high impact; high influence over project)
- Clinical Preceptor (high impact; high influence over project)
- Forensic Review Board (high impact; high influence over project)
- Judicial System Partners (high impact; high influence over project)
- Forensic hospital leadership (director, assistant directors, medical director, staff, and psychiatrists) (high impact; high influence over project)
- Forensic Admission Coordinator (high impact; high influence over project)
- UofSC and Medical University of South Carolina (MUSC) psychiatrists & psychologists (high impact; high influence over project)
- Community Mental Health Center liaisons (medium impact; medium influence over project)
- Community Residential Care Facilities (medium impact; medium influence over project)
- UofSC Faculty Advisors (high impact; high influence over project)
- Information Technology Leaders (high impact; high influence over project)

- DMH Statistician (high impact; high influence over project)

#### **Other Players:**

- Contracted Forensic Staff (medium impact; medium influence over project)
- Legislative Partners (Chair of Senate Finance and House Ways and Means sub-committees) (high impact; high influence over project)
- Patient Families (Low impact; low influence over project)
- Members of the community (Low impact; low influence over project)
- Advocacy & Victims Groups (medium impact; medium influence over project)
- Law Enforcement (high impact; high influence over project)

#### **Organizational Requirements**

The South Carolina Department of Mental Health (SCDMH) is the state's public mental health authority and operates the forensic program at G. Werber Bryan Psychiatric Hospital (BPH). The Division of Inpatient Services (DIS) is a 1500 bed, state operated (by SCDMH), multi-hospital and long-term care (nursing home) system, comprised of two psychiatric and one addictions treatment hospital and three nursing homes. The mission of SCDMH/DIS is to support the recovery of people with mental illnesses. Of the two psychiatric hospitals, the Columbia-based, G. Werber Bryan Psychiatric hospital (BPH), a 482- licensed bed acute care facility, operates a 230-bed forensic division for the treatment of defendants in need of inpatient psychiatric services for competency evaluation, restoration and long term psychiatric rehabilitation. The forensic program is identified as the agency's number one priority. BPH also has 200 acute hospital beds for adults and a 51-bed hospital program for children and adolescents. Patrick B. Harris hospital is an Anderson, South Carolina-based, adult, acute care psychiatric facility.

Finally, Morris Village is a 100-bed acute alcohol and drug addiction treatment center. The long-term care facilities consist of three veterans nursing homes located in Anderson, South Carolina, Walterboro, South Carolina and Columbia, South Carolina. There is one general skilled nursing facility (SNF) located in Columbia, South Carolina. DIS employs nurses, doctors, pharmacists, social workers, activity therapists, chaplains, administrative and clinical support staff, and has a labor force of 3000 to support the operations of the multi-hospital and nursing home system.

The evaluation, treatment and care of forensic patients is led by an interdisciplinary team of forensic psychiatrists, psychologists, social workers and nurses trained to address the clinical and the legal aspects of the forensic process. Forensic evaluation occurs in the outpatient Forensic Evaluation Services (FES) program. The treatment and care of the patients during the acute phase are provided at the BPH forensic facility. Thus, the end users of the organizational system are the forensic patients awaiting access to forensic evaluation to determine competency to stand trial, criminal responsibility, and psychiatric treatment services for competency restoration or psychiatric rehabilitation. In addition, the judicial system components (detention centers, lawyers, judges) are also end users. As the patient progresses in treatment and no longer requires the level of therapeutic security provided at the forensic facility, individual treatment and care needs are provided in the DIS facilities described above. The customer requirements for the project are patient flow and waitlist management to allow individuals awaiting the legal process timely access to court ordered forensic evaluation and treatment in preparation for trial.

### **Approach**

The approach to my project will incorporate Deming's model, also known as PDSA.

- The cycle begins with the Plan step. This involves identifying a goal or purpose, formulating a theory, defining success metrics and putting a plan into action.
- These activities are followed by the Do step, in which the components of the plan are implemented, such as making a product.
- Next comes the Study step, where outcomes are monitored to test the validity of the plan for signs of progress and success, or problems and areas for improvement.
- The Act step closes the cycle, integrating the learning generated by the entire process, which can be used to adjust the goal, change methods or even reformulate a theory altogether.

These four steps are repeated over and over as part of a never-ending cycle of continual improvement (The W. Edward Demings Institute, 2016).

Table 1.6.  
*Timeframe & Milestones*

<b>Project Stages (Milestones or Checkpoints)</b>	<b>START DATE</b>	<b>END DATE</b>	<b>MILESTONE</b>
<b>Work with Chair on Project Proposal</b>	5/16/2017	8/15/2017	<b>May 2017</b>
<b>Draft IRB Proposal</b>	9/1/2017	9/15/2017	
<b>Establish Dashboard</b>	5/18/2017	6/30/2017	<b>May 2017</b>
<b>Begin Draft Manuscript</b>	4/9/2017	3/20/2018	<b>April 2017</b>
<b>Send All Proposal Materials to Committee for review and feedback</b>	July 2017	July 2017	
<b>Prepare Project Proposal Defense</b>	8/1/2017	9/5/2017	<b>Sept 2017</b>



<b>Revisions to Proposal</b>	9/1/2017	9/8/2017	
<b>IRB Approval from UofSC &amp; DMH Submit letter of successful proposal defense from UofSC School of Nursing and the Department of Mental Health's IRB to UofSC's IRB</b>	9/5/2017	9/18/2017	<b>Sept 2017</b>
<b>Project Start/ Intervention</b>	9/13/2017	Sept 2017	<b>Sept 2017</b>
<b>Project Start: Initiate Intervention/Practice Change with Weekly Assessments</b>	9/18/2017	12/31/2017	<b>Dec 2017</b>
<b>Evaluate Interventions and Practice Change</b>	1/5/2018	2/20/2018	<b>Feb 2018</b>
<b>Finalize DNP Project Manuscript</b>	2/1/2018	March 2018	<b>March 2018</b>
<b>Finalize Presentation</b>	Jan 2018	March 2018	<b>March 2018</b>
<b>Project Deliverables Dashboards; Statutory Compliance; Reduced Waitlist; Reduced Wait Times</b>	Jan 2018	March 2018	<b>March 2018</b>
<b>Send Manuscript &amp; Presentation to Committee for Review</b>	3/20/2018	3/20/2018	
<b>Defend Final Project</b>	March 2018	March 2018	<b>Mar 2018</b>
<b>Make any Required Revisions &amp; Send Paperwork to Graduate School</b>	Mar 2018	Apr 2018	
<b>Presentation to Organization</b>	Apr 6, 2018	Apr 2018	
<b>Graduation</b>		May 2018	<b>May 2018</b>

**Note: Refer to Gantt Chart in Appendix L**

#### **Inclusions & Deliverables**

- Develop dashboards

- Replacement of manual processes utilizing electronic data bases to capture real time metrics and transition from person-dependent to systems-dependent data generation and analysis.
- Bring organization into statutory compliance

### **Exclusions**

The opening of additional civil beds; availability of community placements

### **Critical Success Factors**

#### **Factors Impacting Project Success**

- Support from key leadership
- DMH affiliation agreements with over 60 colleges and universities to include medicine, nursing, and other allied health professions for training and knowledge acquisition through the use of its facilities for clinical placements.
- Currently, DMH is a recipient of grants that require the support of research and evidence-based practice at the clinical site.
- DMH has staff trained in accessing electronic databases to facilitate the acquisition of evidence for incorporation into practice.
- As a legislatively mandated program of DMH, and in accordance with state law, DMH is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by court order and state statute.

#### **Factors That Could Negatively Impact the Project's Success**

- Inability to meet the statutory requirements under SC state statute due to a mismatch between capacity and demand.
- Organizational culture, time and limited evidence-based practice.

- Resistance to change
- Political Climate
- Budgetary Restrictions
- Legislative Mandates
- Personal Life Stressors
- Loss of Key Stakeholders

### **Assumptions**

- The demand for forensic beds exceeds capacity.
- The agency's overall priority and focus will remain on forensic services.
- The Project is not time-limited.
- Inefficiencies in patient flow exist.

### **Constraints**

Time; monetary; retention of key stakeholders; accessibility to automated forensic metrics; people resources; state government regulations; other regulatory requirements.

### **Related Projects**

A project is currently in the planning stages to determine the feasibility of adding additional civil psychiatric beds. A DMH project that could impact forensic patient flow is the opening of Crisis Stabilization Units (June, 2017).

Table 1.7  
*Risk Identification 1-Low 5-High*

<b>Risk Description</b>	<b>Project Impact</b>	<b>Probability of Occurrence</b>
<b>Loss of adequate state funding impact</b>	<b>5</b>	<b>3</b>
<b>Turnover of key stakeholders</b>	<b>5</b>	<b>3</b>

<b>Agency deemed to be in contempt of court</b>	<b>5</b>	<b>2</b>
<b>Infrastructure failure</b>	<b>5</b>	<b>1</b>
<b>Loss of contract services impact</b>	<b>5</b>	<b>3</b>
<b>Recidivism</b>	<b>4</b>	<b>2</b>
<b>Political Barriers</b>	<b>4</b>	<b>2</b>
<b>High profile forensic patient</b>	<b>3</b>	<b>2</b>

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Table 1.8  
DNP Project Measurement

Measure	Type of Measure	Purpose of Measure	Data Needed for Measure	Source of Data for Measure	Frequency of Data Collection	How will Data Be Tracked and Assessed Over Time
Number of patients on Waitlist	Outcome Measure	Indicator of trends to facilitate the management of fluctuations and project amount of capacity required	Inpatient Waitlists for 24 Months	Avatar (Patient Billing and management system)	Daily	Using Net Smart EHR Management Systems, Forensic Dash-board and Waitlist Steering Committee
Waitlist Disposition	Process Measure	To capture the disposition of forensic patients on the waitlist	Waitlist Disposition Summary Reports for 24 Months	Avatar(Patient Billing and management system)	Monthly (As we complete PDSAs data will be tracked weekly)	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee.
Time on waitlist	Process Measure	To monitor and manage productivity and efficiencies that support forensic patient flow	Average Days Report which tracks data by month and type of admission	Avatar(Patient management system)	Weekly (As we complete PDSAs data will be tracked daily)	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee
Average Length of Stay (ALOS)	Process Measure	To monitor and evaluate patient population,	Length of Stay Report for 24 Months	Avatar(Patient Management system)	Monthly	Using Net Smart EHR Systems, Forensic

		treatment, discharge process, and placement				Dashboard and Waitlist Steering Committee
Numbers of Discharges	Balancing Measure	To monitor and evaluate bed turnover & productivity	Admission & Discharge Reports for 24 Months	Avatar (Patient Billing and management system)	Weekly	Using Net Smart EHR Systems, Dashboard and Waitlist Steering Committee
Numbers of Admissions	Balancing Measure	To monitor and evaluate productivity	Admission & Discharge Report for 24 Months	Avatar(Patient Billing and management system)	Weekly	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee
Types of Admissions: <ul style="list-style-type: none"> <li>• Emergency</li> <li>• Inpatient Evaluation</li> <li>• Judicial</li> <li>• Not Guilty by Reason of Insanity (NGRI)</li> <li>• Restoration</li> </ul>	Process Measure	To facilitate forensic patient triage and to drive service type and structure	Admission Type Report For 24 Months	Avatar(Patient Management system)	Monthly (As we complete PDSAs data will be tracked weekly)	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee

Demographics: <ul style="list-style-type: none"> <li>• Age</li> <li>• Sex</li> <li>• Race</li> <li>• Education Level</li> </ul>	Balancing Measure	To ensure healthcare equity for all patients and to ensure the optimization of Medicaid and Medicare revenue for patients age 21 & under or age 65 and older	Age, race, and education level	Avatar(Patient Management system)	Monthly	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee
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## **Sustainability Plan**

Lean methodology is an evidence-based practice improvement approach adopted from the Toyota Company which targets unnecessary intermediate processes and retains only those that add value (Moran, Burson, & Conrad, 2017; Sullivan, Soefje, Reinhart, McGeary, & Cabie, 2014; Zhu, Lu, & Dai, 2014). PDSA is part of the Institute for Healthcare Improvement Model for accelerating quality improvement in healthcare to implementing change (Institute for Healthcare Improvement, n.d.). The overall purpose of this project is to use lean methodology and PDSA to identify barriers in the patient flow process that lead to delays in treatment for forensic psychiatric patients and to implement a plan for removing those barriers to improve psychiatric and physical health outcomes for patients. Ongoing monitoring of measures and goals will be established to manage capacity and demand. Data from the forensic dashboard will be used to drive tests of change.

## **Conclusion**

The growing demand for inpatient forensic psychiatric treatment and services, coupled with a static supply of resources creates the need for innovation in practices that create efficiencies in the delivery of services for this challenging population. Patient flow in a forensic psychiatric hospital setting is an understudied topic. Additional study is needed. The removal of barriers to patient flow will result in a decrease in the delayed access to forensic psychiatric treatment due to the high demand for beds coupled with a limited supply, and consequently, a decrease in the imbalance between capacity and demand.



## CHAPTER 2

### FORENSIC PATIENT FLOW:

### A MISMATCH BETWEEN CAPACITY AND DEMAND

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Bellamy, V. J., Hughes, R. G., Tavakoli, A. S., & Handley, P. A. To be submitted to *The Journal for Healthcare Quality*.

## ABSTRACT

**Objective:** To use lean methodology and Plan-Do-Study-Act (PDSA) to identify barriers to patient flow and improve timely treatment for forensic psychiatric patients.

**Background:** The United States (U.S.) has a growing incarcerated population. The volume, coupled with inefficient patient flow through the judicial and health care systems, create an imbalance between the high demand for services and the capacity to deliver health care.

**Study Population:** Criminal defendants with unmet psychiatric and chronic disease treatment needs.

**Methods:** A nonexperimental evidence-based quality improvement study was conducted at a forensic psychiatric hospital in the Southeastern region of the U.S. utilizing Lean Methodology and Plan-Do-Study-Act (PDSA) along with patient flow dashboards to identify barriers (communication, legal, active treatment and discharge process) in patient flow; and improve timely treatment by reducing the number of days on the waitlist and length of stay, for forensic psychiatric patients.

**Results:** Statistically significant reductions in the forensic waitlist and wait time were achieved. During the study period, the average length of stay was reduced, and both the number of admissions and discharges were increased.

**Conclusions:** Maximization of efficiencies within the forensic psychiatric hospital patient flow process, through the minimization and elimination of non-value-added waste (waiting, over-processing, defects, and skills), resulted in a reduction in the waitlist and wait times due to improved patient flow. Such improvements increased the state's

treatment capacity for defendants awaiting inpatient services at the forensic psychiatric hospital.

*Keywords:* forensic psychiatric hospital, patient flow, waitlist, wait time, quality improvement, lean methodology, plan-do-study-act.

## INTRODUCTION

Currently, the United States (US) has the largest incarcerated population in the world with as many as 2.2 million adults incarcerated (Kennedy-Hendricks, Huskamp, Rutkow, & Barry, 2016). Research consistently shows that people with mental illness make up a large proportion of the incarcerated population (Kennedy-Hendricks et al., 2016; Prins, 2014; Steadman, Osher, Robbins, Case, & Samuels, 2009). Individuals with mental illness, and specifically those in the criminal justice system, have complex health care needs that are often difficult to diagnose and treat (Abram, Teplin, & McClelland, 2003). Consequently, the health care system is greatly challenged to meet the needs of this vulnerable population (Kennedy-Hendricks, et al., 2016). Lack of appropriate treatment leads to exacerbation of mental health conditions, extended lengths of stay in hospitals, and an increase in health care costs (Kennedy-Hendricks, et al., 2016). Therefore, it is imperative that these individuals receive timely and appropriate treatment.

The state of South Carolina currently has approximately 20,951 incarcerated adults. Of that population, approximately 3,500 are diagnosed with a serious mental illness (SMI) (State of South Carolina, Department of Corrections, 2016). In accordance with South Carolina law, South Carolina Department of Mental Health (SCDMH) is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by order and state statute. A forensic psychiatric evaluation is a clinical assessment/judgment by a qualified, forensically trained provider of a criminal defendant's competency to stand trial, capacity to conform and responsibility for a committed felony (South

Carolina Department of Mental Health [SCDMH], 2017). Such clinical information is used to facilitate the adjudicative process. Currently, the SCDMH is unable to meet the requirements under SC state statute.

The forensic unit has a capacity of 230 beds. At any given time, an additional 70-100 people are awaiting psychiatric treatment for restoration to competency or long term psychiatric rehabilitation at the SCDMH forensic psychiatric hospital. With an average length of stay of 200 days on the forensic unit, patients waiting for a bed languish in jail while their psychiatric condition deteriorates. Consequently, there is a serious mismatch between the demand for treatment and treatment capacity in SC. Currently, there are no plans to increase bed capacity at the forensic hospital. Without change, the patient waitlist will continue to grow and access to treatment will continue to be prolonged. At present, increasing patient flow through the SCDMH forensic hospital is the optimal option to increase capacity and get these patients to needed treatment. Identifying and removing barriers to patient flow earlier could mean that the capacity and demand mismatch could be reduced.

The question answered by this evidence-based project was: In the state of South Carolina, for adult patients requiring psychiatric treatment in the legislatively mandated forensic, psychiatric hospital, does the implementation of quality improvement, using lean methodology and Plan-Do-Study -Act (PDSA) to remove identified barriers (inadequate allocation of forensically trained physicians and psychologists to provide forensic evaluations, inadequate waitlist management, and lack of a patient triage system) to patient flow, reduce the forensic waitlist by

25%, and reduce the time on the forensic waitlist by 50% compared to pre-intervention existing data, over a four month period?

## **Methods**

### **Study Design**

The intent of the design and method of the evidence-based project is to be aligned with its purpose and goals (Moran, Burson, & Conrad, 2017). This project was non-experimental, evidence-based quality improvement using Lean Methodology and PDSA (Moran et al., 2017). The study assessed the current state of waitlist management and reviewed administrative and clinical processes that impacted the flow and movement of patients in and out of the forensic units. During the initial project implementation, Lean methods were used to determine if additional barriers to patient flow existed (see Figure 2.1). The next step of the project entailed implementing the PDSA cycle. A plan was developed to reduce barriers to patient flow. Success metrics were also identified in this step. During the second step, the Do step, the plan was implemented. During the Do step the change was tested. Communication was vital in this step. During the third step, the Study step, outcomes were analyzed to assess the validity of the plan and to monitor signs of progress and success, as well as any problems that arose. During the last step, the Act step, the learning generated by the process was analyzed and integrated. The goals, change methods, and plan of the project were modified as appropriate (Institute for Healthcare Improvement, n.d.).

# Theoretical/ Conceptual Framework

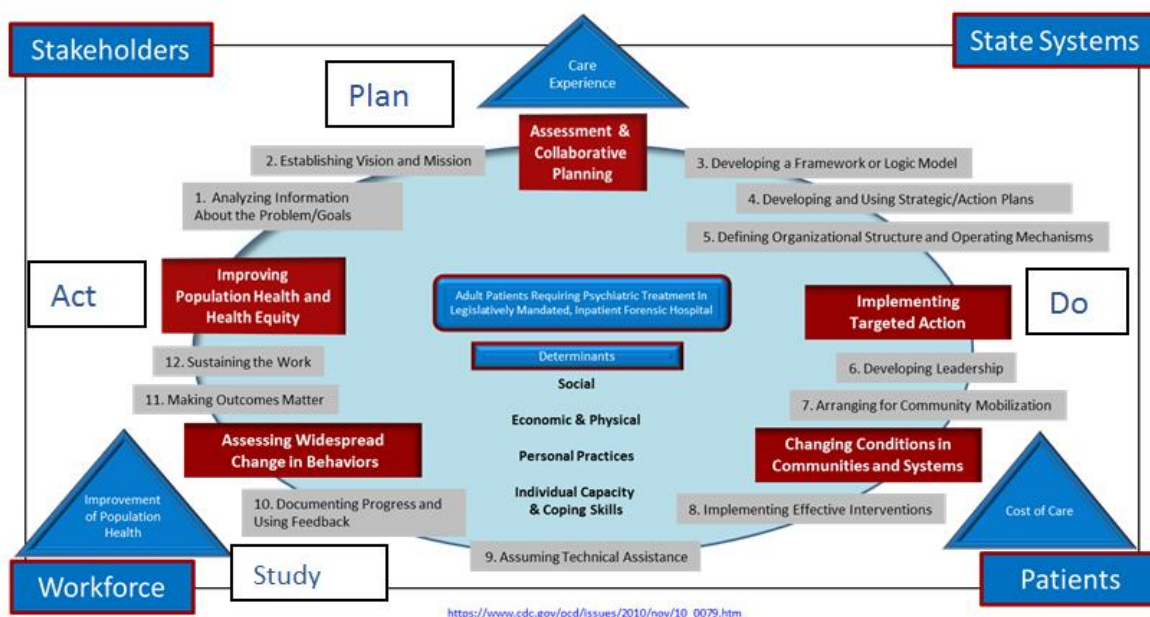


Figure 2.1. Conceptual Framework. This figure illustrates the integration of PDSA and population health theory adapted from CDC.gov.

## Sample/Setting

The population in this project was comprised of incarcerated adults on the forensic waitlist, forensic waitlist data containing type of admission (pre-trial; not guilty by reason of insanity; emergency; psychosocial rehabilitation), and data related to forensic admissions, discharges, and length of stay. For comparison purposes, the study comprised the total population of waitlist and total sample of admissions and discharges over two consecutive years. The project was reviewed and deemed exempt by both the organization and participating University's Institutional Review Boards (IRBs) prior to initiating the study.

The setting for this project was a legislatively mandated forensic psychiatric hospital of the Department of Mental Health, Division of Inpatient Services (DIS), a 1500 bed, state-operated, multi-hospital and long-term care (nursing home) system,

comprised of two psychiatric hospitals, an alcohol and drug addiction treatment hospital, and four nursing homes. Of the two psychiatric hospitals, the flagship psychiatric hospital, a 482-licensed bed acute care facility, operates a 230-bed forensic division for the treatment of defendants in need of inpatient psychiatric services for competency restoration and long-term psychiatric rehabilitation. This hospital also has 200 acute civil beds for adults and a 51-bed inpatient program for children and adolescents. DIS has a labor force of over 3000, including health care clinicians, administrators, and clinical support staff, to support the operations of the multi-hospital and nursing home system.

The evaluation, treatment and care of forensic patients is led by an interdisciplinary team of forensic psychiatrists, psychologists, primary care practitioners, social workers and nurses trained to address the clinical and legal aspects of the forensic process. Forensic evaluation occurs in the outpatient Forensic Evaluation Services (FES) program. The treatment and care of the patients during the acute phase are provided at the inpatient forensic facility. As the patient progresses and no longer requires the level of therapeutic security provided at the forensic facility, individual treatment, and care needs are provided in the DIS facilities described above.

### **Data Collection**

A waitlist management application was modified to replace manual methods of data collection. The waitlist and wait time data were collected through the use of dashboards that were developed using Avatar which is a practice management system in conjunction with the waitlist management application. In addition, an excel database, designed for



waitlist management was utilized for data validation. Waitlist and wait time data were captured for the same weeks of 2016 and 2017 for statistical comparison. This method allowed for consistency and consideration of seasonal trends. The waitlist and wait time data for the same weeks of 2016 and 2017 captured the length of time on the waitlist in days as well as the actual number of persons awaiting inpatient admission to the forensic hospital. The average number of days on the waitlist (wait time) and the number of persons on the waitlist over 16 observational weeks of 2016 and 2017, were pulled for comparison to determine the results of interventions for statistical analysis. The analysis of data was conducted using descriptive and inferential statistics. *P* values of less than or equal to 0.0001 were considered significant.

## **Findings**

### **Results**

In an attempt to address the forensic waitlist challenges utilizing lean methodology and plan-do-study act (PDSA), four PDSA sessions were conducted to improve efficiencies in waitlist management (see Figure 2.2). The first PDSA focused on communication across the SCDMH system, shifting from person-centered to a system's database to facilitate waitlist management and the break-down of silos. To accomplish this paradigm shift required a multilevel change across various disciplines in collaboration with outpatient community mental health center partners. Weekly waitlist management meetings were developed for the purpose of addressing issues that affected both community and inpatient. Another silo piece about discharge readiness involved team members' perspectives of readiness. As a result, changes were made to the forensic review board (FRB). The development of guidelines for board participation as well as a

checklist was developed. The checklist was designed to ensure standard work in preparing patients for presentation to the FRB. Next, board training was required and provided for all members of the FRB. New policies, guidelines and timeframes for applying for human services benefits were established. Communication barriers also existed within the judicial system. Through multisystem collaboration, communication and flow were improved.

The second PDSA addressed legal issues that impacted the admission and discharge process. The organization was not receiving court orders timely. The solicitor has 15 days to file paperwork to initiate the probate process. A test of change was conducted to ameliorate the problem. The responsibility for getting the orders to the SCDMH had to be established. This was accomplished through collaboration with solicitors and education of legal partners (solicitors and public defenders). Through additional tests of change, it was determined that a team approach could improve communication through the use of forensic designated examiner (DE) teams. A forensic DE team comprised of a forensic psychiatrist, social worker and probate judge was formed to streamline the probate process and facilitate the triage of patients to the appropriate level of care. This involved partnering with probate judges and allowed for the jurisdictional transfer of defendants locally to facilitate the probate process through standard work. Next, a push-pull system was established to ensure receipt of the right court orders from the right solicitors. This process facilitated the development of a triage system to ensure the assignment of patients to the right area for maximal active treatment opportunities. Finally, the incorporation of the legal consultant as a member of the forensic leadership and as the FRB chair, with a cross trained backup was accomplished to ensure consistency in legal

representation with the clinical and support team. Consequently, utilizing lean methodology allowed for the identification and elimination of barriers to legal processes.

The third PDSA session focused on active treatment. Several tests of change were identified. The utilization of staffing resources was process mapped and the redeployment of forensically-trained staff was accomplished to increase active treatment. A patient triage system was developed to improve efficiency and access to the appropriate level of care and to effectively address the individualized needs of the patient across the care continuum. The expansion of treatment space and development of expectations for increasing active treatment improved discharge readiness and shortened lengths of stay in the hospital. The removal of the procedural barriers eliminated waste in time and duplication of services to increase the use of treatment space. To improve efficiencies in treatment, the application of an evidence-based practice model developed by Trestman at UCONN Health was adapted for use as a forensic psychotherapy model to address individualized patient needs (South Carolina Department of Mental Health, 2017).

The fourth PDSA collaboration focused on medical issues which slowed the discharge process. The placement of tuberculin skin tests and the ordering of discharge medications were identified as barriers to the discharge process which prevented the availability of beds for new admissions. Standard work was put in place to establish time frames for PPD placement based on refinements in discharge planning to include the development of a discharge readiness check list. Also, the delay in establishing human services benefits for community placement created a barrier to discharge. In collaboration with treatment teams, administration, and other state and federal stakeholders, barriers to discharge were removed/eliminated, allowing for the achievement of discharge goals.

Recognizing that discharge planning begins on admission, the development of a discharge coordinator was critical to the success of the initiatives. Creative strategies to improve timely approval of benefits, allocation of funding streams and increased active communication and collaboration with community partners, enhanced the successful discharge of the forensic patient.

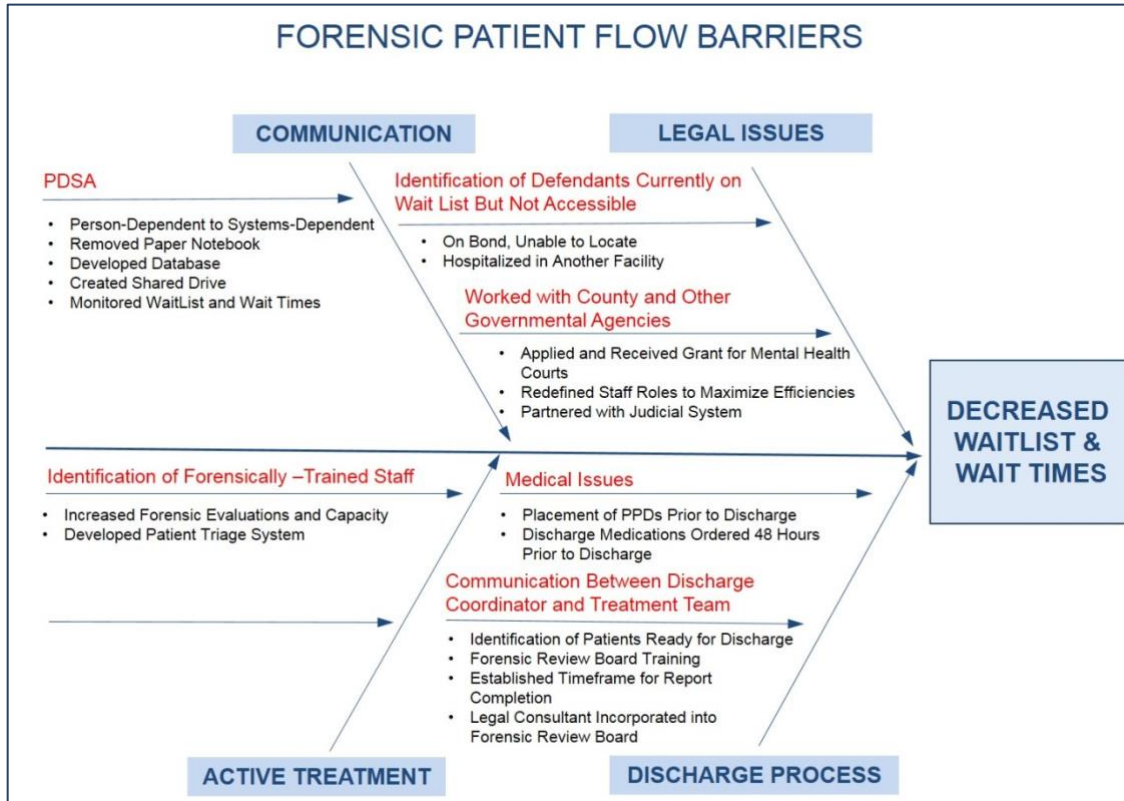


Figure 2.2. Forensic Patient Flow Barriers. This is the fishbone diagram detailing barriers to forensic patient flow.

### Statistical Findings:

The sample in this project comprised the forensic waitlist data. Forensic waitlist data over the same 16-week period of 2016 and 2017 during the months of September through December were captured as weekly averages of the number of persons on the waitlist and the amount of time each person spent in days on the waitlist (see Figure 2.3).

The days associated with a particular defendant or observation week were excluded from

the sample if that defendant met the criteria for outlier (on bond and unable to be located by the judicial system; out of state or in custody in another state and unavailable). Three defendants originally on the waitlist, met the exclusion criteria for the 2016 observations. The same 3 defendants met the exclusion criteria for the 2017 observations.

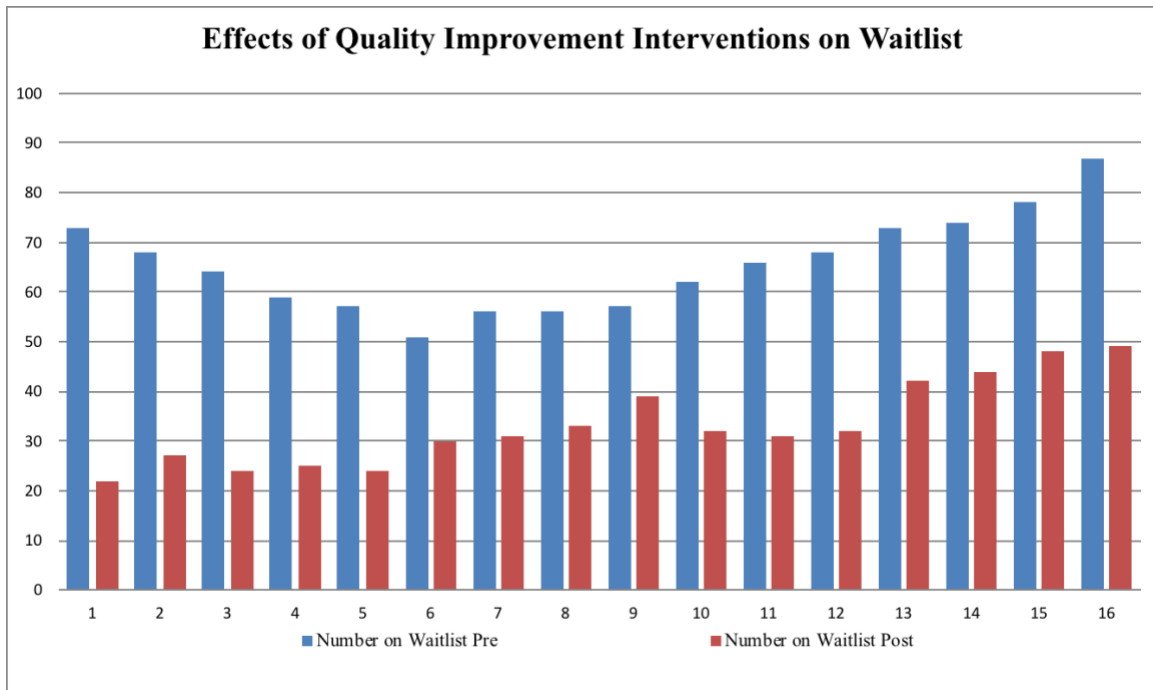


Figure 2.3. Forensic Patient waitlist numbers pre-intervention (2016) as compared to post-intervention (2017).

Table 2.1 indicates that all proportion changes under the null ( $p$  value= 0.25) were statistically significant except for week nine. The results also showed that the total proportion under the null ( $p$  value = 0.5) was statistically significant ( $p$  -value < 0.0001). In addition, the result of one sample proportion under the null ( $p$  value = 0.5) revealed that only six weeks (weeks 1, 2, 3, 9, 14 and 15) out of 16 weeks were statistically significant. Also, the results did not indicate that the total proportion under the null ( $p$  value= 0.5) was significant ( $p$  value= 0.30) (see Table 2.1). Consequently, the

improvement yielded statistically significant improvements in reducing the number on the waitlist (see Table 2.1 and Appendix M.1).

Table 2.1  
*Statistical Measures Related to Waitlist (n= 16)*

Week	Number on Waitlist Pre	Number on waitlist Post	Proportion Change	p Value Under Null =.25	p Value Under Null =.50
1	73	22	-69.86	.00	.00
2	68	27	-60.29	.00	.04
3	64	24	-62.50	.00	.02
4	59	25	-57.63	.00	.12
5	57	24	-57.89	.00	.11
6	51	30	-41.18	.01	.10
7	56	31	-44.64	.00	.21
8	56	33	-41.07	.01	.09
9	57	39	-31.58	.14	.00
10	62	32	-48.39	.00	.40
11	66	31	-53.03	.00	.31
12	68	32	-52.94	.00	.31
13	73	42	-42.46	.00	.10
14	74	44	-40.54	.00	.05
15	78	48	-38.46	.01	.02
16	87	49	-43.68	.00	.12
<b>Total</b>	<b>1049</b>	<b>533</b>	<b>-.508</b>	<b>.00</b>	<b>.30</b>

*Note.* Forensic Patient waitlist numbers pre-intervention (2016) as compared to post-intervention (2017).

The average number of people on the waitlist before intervention was 65.56 with a standard deviation of 9.69, whereas after intervention the average number on the waitlist was 33.31 with a standard deviation of 8.64. Also, the results indicated the average of percentage change on a variable (number of people on waitlist) was -49.13 with a standard deviation of 10.43. The results indicated that there were statistically significant differences for the number of people on the waitlist by pre and post intervention using both parametric test (two independent T-test) and non-parametric test (Wilcoxon Two Sample test)  $p$  value  $< 0.0001$ (see Appendix M.1). The interventions yielded statistically significant improvement.

Table 2.2 indicated that all proportion changes of the average days on the waitlist under the null ( $p = 0.25$ ) were statistically significant except for week five. The results also showed the total proportion under the null ( $p = 0.25$ ) was statistically significant. In addition, the result of one sample proportion under the null ( $p = 0.5$ ) revealed that only five (weeks 3, 5, 6, 9, 10) out of 16 weeks were statistically significant. Also, the results did not indicate that the total proportion under the null ( $p = 0.5$ ) was significant ( $p = 0.34$ ). The overall sample did not show a decrease of 50% of average days; however, 5 weeks out of 16 weeks did show a significant decrease of average days by 50% (see Table 2.2).

Table 2.2  
Average Days on Waitlist

Week	Average Days on Waitlist Pre-Intervention	Average Days on Waitlist Post-Intervention	Proportion Change	<i>p</i> Value Under Null =.25	<i>p</i> Value Under Null =.50
1	37	20	-45.94	.01	.31
2	38	16	-57.89	.00	.16
3	54	19	-64.81	.00	.01
4	54	29	-46.30	.00	.29
5	49	38	-22.44	.33	.00
6	60	38	-36.67	.03	.02
7	67	37	-44.78	.00	.19
8	79	33	-58.23	.00	.07
9	80	30	-62.50	.00	.01
10	87	27	-68.96	.00	.00
11	107	47	-56.07	.00	.10
12	100	54	-46.00	.00	.21
13	93	49	-47.31	.00	.30
14	91	50	-45.05	.00	.17
15	98	50	-48.98	.00	.42
16	94	50	-46.81	.00	.27
<b>Total</b>	<b>1188</b>	<b>587</b>	<b>-.494</b>	<b>.00</b>	<b>.34</b>

Note: Average number of days on waitlist pre-intervention (2016) as compared to post-intervention (2017), *p* value for one sample proportion test (one-sided test).

The average number of days on the waitlist (wait time) before intervention was



74.25 with a standard deviation of 23.03, whereas after intervention, the average number of days on the waitlist (wait time) was 36.69 with a standard deviation of 12.45. The results showed the average of percentage change on the average days on the waitlist (wait time) was -49.92 with a standard deviation of 11.42. The results indicated a statistically significant difference for the average number of days on the waitlist by pre and post-intervention using both parametric (two independent T-test) and non-parametric test (Wilcoxon Two sample test)  $p < 0.0001$  (see Appendix N.1 and Figures 2.4 and 2.5).

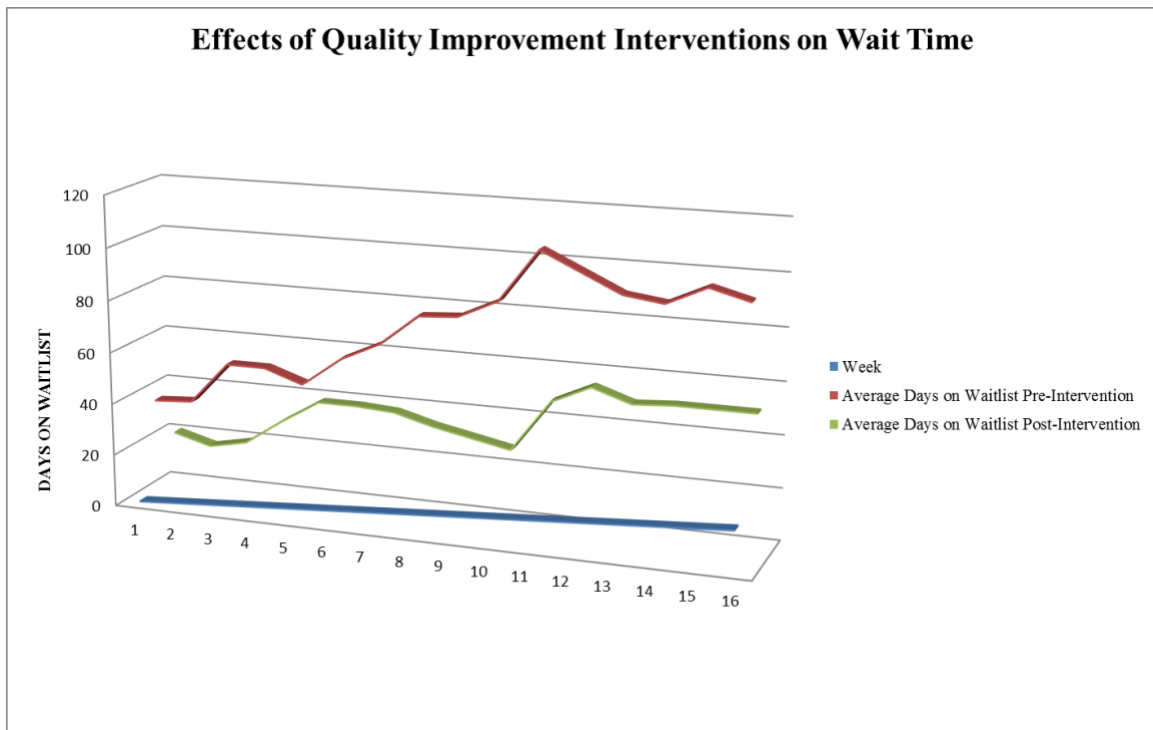


Figure 2.4. Average days on waitlist  
Average number of days on waitlist pre-intervention (2016) as compared to post-intervention (2017).

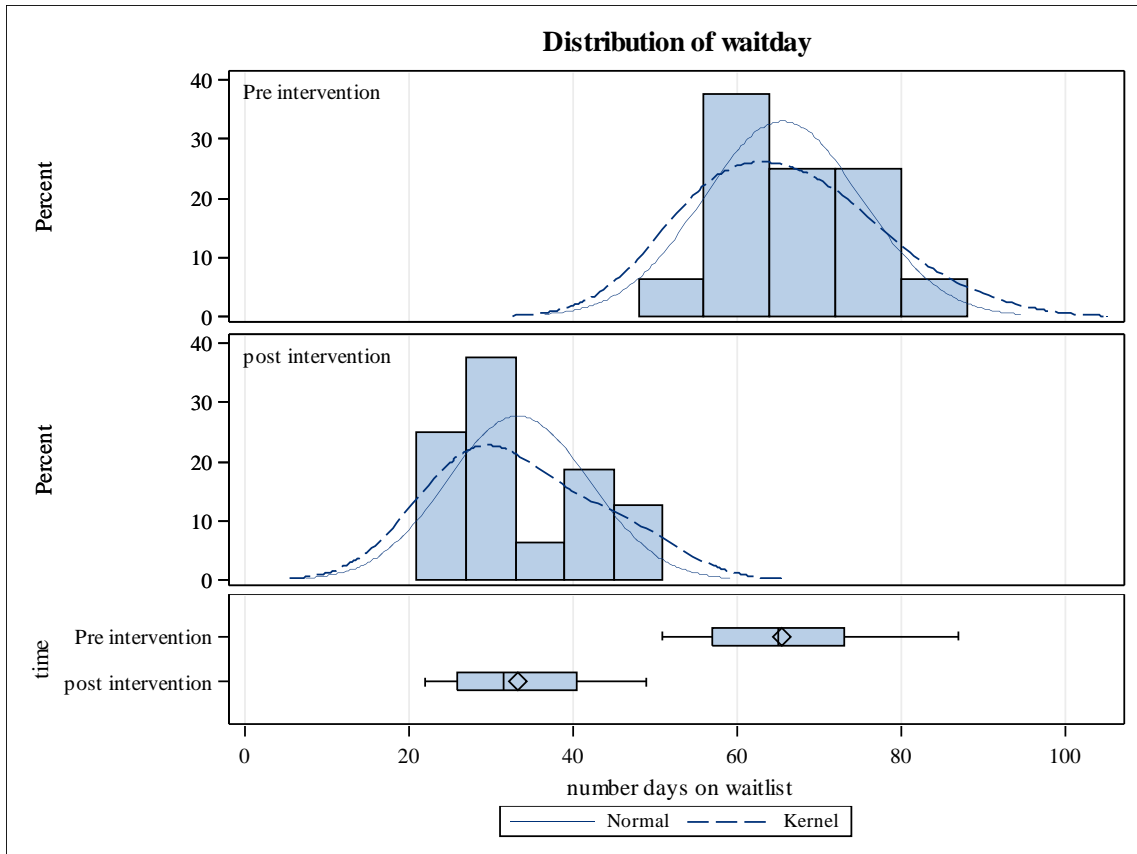


Figure 2.5. Distribution of wait time in days pre-intervention and post-intervention.

### Discussion

The project successfully achieved a reduction in both the number on the waitlist (50%) and the average number of days (time) on the waitlist (51%). The quality improvement project was a cost-neutral initiative to decrease the imbalance between capacity and demand. Through determining the processes and practice inefficiencies that negatively impacted the forensic patient flow, and conducting tests of change to remove barriers through the implementation of PDSA, the appropriate movement of patients across the continuum of care was achieved. The project aims were met as evidenced by a significant decrease in the waitlist and wait times for accessing inpatient, forensic psychiatric treatment. The results did indicate the achievement of statistically significant

outcomes. The use of multiple PDSAs resulted in improved organizational efficiency; the results are as follows: 1) reduction in the forensic waitlist; 2) decrease in wait time; 3) decrease in time from admission to discharge and 4) increase in active treatment by addressing the medical issues to improve the discharge process. The use of Lean tools and the organization of teams allowed for the critical review of current processes. PDSAs facilitated the development of plans and tests of change which resulted in overall process improvement.

By narrowing the waitlist, new barriers have been created. Currently, defendants are on the waitlist for shorter time periods. This improvement coupled with the solicitor having up to 15 days to file orders and schedule court hearings, has created additional bottlenecks. Future PDSA cycles could focus on enhancing the push-pull system of communication between SCDMH and judicial/community partners; thereby, further reducing the forensic waitlist.

## **Conclusions**

The lack of adequate throughput and patient flow across the continuum of care impacts access to inpatient mental health services and creates barriers to entering and exiting the forensic psychiatric hospital. The results of this study illustrate how the identification and removal of barriers to patient flow, by increasing efficiencies in the flow process, lead to a decrease in wait times for criminal defendants to access inpatient forensic psychiatric treatment. The use of lean methods and PDSA to improve patient flow results in a decrease in the imbalance between the demand for inpatient forensic psychiatric services and the capacity to deliver them, resulting in shorter wait times to access inpatient treatment and care.

## **Implications for Practice**

The growing demand for inpatient forensic psychiatric treatment and services, coupled with a static supply of resources, warrant the need for innovation in practices that create efficiencies in the delivery of services for this challenging population. The identification and removal of barriers to patient flow using lean methodology and PDSA significantly decreased the delay in access to forensic psychiatric treatment.

A literature review of five databases indicated support for the use of Lean Methods and PDSA as evidence-based approaches to facilitate quality improvement projects. However, there was no evidence found in the peer-reviewed literature of prior effort to implement these methods in a forensic psychiatric setting; therefore, their effectiveness in the forensic psychiatric hospital would benefit from continued assessment.

The use of PDSAs to develop and test change significantly improved administrative and clinical processes that facilitated the efficient treatment and flow of forensic patients across the care continuum. The aims of the study were not just met but were exceeded. With the increasing demand for psychiatric treatment of the forensic patient population, more initiatives to address the sociocultural aspects of change in the practice setting are needed. In addition, the use of technology to facilitate the integration of clinical, legal and administrative processes is significant to the future needs of healthcare.

## **Future Research**

Due to the paucity of literature, patient flow in a forensic psychiatric hospital setting is an understudied topic. Evidence that addresses the use of lean methodology and PDSA to examine patient flow in a forensic psychiatric hospital could not be located;

therefore, a study of patient flow in a forensic hospital setting is recommended for future research. Although evidence was found to address patient flow in other hospital settings to include emergency departments and operating rooms, additional study is needed.

Research and study of flow relative to both psychiatric hospitals as well as other settings to include components of the judicial system are warranted and would allow for the acquisition of new knowledge for application to the forensic psychiatric hospital setting.

### **Acknowledgments**

The authors wish to express gratitude for the invaluable support from the South Carolina Department of Mental Health, judicial partners, professional colleagues, and the University of South Carolina Faculty and Staff.

## CHAPTER 3

### FINDINGS AND CONCLUSIONS

#### Introduction

The purpose of this chapter is to address the findings from data collected during the Doctor of Nursing Practice (DNP) quality improvement (QI) project. The following findings from the evidence-based project concluded that the implementation of quality improvement, using lean methodology and Plan-Do-Study Act (PDSA) to remove identified barriers (inadequate allocation of forensically trained physicians and psychologists to provide forensic evaluations, inadequate waitlist management, and lack of a patient triage system) to patient flow, reduced the forensic waitlist and reduced the time on the waitlist. The project successfully achieved the predefined goals.

Process mapping resulted in four common themes that impacted the waitlist and wait times. The four themes included: communication, active treatment, legal issues, and discharge process issues. The main theme with communication centered around shifting from person-dependent to system-dependent processes. The focus with active treatment was two-fold; the first being the identification of forensically-trained staff and the redeployment of staff to effectively meet the patients' needs; the second was the expanded use of treatment space. The identified legal issues were associated with getting timely orders from solicitors to ensure compliance with statutory time frames. The final theme involved the discharge process. A need was identified for a new organizational role of a forensic discharge coordinator.

## **Data Collection:**

A waitlist management application was modified to replace manual methods of data collection. The waitlist and wait time data were collected through the use of dashboards that were developed using Avatar which is a practice management system in conjunction with the waitlist management application. In addition, an excel database, designed for waitlist management was utilized for data validation. Waitlist and wait time data were captured for the same weeks of 2016 and 2017 for statistical comparison. This method allowed for consistency and consideration of seasonal trends. The waitlist and wait time data for the same weeks of 2016 and 2017 captured the length of time on the waitlist in days as well as the actual number of persons awaiting inpatient admission to the forensic hospital. The average number of days on the waitlist (wait time) and the number of persons on the waitlist over 16 observational weeks of 2016 and 2017, were pulled for comparison to determine the results of interventions for statistical analysis. The analysis of data was conducted using descriptive and inferential statistics. *P* values of less than or equal to 0.0001 were considered significant.

## **Findings**

### **Results**

In an attempt to address the forensic waitlist challenges utilizing lean methodology and plan-do-study act (PDSA), four PDSA sessions were conducted to improve efficiencies in waitlist management (see figure 3.1). The first PDSA focused on communication across the SCDMH system, shifting from person-centered to a system's database to facilitate waitlist management and the break-down of silos. To accomplish this paradigm shift required a multilevel change across various disciplines in

collaboration with outpatient community mental health center partners. Weekly waitlist management meetings were developed for the purpose of addressing issues that affected both community and inpatient. Another silo piece about discharge readiness involved team members' perspectives of readiness. As a result, changes were made to the forensic review board (FRB). Guidelines and a checklist were established to facilitate board participation. The checklist was designed to ensure standard work in preparing patients for presentation to the FRB. Next, board training was required and provided for all members of the FRB. New policies, guidelines and timeframes to apply for human services benefits were established. Communication barriers also existed within the judicial system. Through multisystem collaboration, communication and flow were improved.

The second PDSA addressed legal issues that impacted the admission and discharge process. The organization was not receiving court orders timely. The solicitor has 15 days to file paperwork to initiate the probate process. A test of change was conducted to ameliorate the problem. The responsibility for getting the orders to the SCDMH had to be established. This was accomplished by collaborating with solicitors and educating legal partners (solicitors and public defenders). Through additional tests of change, it was determined that a team approach could improve communication through the use of forensic designated examiner (DE) teams. A forensic DE team comprised of a forensic psychiatrist, social worker and probate judge was formed to streamline the probate process and facilitate the triage of patients to the appropriate level of care. This involved partnering with probate judges and allowed for the jurisdictional transfer of defendants locally to facilitate the probate process through standard work. Next, a push-

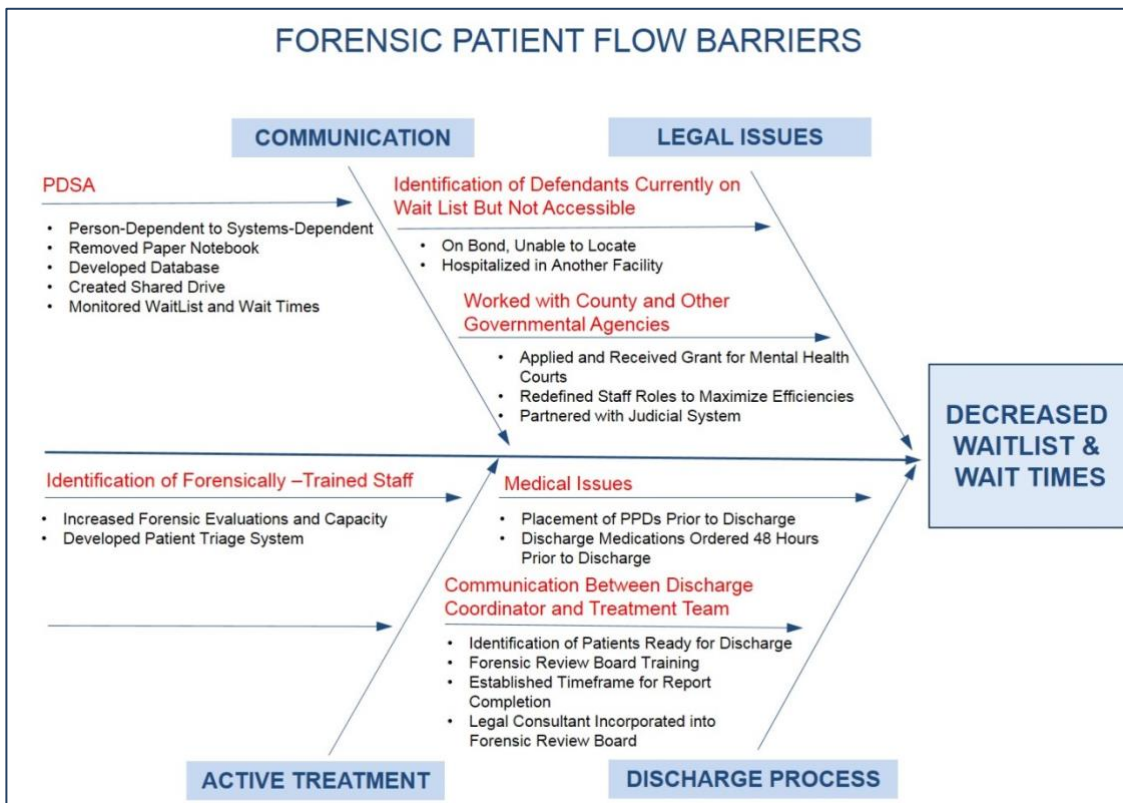


pull system was established to ensure receipt of the right court orders from the right solicitors. This process facilitated the development of a triage system to ensure the assignment of patients to the right area (outpatient, inpatient forensic restoration versus psychiatric rehabilitation unit or an inpatient civil facility) for maximal active treatment opportunities. Finally, the incorporation of the legal consultant as a member of the forensic leadership and as the FRB chair, with a cross trained backup was accomplished to ensure consistency in legal representation with the clinical and support team. Consequently, utilizing lean methodology allowed for the identification and elimination of barriers to legal processes.

The third PDSA session focused on active treatment. Several tests of change were identified. The utilization of staffing resources was process mapped and the redeployment of forensically-trained staff was accomplished to increase active treatment. A patient triage system was developed to improve efficiency and access to the appropriate level of care and to effectively address the individualized needs of the patient across the care continuum. The expansion of treatment space and development of expectations for increasing active treatment improved discharge readiness and shortened lengths of stay in the hospital. The removal of procedural barriers eliminated waste in time and the duplication of services to increase the use of treatment space. To improve efficiencies in treatment, the application of an evidence-based practice model developed by Trestman at UCONN Health was adapted for use as a forensic psychotherapy model to address individualized patient needs (South Carolina Department of Mental Health, 2017).

The fourth PDSA collaboration focused on medical issues which slowed the discharge process. The placement of tuberculin skin tests and the ordering of discharge

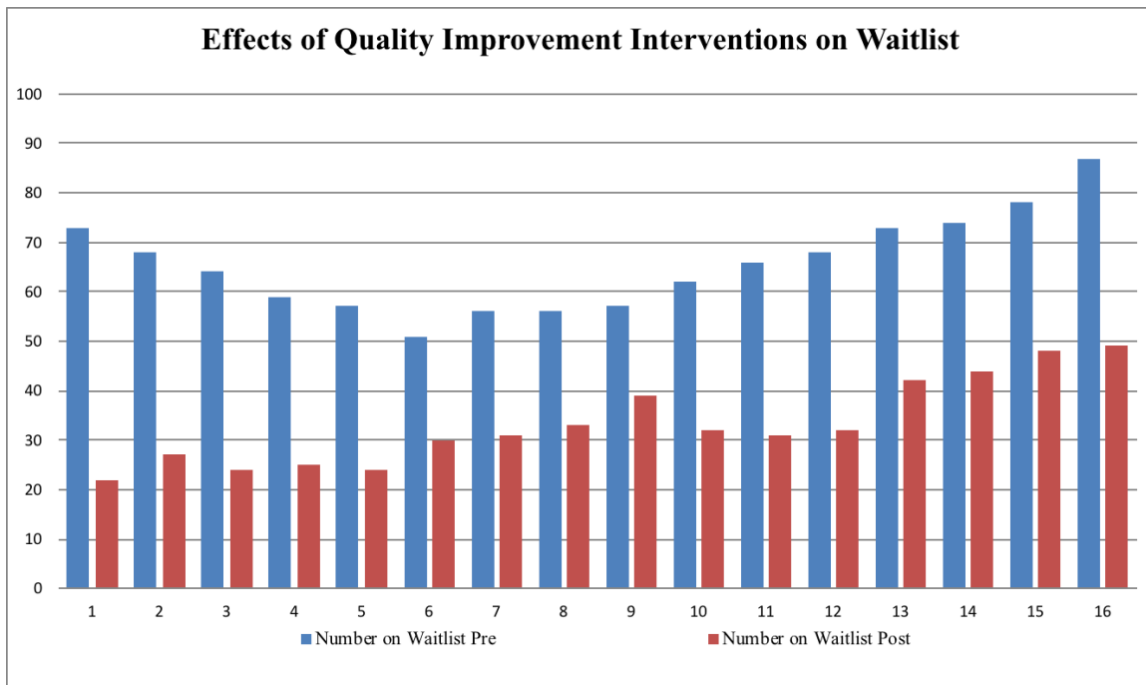
medications were identified as barriers to the discharge process which prevented the availability of beds for new admissions. Standard work was put in place to establish time frames for PPD placement based on refinements in discharge planning to include the development of a discharge readiness check list. Also, the delay in establishing human services benefits for community placement created a barrier to discharge. In collaboration with treatment teams, administration, and other state and federal stakeholders, barriers to discharge were removed/eliminated, allowing for the achievement of discharge goals. Recognizing that discharge planning begins on admission, the development of a discharge coordinator was critical to the success of the initiatives. Creative strategies to improve timely approval of benefits, allocation of funding streams and increased active communication and collaboration with community partners, enhanced the successful discharge of the forensic patient (see figure 3.1).



*Figure 3.1.* Forensic Patient Flow Barriers. This is the fishbone diagram detailing barriers to forensic patient flow. The four themes identified were communication, legal issues, active treatment and discharge process.

### Statistical Findings

The sample in this study comprised the forensic waitlist data. Forensic waitlist data over the same 16-week period of 2016 and 2017 during the months of September through December were captured as weekly averages of the number of persons on the waitlist and the amount of time each person spent in days on the waitlist (see Figure 3.1 and Table 3.1). The days associated with a particular defendant or observation week were excluded from the sample if that defendant met the criteria for outlier (on bond and unable to be located by the judicial system; out of state or in custody in another state and unavailable). Three defendants originally on the waitlist, met the exclusion criteria for the 2016 observations. The same 3 defendants met the exclusion criteria for the 2017 observations.



*Figure 3.2.* Forensic Patient waitlist numbers pre-intervention (2016) as compared to post-intervention (2017).

Table 3.1 indicates that all proportion changes under the null ( $p$  value = 0.25) were statistically significant except for week nine. The results also showed that the total proportion under the null ( $p$  value= 0.5) was statistically significant ( $p$  -value < 0.0001). In addition, the result of one sample proportion under the null ( $p$  -value = 0.5) revealed that only six weeks (weeks 1, 2, 3, 9, 14 and 15) out of 16 weeks were statistically significant. Also, the results did not indicate that the total proportion under the null ( $p$  value= 0.5) was significant ( $p$  value= 0.30) (see Table 3.1). Consequently, the improvement yielded statistically significant improvements in reducing the number of defendants on the waitlist.

Table 3.1  
Statistical Measures Related to Waitlist ( $n= 16$ )

Week	Number on Waitlist Pre	Number on waitlist Post	Proportion Change	$p$ Value Under Null =.25	$p$ Value Under Null =.50
1	73	22	-69.86	.00	.00
2	68	27	-60.29	.00	.04
3	64	24	-62.50	.00	.02
4	59	25	-57.63	.00	.12
5	57	24	-57.89	.00	.11
6	51	30	-41.18	.01	.10
7	56	31	-44.64	.00	.21
8	56	33	-41.07	.01	.09
9	57	39	-31.58	.14	.00
10	62	32	-48.39	.00	.40

<b>11</b>	66	31	-53.03	.00	.31
<b>12</b>	68	32	-52.94	.00	.31
<b>13</b>	73	42	-42.46	.00	.10
<b>14</b>	74	44	-40.54	.00	.05
<b>15</b>	78	48	-38.46	.01	.02
<b>16</b>	87	49	-43.68	.00	.12
<b>Total</b>	<b>1049</b>	<b>533</b>	<b>-.508</b>	<b>.00</b>	<b>.30</b>

*Note.* Forensic Patient waitlist numbers pre-intervention (2016) as compared to post-intervention (2017).

Table 3.2 results presents the average number of people on the waitlist before intervention was 65.56 with a standard deviation of 9.69, whereas after intervention the average number on the waitlist was 33.31 with a standard deviation of 8.64. Also, the results indicated the average of percentage change on a variable (number of people on waitlist) was -49.13 with a standard deviation of 10.43. The results indicated that there were statistically significant differences for the number of people on the waitlist by pre and post intervention using both parametric test (two independent T-test) and non-parametric test (Wilcoxon Two Sample test)  $p$  value  $< 0.0001$ (see Table 3.2). The interventions yielded statistically significant improvement.

Table 3.2

*Waitlist Standard Deviation (n=16)*

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
<b>Number of people on waitlist pre-intervention</b>	16	65.56	9.69	51.00	87.00

<b>Number of people on waitlist post-intervention</b>	<b>16</b>	<b>33.31</b>	<b>8.64</b>	<b>22.00</b>	<b>49.00</b>
<b>Percentage change</b>	16	-49.31	10.43	-69.86	-31.58

*Note:* Percentage change of waitlist pre-intervention (2016) as compared to post-intervention (2017). N, mean, standard deviation, and range for selected variables

Table 3.3 indicated that all proportion changes of the average days on the waitlist under the null ( $p = 0.25$ ) were statistically significant except for week five. The results also showed the total proportion under the null ( $p = 0.25$ ) was statistically significant. In addition, the result of one sample proportion under the null ( $p = 0.5$ ) revealed that only five (weeks 3, 5, 6, 9, 10) out of 16 weeks were statistically significant. Also, the results did not indicate that the total proportion under the null ( $p = 0.5$ ) was significant ( $p = 0.34$ ). The overall sample did not show a decrease of 50% of average days; however, five weeks out of 16 weeks did show a significant decrease of average days by 50% (see Table 3.3).

Table 3.3  
*Average Days on Waitlist*

<b>Week</b>	<b>Average Days on Waitlist Pre-Intervention</b>	<b>Average Days on Waitlist Post-Intervention</b>	<b>Proportion Change</b>	<b><math>p</math> Value Under Null =.25</b>	<b><math>p</math> Value Under Null =.50</b>
<b>1</b>	37	20	-45.94	.01	.31
<b>2</b>	38	16	-57.89	.00	.16
<b>3</b>	54	19	-64.81	.00	.01
<b>4</b>	54	29	-46.30	.00	.29
<b>5</b>	49	38	-22.44	.33	.00
<b>6</b>	60	38	-36.67	.03	.02

7	67	37	-44.78	.00	.19
8	79	33	-58.23	.00	.07
9	80	30	-62.50	.00	.01
10	87	27	-68.96	.00	.00
11	107	47	-56.07	.00	.10
12	100	54	-46.00	.00	.21
13	93	49	-47.31	.00	.30
14	91	50	-45.05	.00	.17
15	98	50	-48.98	.00	.42
16	94	50	-46.81	.00	.27
<b>Total</b>	<b>1188</b>	<b>587</b>	<b>-.494</b>	<b>.00</b>	<b>.34</b>

*Note:* Average number of days on waitlist pre-intervention (2016) as compared to post-intervention (2017),  $p$  value for one sample proportion test (one-sided test).

Table 3.4 revealed the average number of days on the waitlist (wait time) before intervention was 74.25 with a standard deviation of 23.03, whereas after intervention, the average number of days on the waitlist (wait time) was 36.69 with a standard deviation of 12.45. The results showed the average of percentage change on the average days on the waitlist (wait time) was -49.92 with a standard deviation of 11.42. The results indicated a statistically significant difference for the average number of days on the waitlist by pre and post-intervention using both parametric (two independent T-test) and non-parametric test (Wilcoxon Two sample test)  $p < 0.0001$  (see Table 3.4).

Table 3.4  
 Wait Time Standard Deviation (n= 16)

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Average days on waitlist pre-intervention	16	74.25	23.03	37.00	107.00
Average days on waitlist post-intervention	16	36.69	12.45	16.00	54.00
Percentage Change	16	-49.92	11.42	-68.97	-27.45

Note: N, mean, standard deviation, and range for selected variables. Percentage change of average days on waitlist pre-intervention (2016) as compared to post-intervention (2017), *p* value for testing average days on waitlist ( $p < 0.0001$ ) (Parametric and non-parametric test).

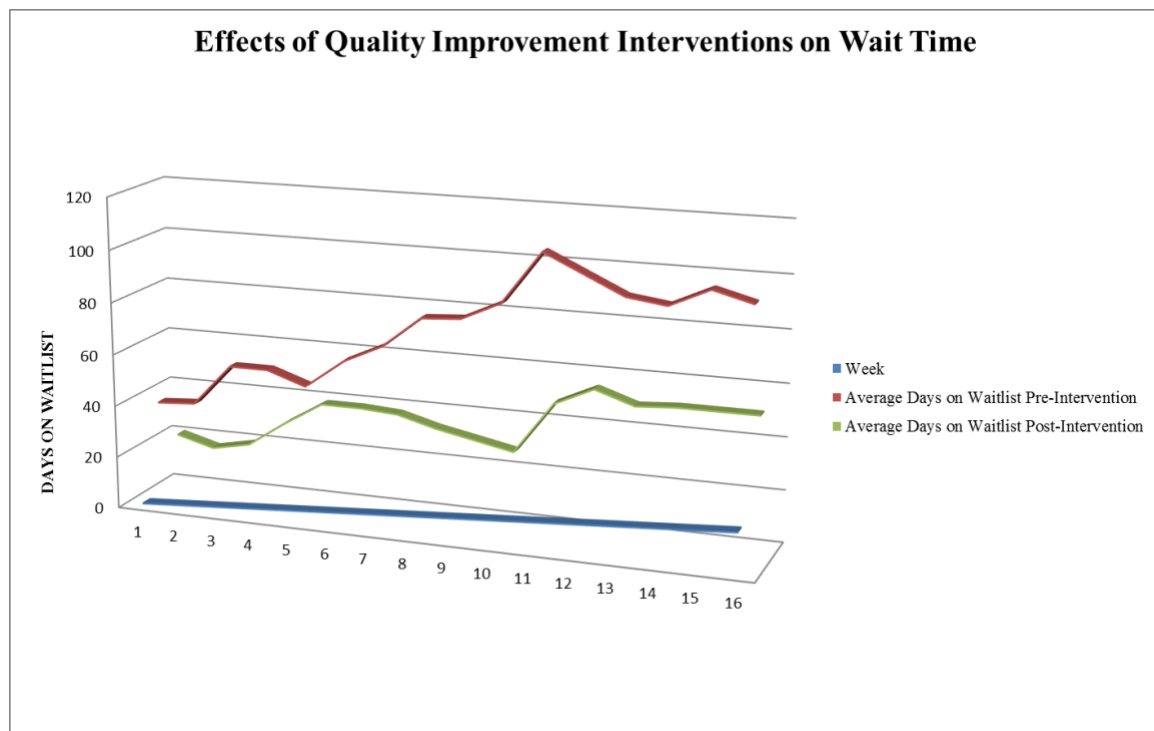


Figure 3.3. Average days on waitlist  
 Average number of days on waitlist pre-intervention (2016) as compared to post-intervention (2017).



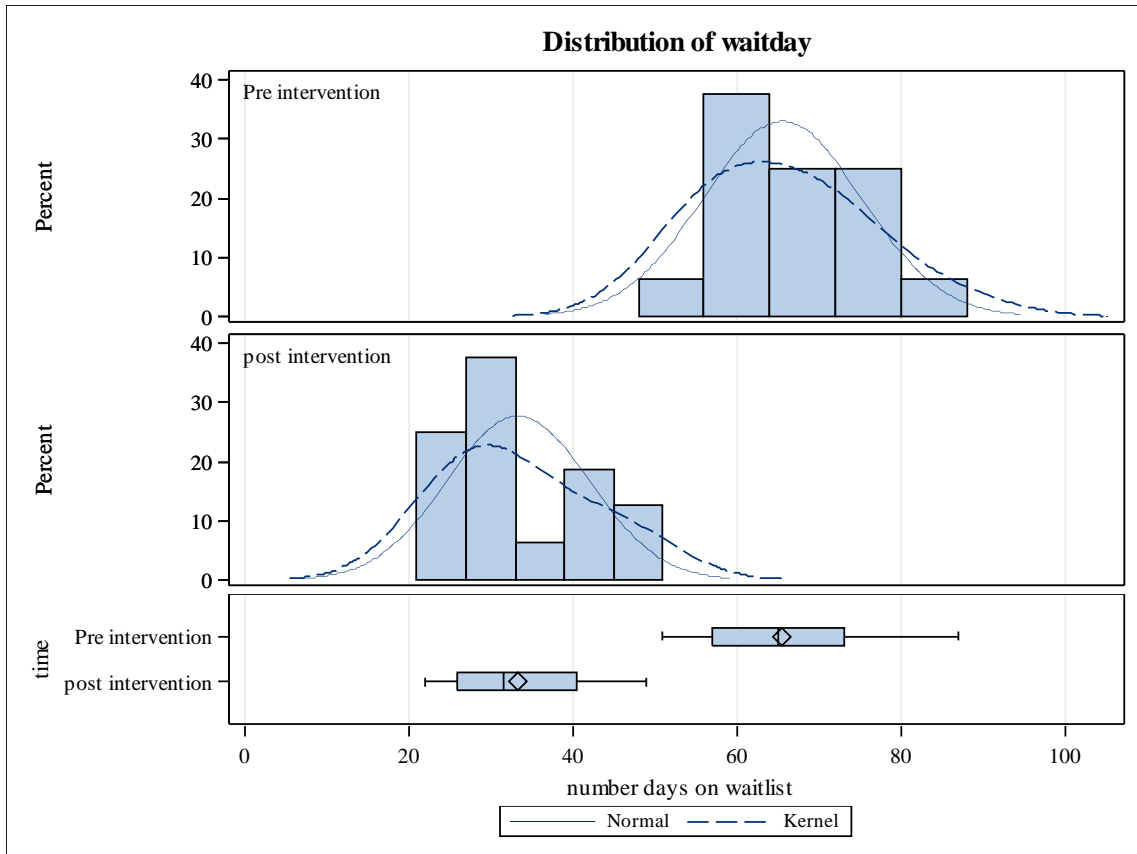


Figure 3.4. Distribution of wait time in days pre-intervention and post-intervention.

### Discussion

The project successfully achieved a reduction in both the number on the waitlist (50%) and the average number of days (time) on the waitlist (51%). The quality improvement project was a cost-neutral initiative to decrease the imbalance between capacity and demand. Through determining the processes and practice inefficiencies that negatively impacted the forensic patient flow, and conducting tests of change to remove barriers through the implementation of PDSA, the appropriate movement of patients across the continuum of care was achieved. The project aims were met as evidenced by a significant decrease in the waitlist and wait times for accessing inpatient, forensic psychiatric treatment. The results did indicate the achievement of statistically significant

outcomes. The use of multiple PDSAs resulted in improved organizational efficiency; the results are as follows: 1) reduction in the forensic waitlist; 2) decrease in wait time; 3) decrease in time from admission to discharge and 4) increase in active treatment by addressing the medical issues to improve the discharge process. The use of Lean tools and the organization of teams allowed for the critical review of current processes. PDSAs facilitated the development of plans and tests of change which resulted in overall process improvement.

By narrowing the waitlist, new barriers have been created. Currently, defendants are on the waitlist for shorter time periods. This improvement coupled with the solicitor having up to 15 days to file orders and schedule court hearings, has created additional bottlenecks. Future PDSA cycles could focus on enhancing the push-pull system of communication between SCDMH and judicial/community partners; thereby, further reducing the forensic waitlist.

## **Conclusions**

The lack of adequate throughput and patient flow across the continuum of care impacts access to inpatient mental health services and creates barriers to entering and exiting the forensic psychiatric hospital. The results of this study illustrate how the identification and removal of barriers to patient flow, by increasing efficiencies in the flow process, lead to a decrease in wait times for criminal defendants to access inpatient forensic psychiatric treatment. The use of lean methods and PDSA to improve patient flow results in a decrease in the imbalance between the demand for inpatient forensic psychiatric services and the capacity to deliver them, resulting in shorter wait times to access inpatient treatment and care.

## **Implications for Practice**

The growing demand for inpatient forensic psychiatric treatment and services, coupled with a static supply of resources, create the need for innovation in practices that create efficiencies in the delivery of services for this challenging population. The identification and removal of barriers to patient flow using lean methodology significantly decreased the delay in access to forensic psychiatric treatment.

A literature review of five databases indicated support for the use of Lean Methods and PDSA as evidence-based approaches to facilitate quality improvement projects. However, there was no evidence found in the peer-reviewed literature of prior effort to implement these methods in a forensic psychiatric setting; therefore, their effectiveness in the forensic psychiatric hospital would benefit from continued assessment.

The use of PDSAs to develop and test change significantly improved administrative and clinical processes that facilitated the efficient treatment and flow of forensic patients across the care continuum. The aims of the study were not just met but were exceeded. With the increasing demand for psychiatric treatment of the forensic patient population, more initiatives to address the sociocultural aspects of change in the practice setting are needed. In addition, the use of technology to facilitate the integration of clinical, legal and administrative processes is significant to the future needs of healthcare.

## **Future Research**

Due to the paucity of literature, patient flow in a forensic psychiatric hospital setting is an understudied topic. Evidence that addresses the use of lean methodology and PDSA to examine patient flow in a forensic psychiatric hospital could not be located;

therefore, the study of patient flow in a forensic hospital setting is recommended for future research. Although evidence was found to address patient flow in other hospital settings to include emergency departments and operating rooms, additional study is needed. Research and study of flow relative to both psychiatric hospitals as well as other settings to include components of the judicial system are warranted and would allow for the acquisition of new knowledge for application to the forensic psychiatric hospital setting.

### **Dissemination**

The literature review and findings from this evidence-based, quality improvement project are scheduled to be presented at the Seventeenth Annual Research and Scholarship Day 2018 and Mary Ann Parsons Lectureship at the University of South Carolina College of Nursing on April 18, 2018. An introduction to the problem, the purpose of the project and study design will be presented. Results include a reduction in the waitlist and wait time for forensic psychiatric treatment. An abstract of the quality improvement project and a poster were submitted (see Appendices H and I). Study findings and results will be presented to the SCDMH leadership, and South Carolina Mental Health Commission. A manuscript will be submitted for publication in the Journal for Healthcare Quality (JHQ). JHQ is the official journal of the National Association for Healthcare Quality (NAHQ).

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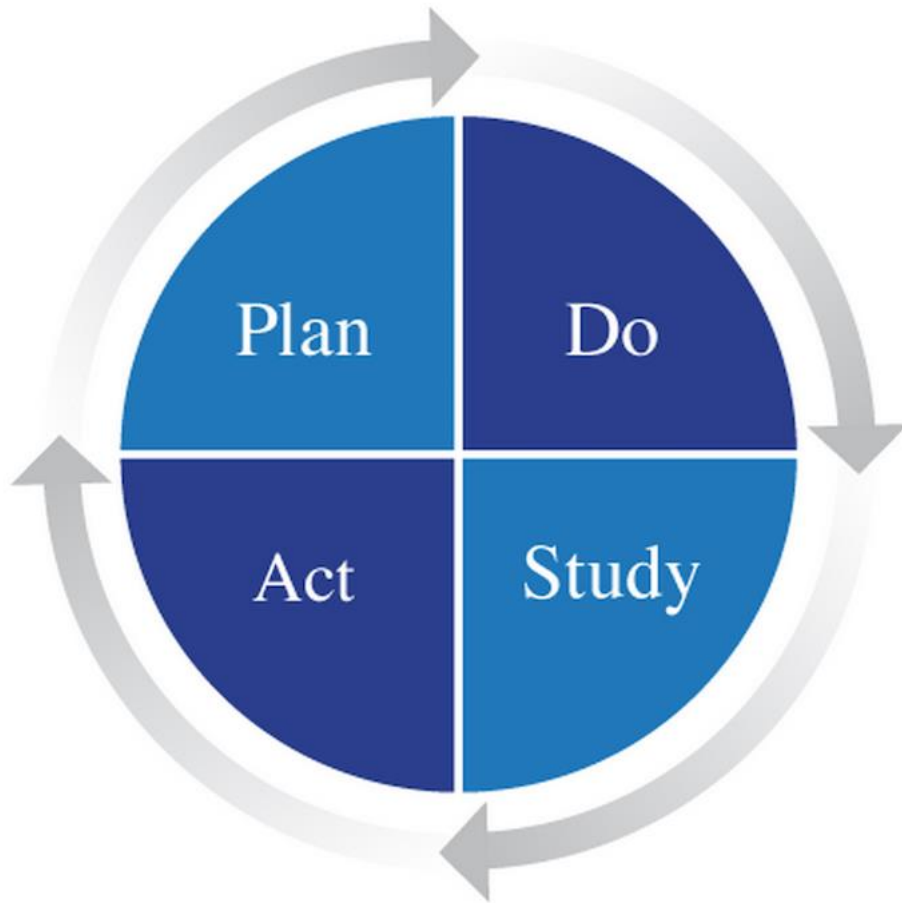
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**APPENDIX A**  
**MODEL OF CHANGE**



PDSA Cycle  
Institute for Healthcare Improvement  
[www.ihl.org/resources/Pages/Tools/PlanDoStudyActWorksheet.aspx](http://www.ihl.org/resources/Pages/Tools/PlanDoStudyActWorksheet.aspx)

## APPENDIX B

### EVIDENCE TABLE

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
<p><b>Hung, D., Martinez, M., Yakir, M. &amp; Gray, C. (2015). Implementing a Lean Management System in Primary Care: Facilitators and Barriers from the Front Lines.</b> <i>Q Manage Health Care, 24(3), 103-108. doi: 10.1097/QMH.0000000000000062</i></p> <p><b>Type of Study:</b> <b>Qualitative Study</b></p> <p><b>Quality Rating:</b> A</p> <p><b>Evidence Level : III</b></p>	<p><b>Design:</b> Qualitative research design</p> <p><b>Sample:</b> Snowball &amp; Purposive sampling techniques were used to identify participants that included 34 primary care physicians and staff.</p> <p><b>Setting:</b> An 86,000-patient base, multispecialty clinic of a large, not-for-profit, ambulatory care delivery system in California</p>	<p>Although the researchers used qualitative methods, they did not discuss their study in light of any of the criteria usually used to evaluate qualitative research including credibility, dependability, confirmability, and member checks. They did address reliability by engaging in independent parallel coding, where another researcher independently coded randomly selected transcripts. Any</p>	<p>Staff engagement and performance management, sensitivity to the professional values and culture of medicine, and perceived adequacy of organizational resources were critical when introducing Lean changes.</p> <p>Staff empowerment, the visual display of performance metrics and having a culture of innovation and collaboration were identified as the specific drivers of change.</p>	<p>Whereas Lean provides a new approach to delivering care, the implementation process is complex and crucial to success. Understanding early facilitators and barriers can maximize Lean's potential to improve health care delivery.</p> <p>To achieve improvements in performance using Lean techniques, a reversal of perspective on work processes and continuous improvement may be</p>

<p><b>Purpose:</b> To highlight key facilitators and barriers to implementing Lean among frontline primary care providers</p>	<p><b>Instruments used:</b> Semi-structured interview guides</p> <p><b>Data Collection:</b> All data collection activities were approved by the IRB; participation was voluntary and written, informed consent was obtained prior to each interview or focus group. Audio-recorded sessions (interviews and focus groups) of approximately 60 minutes were transcribed verbatim by a professional transcription service.</p> <p><b>Data analysis:</b> All transcripts were entered into Atlas.ti software. Transcripts were analyzed and coded using an inductive approach.</p>	<p>discrepancies were discussed and reconciled</p>	<p>Barriers to change included physician resistance to standardized work, difficulty transferring management responsibilities to non-physician staff, and time and staffing required to participate in improvement efforts.</p>	<p>required.</p>
<p>Flynn, G., O'Neill, C., &amp; Kennedy, H. G. (2011).</p>	<p><b>Design:</b> Naturalistic</p>	<p>The numbers included in this prospective</p>	<p>The DUNDRUM-2 triage urgency scale has good</p>	<p>There is a distinction between the items</p>

<p><b>DUNDRUM-2: Prospective validation of a structured professional judgment instrument assessing priority for admission from the waiting list for a forensic mental health hospital. <i>Research Notes, 4 (230), 1-10.</i></b></p> <p><b>Type of Study:</b> <b>Qualitative Study</b></p> <p><b>Quality Rating: A</b></p> <p><b>Evidence Level : I</b></p> <p><b>Purpose:</b> <b>The aim of this study was to draft and test criteria in a prospective “real life” observational study over a 6-month period</b></p>	<p>prospective observational study was conducted where the researcher rated referrals using the DUNDRUM-1 triage security scale and the DUNDRUM-2 triage urgency scale. The key outcome measure was whether or not the individual was admitted.</p> <p>This study consisted of three phases. The first was an iterative drafting process followed by observational study of decision making in practice at the weekly referrals meeting when all referrals are discussed, accepted for admission or dealt with in some other way, and those accepted are prioritized.</p>	<p>naturalistic outcome study are small when some sub-groups are considered, particularly for those waiting for admission from less secure hospitals. All other analyses had sufficient power to reach statistical significance and there does not appear to be any evidence of possible error due to lack of statistical power. It is believed that the item content is likely to be generalizable.</p>	<p>psychometric properties. It has good inter-rater reliability and high internal consistency. The DUNDRUM -1 triage security score and the DUNDRUM -2 triage urgency score correlated <math>r=0.683</math>. At the time of admission, after a mean of 23.9 (SD 35.9) days on the waiting list, those admitted had higher scores on the DUNDRUM -2 triage urgency scale than those not admitted, with no significant difference between locations (remand or sentenced prisoners, less secure hospitals) at the time of admission. Those admitted also had higher DUNDRUM -1 triage security scores. At the time of admission, the DUNDRUM -2 triage urgency score had the largest AUC (0.912, 95% CI</p>	<p>assessing need for admission to various levels of therapeutic security such as the medium and high secure forensic hospital studied and the items assessed to decide the prioritization of those on a waiting list for admission to a medium or high secure forensic hospital.</p>
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	<p><b>Sample:</b> During the six month observation period, 66 individuals were placed on the waiting list and 38 were eventually admitted. 10 women were placed on the waiting list and 6 were admitted; 56 men were placed on the list of whom 32 were admitted.</p> <p><b>Setting:</b> The Central Mental Hospital provides high, medium and low therapeutic security and community follow-up services for a population of 4.4 million. At the time of the study there were 93 in- patient beds at varying levels of therapeutic security. The service also provides extensive mental health in-reach</p>		0.838 to 0.986).	
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	<p>services to the busiest remand and sentenced committals prisons in the state, and to the other prisons. Patients are admitted to the hospital from the prisons under the Criminal law (Insanity) Act 2006 if medically certified.</p> <p><b>Instruments:</b> The DUNDRUM – 2 a triage urgency scale and DUNDRUM -1 triage security scale were used.</p>			
<p><b>Van Dyke, K. J., McHugh, M., Yonek, J., Moss, D. (2011). Facilitators and Barriers to the Implementation of Patient Flow Improvements Strategies. <i>Q Manage Health Care</i>, 20 (3), 223-233.</b></p> <p><b>Type of Study:</b></p>	<p><b>Design:</b> Qualitative Research design</p> <p><b>Sample:</b> 6 Hospitals participating in the UM Learning network 129 Interviews</p> <p><b>Setting:</b> Emergency departments at 6</p>	<p>There are several limitations to this study. First the study included only 6 hospitals. While the 6 participating hospitals are diverse, they are not nationally representative. In addition, these 6 hospitals self-selected into the collaborative and as a result might</p>	<p>There were facilitators and Challenges to implementation reported by patient flow improvement teams from 2 or more of the 6 hospitals.</p> <p>In some cases, the teams developed successful approaches for addressing the challenges</p>	<p>Management initiation and enforcement of work processes would need to be replaced with more direct involvement from the workforce. As found in the study, the perspectives and contributions of frontline providers will be critical to Lean as a transformative solution</p>



<p><b>Qualitative Research Design</b></p> <p><b>Quality Rating: B</b></p> <p><b>Evidence Level: III</b></p> <p><b>Purpose:</b>  <b>Identify and describe facilitators and barriers to patient flow in 6 hospitals that implemented strategies to improve flow and reduce crowding.</b></p>	<p>hospitals in the US participating in Urgent Matters Learning Network.</p> <p><b>Data Collection:</b>  Conducted 2 rounds of individual interviews of all members of the flow teams and other staff by 3 researchers in 2 teams. First round of interviews in person second by phone.</p> <p><b>Analysis:</b>  Inductive approach. Codes derived after initial review of transcripts. High level of agreement.</p>	<p>possess characteristics, including an openness to change, that differentiate them from hospitals that either did not choose to participate or were not selected to participate. The improvement strategies included do not represent a full menu of possible strategies. Also, the patient flow improvement team's experiences were shaped by their participation in the learning network, which further limits the external validity of our findings. Findings from this small sample are not meant to be generalized to all hospitals. One of the challenges to conducting implementation research is the literature bias-implementation</p>	<p>encountered.</p> <p>The most common facilitators encountered during implementation were participation in the UM learning network (the most frequently cited facilitator), strategic selection of planning team members, executive support and the availability of resources, staff-driven improvement strategies, an aligned reporting structure, implementation of simple process changes, and a flexible and robust information technology system. Barriers to the implementation of strategies included: staff resistance, entrenched organizational culture, lack of staffing resources, previous failures to improve patient flow, and lack of data to monitor progress. Participation in</p>	<p>in health care.</p>
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		failures are rarely reported. Although factors that facilitate or hinder the implementation of quality improvement projects, evidence specific to the implementation of efforts to improve patient flow and reduce ED crowding is limited.	the learning network was the most commonly cited facilitator to implementation. Working within the network compelled the participating hospitals to be accountable for results, making it difficult to abandon or change the strategic direction once it decided on a particular improvement strategy. Unfortunately, the learning network was open to only 6 hospitals.	
<b>Sayah, A. Rogers, L., Devarajan, K., Kingsley-Rocker, L., &amp; Lobon, L. F. (2014). Minimizing ED waiting times and improving patient flow and experience of care. <i>Emergency Medicine International</i>. 2014 (Article ID 981472), 1-8. Retrieved from <a href="http://dx.doi.org/10.1155">http://dx.doi.org/10.1155</a></b>	<b>Design:</b> Qualitative Research design A pre and post-intervention analysis was conducted to assess the impact of a patient flow improvement project.  <b>Sample:</b> Patients that entered the ED from January 2005 December 2011	These changes were implemented in a medium- sized, urban ED and some of the initiatives described and results derive may not be applicable to EDs operating under different constraints and with different patient populations. The institution of the electronic health record	The ED operational changes had a significant positive impact on all measured metrics. Ambulance diversion decreased from a record high mean of 148 hours per fiscal quarter before changes to 0 hours after changes. Press Ganey Patient satisfaction scores rose from 12th percentile	Inefficiencies in the ED throughput process and delays of care may negatively impact patient satisfaction and patient outcomes. During the ED operations overhaul, this problem was tackled by improving the ED flow process, changing the staff culture, and placing the

<p><b><u>/2014/98142</u></b></p> <p><b>Evidence Level: V</b></p> <p><b>Quality Rating: B</b></p> <p><b>Purpose:</b>  <b>To describe a system-wide process improvement project aimed at optimizing the ED patient experience by expediting throughput and flow.</b></p>	<p>(mean = 7,221- 8,044 patients per quarter) was included as a study participant</p> <p><b>Setting:</b>  The emergency department of an academic public institution located in Cambridge Massachusetts</p> <p><b>Instruments Used:</b>  For data analysis, a two-Sample independent t-test was used to compare the mean of the “before” data, to the mean of the “after” data, of the following parameters:  (1) median ambulance hours on diversion per fiscal quarter,  (2) Press Ganey Patient Satisfaction Percentile</p>	<p>in the ED was another confounding factor.</p>	<p>before changes to the 59th percentile after implementation of changes.  ED total length of stay decreases from a mean of 204 minutes to mean of 132 minutes.  Wait time decreased from a mean of 63 minutes to a mean of 18 minutes,  Compliance with ED specific quality core Measures (AMI and CAP)  Improved from a mean of 71% to 97%. The mean rate of ED patients that LWBS (before treatment) was completely dropped from 4.1% to 0.9%. All improvements were statistically significant with a <math>P &lt; \text{or} = 0.001</math>.  These improvements were Sustained amidst an 11% Increase (from a mean of 7,221 to 8,044) in quarterly patient volume between 2005 and 2011.</p>	<p>patient first.  Ultimately, the Cambridge ED could meet and sustain their target outcomes and goals. TCH became a best practice institution based on patient satisfaction, reduced the door-to-provider time, and increased total ED volume and capacity. Improving ED operational efficiency allowed TCH to accommodate increasing volume while simultaneously improving the quality of care and satisfaction of ED patients. This implementation served to demonstrate that outcomes and cultural traditions can be improved through strategy rather than heavy capital investment.</p>
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	<p>scores,  (3)median ED total length of stay time,  (4)median door-to-door provider time (or ED “wait time”),  (5) quality core measurements  (6) percent of volume that left without being seen (LWBS).</p> <p><b>Data Collection:</b>  The data was collected using the electronic medical record systems (Meditech and EPIC). Timestamps were used to compute the total length of stay (TLOS) time. Flags and patient records were used to determine whether a patient left without being seen (LWBS). Patient records were</p>		<p>In reviewing the administrative data, an average TLOS for the pilot period when the protocol was implemented was 127.5 minutes.  Patient volumes during the analysis period in 2009 and 2010 consistently averaged 200 patients per day.  Although the average time of 127.5 minutes during the implementation of the protocol was slightly higher than the internal benchmark</p>	
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	<p>reviewed to access if acute myocardial infarction (AMI) and Community acquired pneumonia (CAP) patients met the appropriate quality core measures. Patient Satisfaction Surveys were sent and data compiled by Press Ganey associates</p>			
<p><b>Popovich, M. A., Boyd, C., Dachenhaus, T., &amp; Kusler, D. (2012). Improving stable patient flow through the emergency department by utilizing evidence-based practice: One hospital's journey. <i>Journal of Emergency Nursing</i>. 3 (5), 474-478.</b></p> <p><b>Type of Study:</b> <b>Literature Review &amp; Quality Improvement</b></p> <p><b>Quality Rating: A</b></p>	<p><b>Design:</b> The Iowa Model of Evidence-Based Practice to Promote Quality Care was used as a framework for this project. With use of this framework, a volume-driven protocol was developed from a retrospective administrative data analysis which sought volume triggers that could be used to determine when to</p>	<p>The limitations of this project for application to other practice settings include the requirement of a physical space to utilize as a separate patient care area, appropriate staffing, and the support of administration to improve patient flow of stable patients. Also, the pilot study was short in duration because of time constraints. Bias that could be introduced by</p>	<p>In reviewing the administrative data, an average TLOS for the pilot period when the protocol was implemented was 127.5 minutes. Patient volumes during the analysis period in 2009 and 2010 consistently averaged 200 patients per day. Although the average time of 127.5 minutes during the implementation of the</p>	<p>Positive changes occurred because of the implementation of this protocol. The protocol provided a tool for making clinical decisions that was based on objective data. The protocol was useful to the emergency department as volume and TLOS began to increase.</p>

<p><b>Evidence Level: V</b></p> <p><b>Purpose:</b>  <b>The purpose of this project was to develop a volume- driven protocol based on retrospective analysis of administrative data to improve early intervention and rapid treatment of stable patients in a pediatric emergency department.</b></p>	<p>staff a satellite area of the ED to promote early intervention and rapid treatment of stable patients.</p> <p><b>Sample:</b>        820,000 visits with 16,247 inpatient admissions. 4 individual months that provided 40 occasions in which the satellite was staffed without the use of a protocol</p> <p><b>Setting:</b>        A Columbus Ohio-based Children's Hospital (Nationwide Children's Hospital), which is the fifth largest freestanding pediatric hospital in the US that provides wellness,</p>	<p>changing other processes during the time of the pilot study could be another limitation. Finally, inconsistencies occurred in documentation of the data related to triage and provider contact. As a result, this measure was excluded from data analysis.</p>	<p>protocol was slightly higher than the internal benchmark set by Nationwide Children's Hospital, the number of patients who LWBS decreased. According to pre-pilot data, in 2009, 62 persons LWBS, whereas during implementation of the protocol, only 49 LWBS.</p> <p>These data showed a 29% reduction, even though the TLOS was greater than the internal benchmark of 120 minutes. The number of days that the satellite was staffed when compared with data from the previous year during the same 4- month period. Another important outcome was that decisions were being made based on the protocol, which eliminated personal</p>	
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	<p>preventative, diagnostic, treatment, and rehabilitative care for infants, children, and adults.</p> <p><b>Instruments Used:</b> The Emergency Severity Index (ESI) was developed to include a 5-tier triage system. Tanabe and colleagues estimated inter-rater reliability on the use of ESI version 3 which was validated for use in pediatric settings was also used. This gives ED administration the ability to predict resource intensity and benchmark length of stay (LOS) according to acuity level but does not provide benchmarking for volumes of patients presenting to the ED.</p> <p><b>Framework:</b></p>		<p>bias regarding staffing of the satellite.</p>	
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	<p>The Iowa Model of Evidence-Based Practice to Promote Quality Care</p> <p><b>Data Collection:</b> Data were collected from a random sampling of months from January 2009 through July 2010. Observing, describing, and documenting a phenomenon through a retrospective review of administrative data was the basis for the development of the protocol addressing acuity, volume, and TLOS. The data reviewed included data collected 3 hours prior to staffing of the satellite area to review volume triggers, acuity, TLOS and the number of patients who LWBS.</p>			
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<p><b>Taylor, M. J., McNicholas, C., Nicolay, C., Dari, A., Bell, D. &amp; Reed, J. E. (2013). Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. BMJ Quality &amp; Safety Online First September 11, 2013. doi:10.1136/bmjqs-2013-001862</b></p> <p><b>Type of Study:</b> Non-experimental study</p> <p><b>Quality Rating:</b> A</p> <p><b>Evidence Level:</b> IV</p> <p><b>Purpose:</b> The purpose of this paper is to propose a theoretical framework for assessing the quality of application of PDSA cycles and explore the quality and consistency of PDSA cycle</p>	<p><b>Design:</b> Systematic review and Meta-Analyses</p> <p><b>Sample:</b> A total of 73 articles that met the inclusion criteria: 42 used 'PDSA' as terminology and 31 used 'PDCA'</p> <p><b>Setting:</b> Healthcare</p> <p><b>Instruments Used:</b> A search was designed to identify peer-reviewed publications that described empirical studies that applied the PDSA method</p> <p><b>Data Collection:</b> NHS Evidence and Cochrane databases were searched by three independent reviewers.</p>	<p>The review aimed to assess the reported application of the PDSA method and the results of individual studies were not analyzed in the review.</p> <p>Despite the review being focused on reported application, rather than success of the interventions, it may still be possible that publication bias affected the results of the study.</p> <p>Research that used PDSA methodology, but did not yield successful results, may be less likely to get published than reports of successful PDSA interventions.</p>	<p>73 of 409 individual articles identified met the inclusion criteria. Of the 73 articles, 47 documented PDSA cycles in sufficient detail for full analysis against the whole framework. Less than 20% (14/73) studies fully documented the application of a sequence of iterative cycles.</p> <p>Moreover, a lack of adherence to the notion of small-scale change is apparent and only 15% (7/47) reported the use of quantitative data at monthly or more frequent data intervals to inform progression of cycles.</p> <p>To advance the science of improvement, a greater understanding of the use of improvement methods, including PDSA, is essential to draw reliable conclusions</p>	<p>The application and reporting of PDSAs is varied and lacks compliance with the principles that underpin its design as a pragmatic scientific method. Therefore, the variation in practice compromises the effectiveness of PDSA as a method for improvement and cautions against studies that view QI or PDSA a 'black box' intervention.</p> <p>The need exists for greater scientific rigor in the application and reporting of PDSA and QI to advance the understanding of the science of improvement and efficacy of the PDSA method. The application of PDSA should have greater consistency and compliance with</p>
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<p><b>application against this framework as documented in peer-reviewed literature.</b></p>			<p>about their effectiveness. The development of systematic and rigorous standards is needed for the application and reporting of PDSAs.</p>	<p>guidelines provided by founders and commentators.</p>
<p><b>Valsangkar N. P., Eppstein, A. C., Lawson, R. A., BSEE, Taylor, A. N. (2017). Effect of lean processes on surgical wait times and efficiency in a tertiary care Veterans Affairs medical center.</b></p> <p><b>Evidence Level: IV</b></p> <p><b>Type of Study: Systematic Review</b></p> <p><b>Quality Rating: B</b></p> <p><b>Purpose:</b></p>	<p><b>Design:</b> Systematic Review of wait list data from 2012 to 2014</p> <p><b>Sample:</b> All patients evaluated by the general surgery department through outpatient clinics, clinical video conferencing, and e- consultations from October 2011 through September 2014 were included.</p>	<p>This study has several limitations. First, the study only addressed a few factors that were monitored over 3 fiscal years. Additional years may need to be studied before long- term results can be validated. Furthermore, although there were no changes in the number of surgeons during the study period, one OR was shut down during 2014, resulting in the loss of block time. This</p>	<p>In this systematic review of institutional wait list data from fiscal years 2012 to 2014, the implementation of lean system redesigns was associated with significant and sustained waitlist reduction from 33.4 days to 12.0 days for patients waiting for elective general surgical procedures.</p>	<p>Multidisciplinary system redesigns using lean principles may decrease patient wait times by addressing and correcting systemic inefficiencies. By reducing systemic inefficiencies, we achieve increased patient throughput, decreased wait lists, and improved patient access in a cost-neutral manner.</p>

<p><b>To identify whether lean processes can be used to improve wait times for surgical procedures in Veterans Affairs hospitals</b></p>	<p><b>Setting:</b> The Richard L. Roudebush Veterans Affairs (VA) Medical Center, a tertiary care referral center within the VA, serving more than 60,000 patients with a 200 mile radius catchment area</p> <p><b>Instruments Used:</b> Databases in the Veterans integrated Service Network 11 data warehouse, Veterans health Administration Support Service Center, and Veteran's Information Systems and technology Architecture/ Dynamic Host Configuration Protocol were queried to assess changes in wait times for elective general surgical procedures and clinical volume</p>	<p>confounded the results to some extent; however, operative volume remained higher than baseline from FY 2012.</p>		
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	<p>before, during and after implementation of lean processes over 3 fiscal years. Also, a Value Stream Analysis was conducted in 2013.</p> <p><b>Data Collection:</b></p> <p>Per VHA policy, Handbook 1200.05, Appendix A, the article presents information that involves the collection or study of existing deidentified data and therefore does not require informed consent or institutional review board approval.</p> <p><b>Data Analysis:</b> All data were calculated using Microsoft Excel 2015 and SPSS Statistics version 15 (SPSS) Inc). Continuous variables</p>			
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	<p>were compared using t test of means when 2 variables were compared or analysis of variables when more than 2 variables were compared. Categorical variables were compared using the X2 test. Statistical significance was set at <math>P &lt; .05</math>.</p>			
<p><b>Dammand, J., Horlick, M., Jacobsen, T. L., Leg, R., Rock, R. L. (2014). Lean management in hospitals: Evidence from Denmark. <i>Administration and Public Management</i>, 23, 19-35.</b></p> <p><b>Type of Study:</b> Case Study</p> <p><b>Quality Rating:</b> A</p> <p><b>Purpose:</b> This single-case study explores whether Lean</p>	<p><b>Design:</b> A single organization case study (a longitudinal study) was conducted to perform an in-depth description of findings in a real-life context.</p> <p>Study design was recorded in concordance with the Quality Improvement (QI) literature as a randomized design (individual- patient randomized controlled trial (RCT) or cluster</p>	<p>Literature on Lean tends to report positive examples. As to the concepts addressed by this study, it is questioned if the distinction of value-adding from non-value activities is as clear in healthcare as it is in manufacturing. Cause and effect are much less clear in life science compared to engineering. There is still no universally accepted definition for value in healthcare as</p>	<p>Efficiency in patient treatment increased, for example through reduction in waiting times, higher process cycle efficiency when patients were treated at the hospital, and shorter walking distances for staff. This was achieved through the use of various lean tools, such as Kaizen tablets, elimination of non-value adding activities, and Gemba mapping. Success factors in the implementation of Lean</p>	<p>The study illustrates a successful implementation of Lean in a public hospital. Thereby, it contributes that practices from the private sector can be successfully transferred if they are adapted to the quite different business models of organizations in the public sector. The study further evaluated how Lean thinking can improve efficiency in patient treatment and found</p>

<p><b>management can improve efficiency in patient treatment at hospitals.</b></p>	<p>randomized trial) or as a non- randomized design (stepped wedge design, time series design, controlled before-after study or uncontrolled before-after study). The preceding order represents the hierarchy of methodological strength.</p> <p><b>Sample:</b> Studies included in qualitative analysis n=34 Continuous Quality Improvement (CQI) = 9; Six Sigma (6S) n=5; Total Quality Management (TQM) n=5;</p> <p>Statistical Process Control/Statistical Quality Control (SPC/SQC) n=5; Plan –Do-Check- Act/Plan-Do-Study-Act (PDCA/PDSA) n = 5;</p>	<p>opposed to the clear measurable profit maximization goal of most businesses. The study could be replicated on a larger scale.</p>	<p>were financial pressure from the government under increasing expectations from patients. Openness of the hospital's top management toward practices from the private sector, thorough employee involvement, provision of the necessary funding for the change toward Lean, and a better definition of the business model.</p>	<p>that many different Lean tools could successfully optimize processes at OUH. These include the inclusion of employees as well as eliminating waste through such initiatives as value stream mapping and Kaizen tablets. However, implementing Lean also had its challenges which included employee reluctance to the visualization of their work. Also, some of the initiatives were time consuming to maintain, and at a certain point the employees stopped functioning the way they were initially supposed to. Without involvement, employees tend to see Lean simply as a cost cutting exercise. Therefore, Lean tools should be explained and</p>
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	<p>Lean n=4; Lean Six Sigma Lean (6S) n=1</p> <p><b>Setting:</b> Odense University Hospital in Denmark</p> <p><b>Instruments Used:</b> MEDLINE, the Cochrane Database, Allied and Complementary Medicine Database, British Nursing Index, Cumulative Index to Nursing and Allied Health Literature, Embassy, Health Business Elite, the Health Management Information Consortium and PsycINFO were searched according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses statement. Empirical studies were included that</p>			<p>visualized to staff members. The reduction of waiting times for patients has positive side effects on the health of the patients and the hospital staff. Finally, hospitals can refine their business model through Lean. Lean helps hospitals prioritize in a way that resources are used most efficiently by avoiding waste before cutting into the quality of treatments and can be a strong tool to balance ethics with business.</p>
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	<p>implemented a described QI methodology to surgical care and analyzes a named outcome statistically.</p> <p><b>Data Collection:</b> Raw data were collected and tabulated independently by two reviewers on to a data extraction sheet (Microsoft Excel 2009; Microsoft Corporation, Redmond, Washington, USA) guided by the Cochrane Handbook. Data collected included first author, year of publication, country in which study was performed, study setting, length of study (before and after intervention), aim of study, study design, number of patients or</p>			
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	<p>observations, interventions and outcomes.</p> <p><b>Data Analysis:</b> Reliance on both qualitative and quantitative data for analysis</p>			
<p><b>Michael, Schaffer, Egan, Little &amp; Pritchard (2013). Improving wait times and patient satisfaction in primary care. <i>Journal for Healthcare Quality</i>, 35(2), 1-17. Doi: 10.1111/jhq.12004</b></p> <p><b>Evidence Level: V</b></p> <p><b>Type of Study: Qualitative</b></p> <p><b>Quality Rating: B</b></p> <p><b>Purpose: To increase patient satisfaction by</b></p>	<p><b>Design:</b> Pre-experimental pretest/posttest design Quality Improvement Project</p> <p><b>Sample:</b> Convenience sampling 1,500 primary care patients</p> <p><b>Setting:</b> The study was conducted in the Ambulatory Primary Care Unit at the Health Department's central practice location of the Florida Department of Health</p>	<p>The use of a pre-experimental pretest/posttest design, convenience sampling strategy and lack of historical information on the psychometric properties of the patient satisfaction survey instrument.</p>	<p>Although the mean waiting room wait time was reduced by 5.33 min, the 20-min wait target established for this category was not met during the first PDSA cycle. Qualitative feedback from unit staff suggests that process improvements may have resulted in a calmer and less chaotic work environment in the Patient reception and Registration areas. Important upstream and Downstream impacts reported by APCU team Members include:</p>	<p>The results of the project provide additional support in favor of the DMIC framework and PDSA improvement method as viable options for conducting QI and achieving wait time process improvements</p>

<p><b>minimizing wait times in a Florida county health department Ambulatory Primary Care Unit (APCU) practice using the Dartmouth Microsystem Improvement Curriculum frame (DMIC) and the Plan-Do-Study-Act (PDSA) improvement process.</b></p>			<p>improved front-end patient flow and fewer delays in relay of charts between the registration and clinical areas, elimination of congestion in the APCU entrance area, enhanced patient privacy, improved access to information and reception assistance for patients, fewer distractions and interruptions for registration staff, and fewer registration process errors.</p>	
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## APPENDIX C

### JOHNS HOPKINS NURSING EVIDENCE-BASED PRACTICE RESEARCH

#### EVIDENCE APPRAISAL

Level 1	Experimental study (randomized controlled trial or RCT)Meta-analysis of RCTs
Level 2	Quasi-Experimental Study
Level 3	Non-Experimental Study Qualitative Study
A	High Quality: Consistent results, sufficient sample size, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific evidence.
B	Good Quality: Reasonably consistent results, sufficient sample size, some control, and fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
C	Low Quality or Major Flaws: Little evidence with inconsistent results, insufficient sample size, conclusions cannot be drawn.

(Dearholt & Dang, 2014)

## APPENDIX D

### JOHNS HOPKINS NURSING EVIDENCE-BASED PRACTICE NON- RESEARCH EVIDENCE APPRAISAL

Level 4	Systematic Review Clinical Practice Guidelines
Level 5	Organizational Expert Opinion, Case Study, Literature Review
A - summative reviews	High quality: Well-defined, reproducible search strategies; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies, and definitive conclusions
B - summative reviews	Good quality: Reasonably thorough and appropriate search; reasonably consistent results, sufficient numbers of well-designed studies, evaluation of strengths and limitations of included studies, with fairly definitive results
C - summative reviews	Low quality or major flaws: Undefined, poorly defined, or limited search strategies; insufficient evidence with inconsistent results, conclusions cannot be drawn
A - expert opinion	High quality: Expertise is clearly evident
B - expert opinion	Good quality: Expertise appears to be credible
C - expert opinion	Low quality or major flaws: Expertise is not discernible or is dubious

(Dearholt & Dang, 2014)

## APPENDIX E

### INSTITUTIONAL REVIEW BOARD APPROVAL UofSC



OFFICE OF RESEARCH COMPLIANCE

#### INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH DECLARATION of NOT RESEARCH

Versie Bellamy  
College of Nursing  
1601 Greene Street  
Columbia, SC 29208

Re: **Pro00071209**

This is to certify that research study entitled, "**Forensic Patient Flow: An Imbalance Between Capacity and Demand**," was reviewed on **9/13/2017**, by the Office of Research Compliance, which is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). The Office of Research Compliance, on behalf of the Institutional Review Board, has determined that the referenced research study is not subject to the Protection of Human Subject Regulations in accordance with the Code of Federal Regulations 45 CFR 46 et. seq.

No further oversight by the USC IRB is required. However, the investigator should inform the Office of Research Compliance prior to making any substantive changes in the research methods, as this may alter the status of the project and require another review.

If you have questions, contact Arlene McWhorter at [arlenem@sc.edu](mailto:arlenem@sc.edu) or (803) 777-7095.

Sincerely,

A handwritten signature in blue ink, appearing to read "Lisa M. Johnson".

Lisa M. Johnson  
ORC Assistant Director  
and IRB Manager

## APPENDIX F

### INSTITUTIONAL REVIEW BOARD APPROVAL SCDMH



*State of South Carolina*  
*Department of Mental Health*

**MENTAL HEALTH COMMISSION:**

Alison Y. Evans, PsyD, Chair  
Joan Moore, Vice Chair  
Beverly Cardwell  
Bob Hlott, MEd  
Everard Rutledge, PhD  
J. Buxton Terry  
Sharon L. Wilson

2414 Bull Street • P.O. Box 485  
Columbia, SC 29202  
Information: (803) 899-8581

**John H. Magill**  
State Director of Mental Health

#### MEMORANDUM

**TO:** Versie Bellamy  
**FROM:** Patricia Handley, DNP  
SCDMH IRB Administrator  
**SUBJECT:** Approval of Proposed Project  
**DATE:** 7/13/2017

The proposed project "Forensic Patient Flow: An Imbalance Between Capacity and Demand," was screened by the SC Department of Mental Health Institutional Review Board. The SCDMH IRB has determined that your proposed project does not meet criteria for human subjects research as defined by Code of Federal Regulations: Title 45, Part 46, PROTECTION OF HUMAN SUBJECTS Definitions. This project does not require review or oversight by the SCDMH IRB.

SCDMH IRB Study Assigned Number: 2017-07-13

We wish you success in your project.

cc: Monica McConnell, Chair SCDMH IRB

**MISSION STATEMENT**

To support the recovery of people with mental illnesses.



## **APPENDIX G**

### **EXECUTIVE SUMMARY**

Forensic Patient Flow: An Imbalance Between Capacity and Demand

Versie J. Bellamy

University of South Carolina

## INTRODUCTION

Lack of appropriate treatment leads to the exacerbation of mental health conditions, extended lengths of stay in hospitals, and an increase in health care costs (Kennedy-Hendricks, Huskamp, Rutkow, & Barry, 2016). Therefore, it is imperative that individuals receive timely and appropriate treatment. Patient flow issues may be a significant barrier to receiving timely and appropriate treatment (Van Dyke, McHugh, Yonek, & Moss, 2011). The sheer volume of the forensic population coupled with inefficient patient flow through the health care system create a large imbalance between the high demand for services and the capacity to deliver them. It is vital that patient flow issues be identified and corrected so that the treatment needs of the population can be met and capacity and demand imbalance reduced.

### Identified Issues

The state of South Carolina (SC) has approximately 20,951 incarcerated adults. Of that population, approximately 3,500 are diagnosed with a serious mental illness (State of South Carolina, Department of Corrections, 2016). In accordance with state law, the SC Department of Mental Health (SCDMH) is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by order and state statute. SCDMH is unable to meet the requirements under SC statute due to an imbalance between capacity and demand.



## **Root Cause**

The root cause of the problem is the demand for inpatient forensic psychiatric treatment and services exceeds the capacity of the state of SC. Research has not been identified on patient flow issues in forensic psychiatric units. There are large numbers of studies on patient flow issues in other hospital settings. There is support that Lean Methodology and Plan-Do-Study-Act (PDSA) are evidence-based approaches to facilitate quality improvement projects (Elder, Johnston, & Crilly, 2015; Lee, & Franc, 2015; New, 2013; New, Andrianopoulos, Cameron, Olver & Stoelwinder, 2013; Van Dyke, et al., 2011). The proposed project will implement Lean methodology and PDSA to address forensic patient flow and waitlist management issues. The PDSA cycle will be used to plan, implement, and assess change based on the identified barriers to patient flow. The proposed study will assess the current state of waitlist management and review administrative as well as clinical processes that impact the flow and movement of patients in and out of the forensic unit.

## **Aggregate Data**

The forensic hospital has a capacity of 230 beds. At any given time, an additional 70-100 people are awaiting psychiatric treatment for restoration to competency or long term psychiatric rehabilitation at the SCDMH forensic hospital. With an average length of stay of 200 days on the forensic units, patients waiting for a bed languish in jail while their psychiatric condition deteriorates. Without change, the patient waitlist will continue to grow and access to treatment will continue to be prolonged. Increasing patient flow through the SCDMH forensic hospital is the optimal option to increase capacity.

The project seeks to answer: In the state of South Carolina, for adult patients requiring psychiatric treatment in the legislatively mandated, inpatient forensic hospital (P), does the implementation of quality improvement, using lean methodology and Plan-Do-Study Act (PDSA) to remove identified barriers (inadequate allocation of forensically trained physicians and psychologists to provide forensic evaluations, inadequate waitlist management, and lack of a patient triage system) to patient flow (I), reduce the forensic waitlist by 25% (from 100 to 75), and reduce the time on the forensic waitlist by 50% (from 180 days to 90 days) (O) over a 3 month period (T)?

### **Barriers and Facilitators**

Primary barriers to the successful implementation of this project include: lack of leadership support and ineffective communication. The plan to mitigate barriers and increase support for this project is as follows: (1) prepare a white paper for senior leadership and other stakeholders to cast vision about the project and how it will benefit the organization by facilitating the organization's ability to perform the mission as required by statute; (2) develop a forensic leadership work group to facilitate the change by incorporating the project into the current infrastructure; (3) provide an orientation to staff about the project and request staff input in project planning to include identification of systemic issues using Lean methods; (4) request an ongoing list of staff concerns prior to and during project implementation, and address each of the concerns both verbally and in writing.

### **Recommendations**

- Process map forensic patient flow and identify barriers impacting waitlist and wait times.

- Remove barriers to patient flow that impact the forensic waitlist and wait times.
- Create a forensic dashboard consisting of measures to monitor system improvements.
- Establish an enhanced oversight group and an interdisciplinary team of inpatient and outpatient stakeholders to collaborate on discharge planning.

### **Sustainability Plan**

Lean methodology is an evidence-based practice improvement approach adopted from the Toyota Company which targets unnecessary intermediate processes and retains only those that add value (Moran, Burson, & Conrad, 2017; Sullivan, Soefje, Reinhart, McGear, & Cabie, 2014; Zhu, Lu, & Dai, 2014). PDSA is part of the Institute for Healthcare Improvement Model for accelerating quality improvement in healthcare to implementing change (Institute for Healthcare Improvement, n.d.). The overall purpose of this project is to use lean methodology and PDSA to identify barriers in the patient flow process that lead to delays in treatment for forensic psychiatric patients and to implement a plan for removing those barriers to improve psychiatric and physical health outcomes for patients. Ongoing monitoring of measures and goals will be established to manage capacity and demand. Data from the forensic dashboard will be used to drive tests of change.

### **Conclusion**

The growing demand for inpatient forensic psychiatric treatment and services, coupled with a static bed supply creates the need for innovation in practices that create efficiencies in the delivery of services for this challenging population. Patient flow in a forensic psychiatric hospital setting is an understudied topic. Additional study is needed.

The anticipated outcome of this project focuses on the removal of barriers to patient flow. The removal of barriers to patient flow will result in a decrease in the delayed access to forensic psychiatric treatment due to the high demand for beds coupled with a limited supply, and consequently, a decrease in the imbalance between capacity and demand.

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## APPENDIX H

### PROJECT PROBLEM

#### Project Purpose Statement

The overall purpose of this project is to use lean methodology and Plan-Do-Study-Act (PDSA) to identify barriers in the patient flow process that lead to delays in treatment for forensic psychiatric patients and to implement a plan for removing those barriers to improve psychiatric and physical outcomes for patients.

#### Background

The U.S. has the largest incarcerated population in the world with as many as 2.2 million adults incarcerated (Kennedy-Hendricks, Huskamp, Rutkow, & Barry, 2016). The state of South Carolina currently has approximately 20,951 incarcerated adults. Of that population, approximately 3,500 are diagnosed with a serious mental illness (SMI) (State of South Carolina, Department of Corrections, 2016). In accordance with South Carolina law, South Carolina Department of Mental Health (SCDMH) is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by order and state statute. Currently, the SCDMH is unable to meet the requirements under SC state statute.

The forensic hospital has a capacity of 230 beds with an average length of stay of 200 days. At any given time, an additional 70-100 people are awaiting psychiatric treatment for restoration to competency or long term psychiatric rehabilitation at the SCDMH forensic hospital. Patients awaiting admission to the forensic hospital, languish

in jail while their psychiatric condition (schizophrenia, depression, and psychosis, bipolar, etc.) and physical health deteriorates because they are not getting their psychiatric needs (medication and therapy) addressed. Moreover, when these patients are admitted to the hospital, the exacerbation of symptoms to include violent and disruptive behaviors, suicidal and homicidal thoughts/ behaviors require longer hospital stays and more aggressive treatment and therapy, and unnecessarily delays discharge (which prevents other potential patients from receiving needed psychiatric care).

### **Project Topic/ Problem**

Forensic Patient Flow: An Imbalance Between Capacity and Demand

What are you trying to accomplish to improve organizational outcomes?

- I am trying to accomplish a reduction in the forensic waitlist and wait time for the legislatively mandated forensic hospital (G. Werber Bryan Psychiatric Hospital) under the auspices of the South Carolina Department of Mental Health.

How will you (and the organization) know that a change is an improvement?

- The organization and I will know that a change is an improvement when the forensic waitlist is reduced by 25% (75 patients) and forensic wait time is reduced by 50% (90 days); (baseline waitlist is 100 patients and baseline wait time is 180 days).

What change can you (with support from key individuals within the organization) make that will result in improvement?

- With support from key individuals within the organization, I endeavor to reduce the number of patients on the forensic waitlist by 25% and decrease the average



number of days on the waitlist by 50% using lean methodology and PDSA to identify and eliminate barriers to patient flow.

#### **Reference**

Kennedy-Hendricks, A., Huskamp, H. A., Rutkow, L., & Barry, C. L. (2016). Improving access to care and reducing involvement in the criminal justice system for people with mental illness. *Health Affairs*, 35(6), 1076-1083 1078p.

doi:10.1377/hlthaff.2016.0006

## APPENDIX I

### PROJECT SCOPE

**Project Problem:** Barriers to patient flow exist in a legislatively mandated forensic psychiatric hospital (G. Werber Bryan Psychiatric Hospital) under the auspices of the South Carolina Department of Mental Health.

#### 1. Project Purpose Statement

The overall purpose of this project is to use lean methodology and Plan-Do-Study-Act (PDSA) to identify barriers in the patient flow process that lead to delays in treatment for forensic psychiatric patients and to implement a plan for removing those barriers to improve psychiatric and physical outcomes for patients.

#### 2. Background

The US has the largest incarcerated population in the world with as many as 2.2 million adults incarcerated (Kennedy-Hendricks, Huskamp, Rutkow, & Barry, 2016). The state of South Carolina currently has approximately 20,951 incarcerated adults. Of that population, approximately 3,500 are diagnosed with a serious mental illness (SMI) (State of South Carolina, Department of Corrections, 2016). In accordance with South Carolina law, the South Carolina Department of Mental Health (SCDMH) is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by order and state statute. Currently, the SCDMH is unable to meet the requirements under SC state statute.

The forensic hospital has a capacity of 230 beds with an average length of stay of 200 days. At any given time, an additional 70-100 people are awaiting psychiatric treatment for restoration to competency or long term psychiatric rehabilitation at the SCDMH forensic hospital. Patients awaiting admission to the forensic hospital languish in jail while their psychiatric condition (schizophrenia, depression, and psychosis, bipolar, etc.) and physical health deteriorates because they are not getting their psychiatric needs (medication and therapy) addressed. Moreover, when these patients are admitted to the hospital, the exacerbation of symptoms to include violent and disruptive behaviors, suicidal and homicidal thoughts/ behaviors require longer hospital stays and more aggressive treatment and therapy, and unnecessarily delays discharge (which prevents other potential patients from receiving needed psychiatric care).

### **3. Objectives**

- Using lean methodology, process map forensic patient flow by September 15, 2017
- Using the developed process map, identify barriers to patient flow that impact the forensic waitlist and wait times by October 15, 2017.
- Using Plan Do Study Act (PDSA), remove barriers to patient flow that impact the forensic waitlist and wait times by December, 15,2017
- Create a dashboard to present data in a format to visualize, continuously monitor, and track progress toward organizational strategic goals, and to engage staff/stakeholders in progress toward removal of barriers to patient flow by June 30, 2017.

- Establish an enhanced oversight group to include a legal representative (present) for the review/vetting of each patient recommended for discharge by June 30, 2017
- Establish an interdisciplinary team of inpatient and outpatient stakeholders to collaborate on discharge planning and placements as well as safety and risk management issues associated with high profile discharges by June, 2017

#### **4. Key Stakeholders and Other Players**

##### **Key Stakeholders**

- Patients awaiting admission (high impact; high influence over project)
- South Carolina Mental Health Commission (high impact; high influence over project)
- SCDMH State Director and Senior Management (Deputy Directors of Inpatient Services (project manager), Administration and Community/Outpatient; Agency Medical Director; Chief Financial Officer (CFO); General Counsel; Division of Inpatient Services (DIS) Medical Director) (high impact; high influence over project)
- DIS Executive Staff (Administrator/Controller; Chief Nursing Officer; Performance Improvement Director & Risk Manager; Director of Organizational Planning and Human Resources (high impact: high influence over project)
- Clinical Preceptor (high impact; high influence over project)
- Forensic Review Board (high impact; high influence over project)
- Judicial System Partners (high impact; high influence over project)

- Forensic hospital leadership (director, assistant directors, medical director, staff, and psychiatrists) (high impact; high influence over project)
- Forensic Admission Coordinator (high impact; high influence over project)
- USC and MUSC psychiatrists & psychologists (high impact; high influence over project)
- Community Mental Health Center liaisons (medium impact; medium influence over project)
- Community Residential Care Facilities (medium impact; medium influence over project)
- USC Faculty Advisors (high impact; high influence over project)
- Information Technology Leaders (high impact; high influence over project)
- DMH Statistician (high impact; high influence over project)

#### **Other Players**

- Contracted forensic staff (medium impact; medium influence over project)
- Legislative Partners (Chair of Senate Finance and House Ways and Means sub-committees) (high impact; high influence over project)
- Patient families (Low impact; low influence over project)
- Members of the community (Low impact; low influence over project)
- Advocacy & Victims Groups (medium impact; medium influence over project)
- Law Enforcement (high impact; high influence over project)

## 5. Organizational Requirements

The South Carolina Department of Mental Health (SCDMH) is the state's public mental health authority and operates the forensic program at G. Werber Bryan Psychiatric Hospital (BPH). The Division of Inpatient Services (DIS) is a 1500 bed, state operated (by SCDMH), multi-hospital and long-term care (nursing home) system, comprised of two psychiatric and one addictions treatment hospital and three nursing homes. The mission of SCDMH/DIS is to support the recovery of people with mental illnesses. Of the two psychiatric hospitals, the Columbia-based, G. Werber Bryan Psychiatric hospital (BPH), a 482- licensed bed acute care facility, operates a 230-bed forensic division for the treatment of defendants in need of inpatient psychiatric services for competency restoration and long term psychiatric rehabilitation. The forensic program is identified as the agency's number one priority. BPH also has 200 acute hospital beds for adults and a 51-bed hospital program for children and adolescents. Patrick B. Harris hospital is an Anderson, South Carolina-based, adult, acute care psychiatric facility. Finally, Morris Village is a 100-bed acute alcohol and drug addiction treatment center. The long-term care facilities consist of three veterans nursing homes located in Anderson, South Carolina, Walterboro, South Carolina and Columbia, South Carolina. There is one general skilled nursing facility (SNF) located in Columbia, South Carolina. DIS employs nurses, doctors, pharmacists, social workers, activity therapists, chaplains, administrative and clinical support staff, and has a labor force of 3000 to support the operations of the multi-hospital and nursing home system.

The evaluation, treatment and care of forensic patients is led by an interdisciplinary team of forensic psychiatrists, psychologists, social workers and nurses

trained to address the clinical and the legal aspects of the forensic process. Forensic evaluation occurs in the outpatient Forensic Evaluation Services (FES) program. The treatment and care of the patients during the acute phase are provided at the BPH forensic facility. Thus, the end users of the organizational system are the forensic patients awaiting access to forensic evaluation to determine competency to stand trial, criminal responsibility, and psychiatric treatment services for competency restoration or psychiatric rehabilitation. In addition, the judicial system components (detention centers, lawyers, judges) are also end users. As the patient progresses in treatment and no longer requires the level of therapeutic security provided at the forensic facility, individual treatment and care needs are provided in the DIS facilities described above. The customer requirements for the project are patient flow and waitlist management to allow individuals awaiting the legal process timely access to court ordered forensic evaluation and treatment in preparation for trial.

## **6. Approach**

The approach to my project will incorporate Deming's model, also known as PDSA.

- The cycle begins with the Plan step. This involves identifying a goal or purpose, formulating a theory, defining success metrics and putting a plan into action.
- These activities are followed by the Do step, in which the components of the plan are implemented, such as making a product.
- Next comes the Study step, where outcomes are monitored to test the validity of the plan for signs of progress and success, or problems and areas for improvement.

- The Act step closes the cycle, integrating the learning generated by the entire process, which can be used to adjust the goal, change methods or even reformulate a theory altogether.

These four steps are repeated over and over as part of a never-ending cycle of continual improvement (The W. Edward Demings Institute, 2016).

## 7. Timeframe & Milestones

Project Stages (Milestones or Checkpoints)	START DATE	END DATE	MILESTONE
Work with Chair on Project Proposal	5/16/2017	8/15/2017	<b>May 2017</b>
Draft IRB Proposal	9/1/2017	9/15/2017	
Establish Dashboard	5/18/2017	6/30/2017	<b>May 2017</b>
Begin Draft Manuscript	4/9/2017	3/20/2018	<b>April 2017</b>
Send All Proposal Materials to Committee for review and feedback	July 2017	July 2017	
Project Proposal Defense	Prepare Project Proposal Defense using a power point presentation of a two- page Executive Summary, and Chapters 1- 3 of manuscript	8/1/2017	<b>August 2017</b>
Revisions to Proposal	9/1/2017	9/8/2017	
IRB Approval from USC & DMH	Submit letter of successful proposal defense from USC School of Nursing and the Department of Mental Health's IRB to USC's IRB	9/18/2017	<b>Sept 2017</b>
Project Start/ Intervention	Process Map Pt. flow using 5W2H to identify barriers;	Sept 2017	<b>Sept 2017</b>



	start PDSA Cycles		
Project Start: Initiate Intervention/Practice Change with Weekly Assessments	9/18/2017	12/31/2017	<b>Dec 2017</b>
Evaluate Interventions and Practice Change	Outcomes Analysis	2/20/2018	<b>Feb 2018</b>
Finalize DNP Project Manuscript	DNP Project Manuscript: Chapters 1-3 completed.	Feb 2018	<b>Feb 2018</b>
Finalize Presentation	Jan 2018	Feb 2018	<b>Feb 2018</b>
Project Deliverables	Dashboards; Statutory Compliance; Reduced Waitlist; Reduced Wait Times	Feb 2018	<b>Feb 2018</b>
Send Manuscript & Presentation to Committee for Review	3/20/2018	3/20/2018	
Defend Final Project	Defense of Final Project	Mar 2018	<b>Mar 2018</b>
Make any Required Revisions & Send Paperwork to Graduate School	Mar 2018	Apr 2018	
Presentation to Organization	Apr 6, 2018	Apr 2018	
Graduation		May 2018	<b>May 2018</b>

## 8. Inclusions & Deliverables

- Develop dashboards
- Replacement of manual processes utilizing electronic data bases to capture real time metrics and transition from person-dependent to systems-dependent data generation and analysis.
- Bring organization into statutory compliance

## 9. Exclusions

The opening of additional civil beds; availability of community placements

## 10. Critical Success Factors

### Factors Impacting Project Success

- Support from key leadership
- DMH affiliation agreements with over 60 colleges and universities to include medicine, nursing, and other allied health professions for training and knowledge acquisition through the use of its facilities for clinical placements.
- Currently, DMH is a recipient of grants that require the support of research and evidence-based practice at the clinical site.
- DMH has staff trained in accessing electronic databases to facilitate the acquisition of evidence for incorporation into practice.
- As a legislatively mandated program of DMH, and in accordance with state law, DMH is court ordered to provide forensic evaluation and treatment for defendants within specified time frames as outlined by court order and state statute.

### Factors That Could Negatively Impact the Project's Success

- Inability to meet the statutory requirements under SC state statute due to a mismatch between capacity and demand.
- Organizational culture, time and limited evidence-based practice.
- Resistance to change
- Political Climate
- Budgetary Restrictions
- Legislative Mandates
- Personal Life Stressors
- Loss of Key Stakeholders

## 11. Assumptions

- The demand for forensic beds exceeds capacity.
- The agency's overall priority and focus will remain on forensic services.
- The project is not time-limited.
- Inefficiencies in patient flow exist.

## 12. Constraints

Time; monetary; retention of key stakeholders; accessibility to automated forensic metrics; people resources; state government regulations; other regulatory requirements

## 13. Related Projects

A project is currently in the planning stages to determine the feasibility of adding additional civil psychiatric beds.

A DMH project that could impact forensic patient flow is the opening of Crisis Stabilization Units (June, 2017).

## 14. Risks

### RISK IDENTIFICATION 1-Low 5-High

Risk Description	Project Impact	Probability of Occurrence
Loss of adequate state funding impact	5	3
Turnover of key stakeholders	5	3
Agency deemed to be in contempt of court	5	2
Infrastructure failure	5	1
Loss of contract services impact	5	3

Recidivism	4	2
Political Barriers	4	2
High profile forensic patient	3	2

## References

- Kennedy-Hendricks, A., Huskamp, H. A., Rutkow, L., & Barry, C. L. (2016). Improving access to care and reducing involvement in the criminal justice system for people with mental illness. *Health Affairs*, 35(6), 1076-1083 1078p.  
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## APPENDIX J

### PROJECT MEASUREMENT

Measure	Type of Measure	Purpose of Measure	Data Needed for Measure	Source of Data for Measure	Frequency of Data Collection	How will Data Be Tracked and Assessed Over Time
Number of patients on Waitlist	Outcome Measure	Indicator of trends to facilitate the management of fluctuations and project amount of capacity required	Inpatient Waitlists for 24 Months	AVATAR (Patient Billing and management system)	Daily	Using Net Smart EHR Management Systems, Forensic Dashboard and Waitlist Steering Committee
Waitlist Disposition	Process Measure	To capture the disposition of forensic patients on the waitlist	Waitlist Disposition Summary Reports for 24 Months	AVATAR (Patient Billing and management system)	Monthly (As we complete PDSAs data will be tracked weekly)	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee.
Time on waitlist	Process Measure	To monitor and manage productivity and efficiencies that support forensic patient flow	Average Days Report which tracks data by month and type of admission	AVATAR (Patient management system)	Weekly (As we complete PDSAs data will be tracked daily)	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee
Average Length of Stay (ALOS)	Process Measure	To monitor and evaluate patient population, treatment, discharge process, and placement	Length of Stay Report for 24 Months	AVATAR (Patient Management system)	Monthly	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee

Numbers of Discharges	Balancing Measure	To monitor and evaluate bed turnover & productivity	Admission & Discharge Reports for 24 Months	AVATAR (Patient Billing and management system)	Weekly	Using Net Smart EHR Systems, Dashboard and Waitlist Steering Committee
Numbers of Admissions	Balancing Measure	To monitor and evaluate productivity	Admission & Discharge Report for 24 Months	AVATAR (Patient Billing and management system)	Weekly	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee
Types of Admissions: <ul style="list-style-type: none"> <li>• Emergency</li> <li>• Inpatient Evaluation</li> <li>• Judicial</li> <li>• Not Guilty by Reason of Insanity (NGRI)</li> <li>• Restoration</li> </ul>	Process Measure	To facilitate forensic patient triage and to drive service type and structure	Admission Type Report For 24 Months	AVATAR (Patient Management system)	Monthly (As we complete PDSAs data will be tracked weekly)	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee
Demographics: <ul style="list-style-type: none"> <li>• Age</li> <li>• Sex</li> <li>• Race</li> <li>• Education Level</li> </ul>	Balancing Measure	To ensure healthcare equity for all patients and to ensure the optimization of Medicaid and Medicare revenue for patients age 21 & under or age 65 and older	Age, race, and education level	AVATAR (Patient Management system)	Monthly	Using Net Smart EHR Systems, Forensic Dashboard and Waitlist Steering Committee

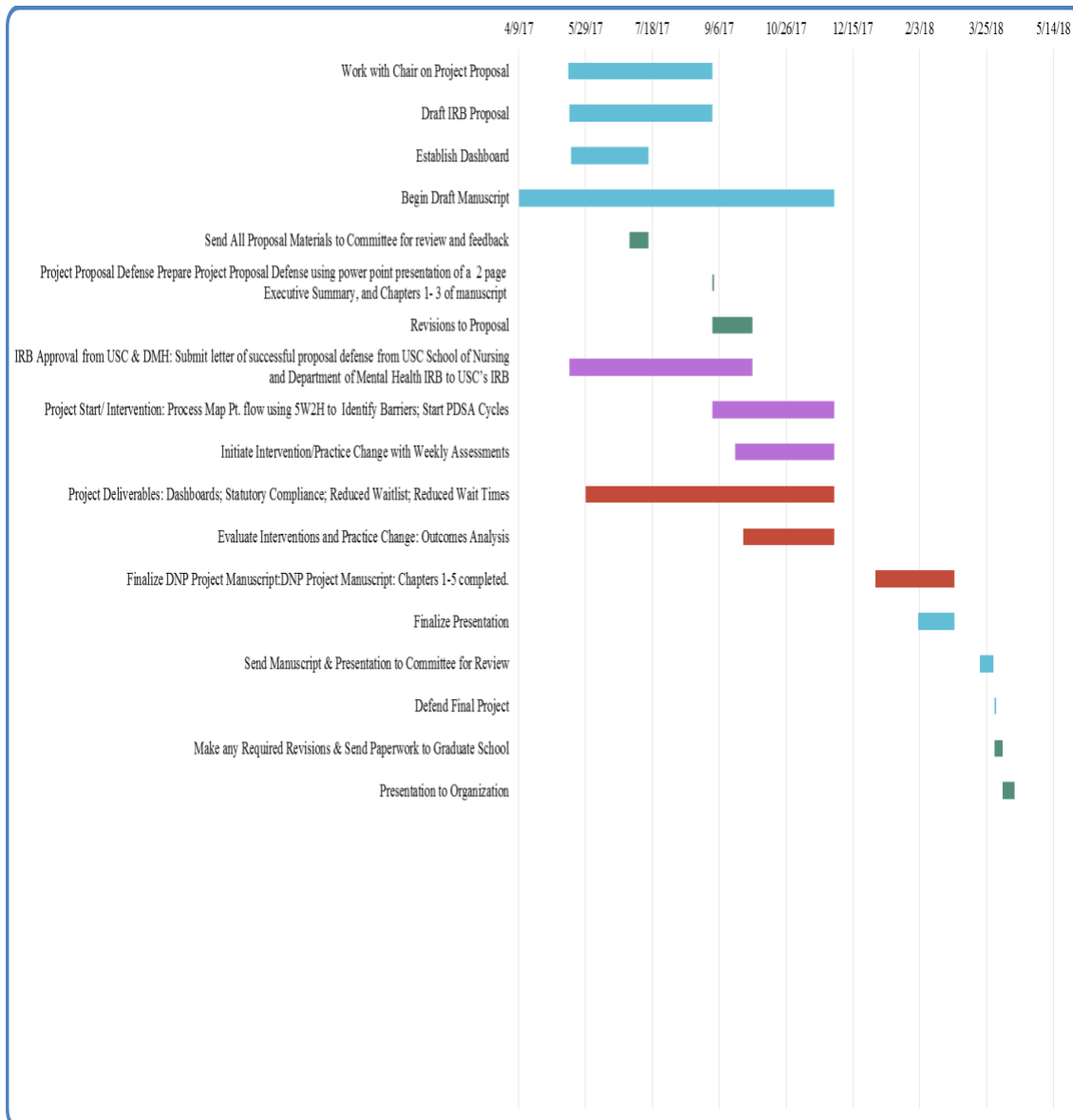
## APPENDIX K

### GANTT CHART

Task	Start Date	Duration	End Date
Work with Chair on Project Proposal	5/16/2017	108	9/1/2017
Draft IRB Proposal	5/17/2017	107	9/1/2017
Establish Dashboard	5/18/2017	58	7/15/2017
Begin Draft Manuscript	4/9/2017	236	12/1/2017
Send All Proposal Materials to Committee for review and feedback	7/1/2017	14	7/15/2017
Project Proposal Defense Prepare Project Proposal Defense using PowerPoint presentation of a 2-page Executive Summary, and Chapters 1- 3 of manuscript	1-Sep-17	1	9/2/2017
Revisions to Proposal	9/1/2017	30	10/1/2017
IRB Approval from USC & DMH: Submit letter of successful proposal defense from USC CON and SCDMH IRB to USC's IRB	5/17/2017	137	10/1/2017
Project Start/ Intervention: Process Map Pt. flow using 5W2H to Identify Barriers; Start PDSA Cycles	9/1/2017	91	12/1/2017
Initiate Intervention/Practice Change with Weekly Assessments	9/18/2017	74	12/1/2017
Project Deliverables: Dashboards; Statutory Compliance; Reduced Waitlist; Reduced Wait Times	5/29/2017	186	12/1/2017
Evaluate Interventions and Practice Change: Outcomes Analysis	9/24/2017	68	12/1/2017
Finalize DNP Project Manuscript: DNP Project Manuscript: Chapters 1-5 completed.	1/1/2018	73	3/15/2018



Finalize Presentation	2/2/2018	41	3/15/2018
Send Manuscript & Presentation to Committee for Review	3/20/2018	10	3/30/2018
Defend Final Project	3/26/2018	0	3/26/2018
Make any Required Revisions & Send Paperwork to Graduate School	3/31/2018	6	4/6/2018
Presentation to Organization	6-Apr-18	9	15-Apr-18



# APPENDIX L

## POSTER ABSTRACT



### Forensic Patient Flow: An Imbalance Between Capacity and Demand

Versie J. Bellamy, MN, RN

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#### Background

- The United States (U.S.) has a growing incarcerated population.
- The volume of this population, coupled with inefficient patient flow through the judicial and health care system, create an imbalance between the high demand for services and the capacity to deliver health care.
- An increasing demand for inpatient forensic services with a static supply of resources, warrants further intervention by treatment and service providers.
- Identifying and removing barriers to patient flow can reduce the imbalance between capacity and demand and result in lower wait times to access inpatient treatment and care.

#### Purpose

- The purpose of this evidence-based quality improvement project was to:
- identify barriers in the patient flow process that lead to inefficient treatment for forensic psychiatric patients
  - to implement a plan for removing those barriers.

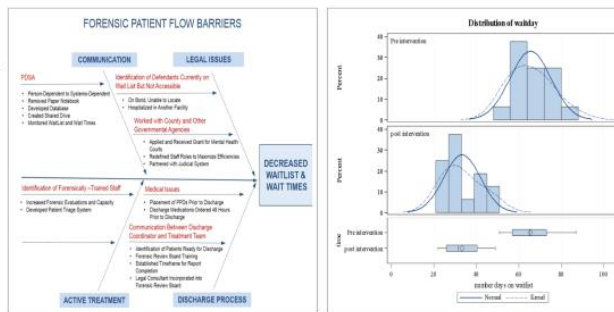
#### Methods

A nonexperimental evidence-based quality improvement study was conducted. Lean Methodology and Plan-Do-Study-Act (PDSA) were used along with patient flow dashboards to identify barriers in patient flow and improve timely treatment for forensic psychiatric patients.



#### Results

A fifty percent reduction in time on waitlist and a fifty-one percent reduction in time on waitlist were achieved. During the study period, the average length of stay was reduced and both admissions and discharges were increased.



#### Conclusions

- The maximization of efficiencies within the forensic psychiatric hospital patient flow process, through the minimization and elimination of non-value added waste (waiting, over processing, defects, and skills) resulted in:
- a reduction in the waitlist and wait times due to improved patient flow.
  - an increase in the state's treatment capacity for defendants awaiting inpatient services at the forensic psychiatric hospital.

#### Acknowledgements

- Project Chair: Ronda Hughes, PhD, MHS, RN, CLNC, FAAN
- Project Committee Member: Abbas S. Tavakoli, Dr.PH, MPH, ME
- Project Committee Member: Carolyn S Harmon, DNP, RN-BC
- Outside Member: Patricia A. Handley, DNP, MSN, RN, CNO SCDMH DIS
- SCDMH Executive Leadership
- SCDMH Forensic Hospital Team

#### References

Available Upon Request



## APPENDIX M

### WAITLIST STANDARD DEVIATION

Table M.1  
*Waitlist Standard Deviation (n=16)*

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Number of people on waitlist pre-intervention	16	65.56	9.69	51.00	87.00
Number of people on waitlist post-intervention	16	33.31	8.64	22.00	49.00
Percentage change	16	-49.13	10.43	-69.86	-31.58

*Note:* Percentage change of waitlist pre-intervention (2016) as compared to post-intervention (2017). N, mean, standard deviation, and range for selected variables

## APPENDIX N

### WAIT TIME STANDARD DEVIATION

Table N.1  
*Wait Time Standard Deviation (n= 16)*

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Average days on waitlist pre-intervention	16	74.25	23.03	37.00	107.00
Average days on waitlist post-intervention	16	36.69	12.45	16.00	54.00
Percentage Change	16	-49.92	11.42	-68.97	-27.45

*Note:* N, mean, standard deviation, and range for selected variables.  
Percentage change of average days on waitlist pre-intervention (2016) as compared to post-intervention (2017), *p* value for testing average days on waitlist ( $p < 0.0001$ ) (Parametric and non- parametric test).

**APPENDIX O**  
**JHQ MANUSCRIPT GUIDELINES**



## Guidelines for Reviewers

“How to Respond to Invitations and Submit Reviews using Editorial Manager”

### Table of Contents

Introduction.....	2
Understanding your main menu.....	3
Responding to invitations.....	4
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[Click Here to Search the Online KnowledgeBase](#)

## Introduction

This guide, developed by Wolters Kluwer Health, is intended to make your experience as a Reviewer using Editorial Manager (EM) as simple and straightforward as possible. What follows are some suggestions for simplifying your duties as a Reviewer while using the Editorial Manager online submission and review system.

This guide is designed to boil down the reviewer responsibilities into two main skill sets:

- Answering Invitations
- Submitting Recommendations

## Software requirements

As a Reviewer using Editorial Manager, you must have Adobe Acrobat Reader (a PDF reader) installed on your computer. If you need to install this software, you can download the free Adobe Acrobat Reader at the following address: <http://get.adobe.com/reader/>

If you experience difficulty installing or utilizing this software, Adobe offers support via their website: <http://www.adobe.com/support/reader/>.

To view the general Software and Hardware requirements for Editorial Manager, please see: <http://www.editorialmanager.com/homepage/homefaq10.html>.

## Understanding your main menu

There are three key folders in your account. You can think of them as a 'filing cabinet' containing all of your current and past assignments.

### Example Review Assignments:

[New Reviewer Invitations](#) (1)

[Pending Assignments](#) (2)

[Completed Assignments](#) (8)

### Key Folders that Manage your Work:

- a. [New Reviewer Invitations](#) – Click here to see new reviewer invitations. You may view the abstract, agree to take on the assignment, or decline to review.
- b. [Pending Assignments](#) – Click here to see all manuscripts you have agreed to review. You may view the due date, view the submission, search for similar articles in Medline, and submit a recommendation.
- c. [Completed Assignments](#) – Click here to see all of your past assignments. You may view your previous comments. The decision letter and other reviewer comments to the author may be available for your reference after the decision is reached.
  - o NOTE: It is up to the journal office's discretion to grant access to these materials. Contact the journal office with any questions.



## Responding to invitations

Invitations to review submissions will be sent to you via email. There are two ways to answer any invitation.

- **Accept or Decline by Logging into Editorial Manager** – You can answer every invitation by logging into Editorial Manager as a Reviewer and checking your [New Invitations](#) folder.
- **Accept or Decline from within Email Invitations** – When you receive an email invitation, you can view the abstract within the email and then respond immediately by clicking the links to Accept or Decline. These are embedded directly within the invitations.
  - **NOTE:** This is an optional feature configured at the discretion of the journal office. If you see the links but are unable to use them, please see the [HELP](#) section (below).

**If you agree to review a manuscript for the journal**, you will automatically be sent an email that includes a due date by which the review should be completed online and detailed instructions for submitting your review.

- **NOTE:** Many Journal Offices limit the number of days Reviewers are given to respond to an invitation to review. Be aware that if you do not respond within the time allotted, you may be automatically un-invited. Should this occur, the submission will no longer be available in the New Reviewer Invitations folder on your main [menu](#).

## Submitting a recommendation

Submissions you have agreed to review will be waiting in your [Pending Assignments](#) folder. First, click [View Submission](#) to view the submission in FDF format (for questions about FDF files, see the HELP section below). Once you've viewed the submission and are ready to complete your review, follow the steps below.

**NOTE:** If, after beginning a review, you would like to exit Editorial Manager and submit the review later, first save your changes by clicking “**Save and Submit Later**”. This will allow you to exit Editorial Manager without losing your work. If you exit Editorial Manager without saving, your work will be lost.

### Steps to Follow:

1. Click ‘Submit Recommendation’ to open the review interface.
2. Click “Reviewer Instructions” to view instructions from the journal office.

3. **Pick a recommendation term from the drop-down box at the top of the form.**
4. **Complete the Reviewer Rating Questions (if applicable).**
  - NOTE: This step is journal-specific and may not appear on your review form.
5. **Enter Blind Comments to the Author.**
  - **Comments entered in this box will be included in the decision letter that is sent to the author.**
  - Do not include your name or any other revealing information about yourself.
  - Do not indicate your acceptance or rejection in these comments.
6. **Enter Confidential Comments to the Editor.**
  - Provide answers to the 'yes' or 'no' questions and include any frank comments to the editor that you wish to make.
  - Enter any message you'd like to send to the editorial office.
    - **NOTE:** These comments will NOT be shared with the authors or other reviewers.
7. **Click “Proceed” to see a proof of the review.**
8. **Click “Submit Review to Journal Office” to send the review to the journal.**

---

## Help

A few common Frequently Asked Questions are included below. If you experience problems not addressed herein, please contact the journal's Editorial Office or search [Editorial Solutions' Online Knowledge Base](#).

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### Frequently Asked Questions from Reviewers Using Editorial Manager™

**Q: Why can't I view the submission?**

[Unable to view submission](#)  
[Unable to view REVISED submission](#)  
[Unable to View PDF file in Browser](#)  
[Setting Adobe Reader to open PDF files](#)

**Q: I completed all of the rating questions. Why can't I submit my review?**

The most likely cause is that you have selected 'N/A' as the answer to one of the rating questions. This option is merely a placeholder and cannot be selected as a response.

**Q: I received an email regarding a review assignment and was not given an option to accept or decline. Why is this the case?**

Some journals are configured to 'Assign' reviews, rather than inviting a person to review. If you were not provided the option to accept or decline, and the submission appeared first in your Pending Assignments folder, the paper has been Assigned to you for review. If you have any questions regarding your assignment, contact the Editorial Office. This can be done using the 'Contact Us' link in the menu bar at the top of any Editorial Manager page.

**Q: Where did my review go?**

A: When you are entering a review, Editorial Manager™ does not save your comments until you either 1) complete the review form and submit the review to the journal office or 2) click "Save and Submit Later".

If you exit Editorial Manager™ or close your web browser, or if your computer crashes while you are in the midst of working on your review, the review will be lost. It is highly recommended that you first write your comments in a word processing program, such as MS Word, save them to your hard drive. When ready, log in to Editorial Manager to submit your review. You can copy and paste your review from an MS Word document straight into the Editorial Manager™ review form.

**Q: Can I read the comments submitted by the other reviewer?**

A: This depends on the review policy of the journal. To determine if a journal has configured this capability: log in to EM, go to 'Completed Assignments' and click on 'View Reviewer Comments'.

**Q: I received an invitation to review by email but there is nothing in my 'New Invitations' or 'Pending Assignments' folders.**

A: Some journals automatically 'un-invite' reviewers who do not respond to invitations after a certain amount of time. If you received an email invitation but the assignment does not show up in your 'New Invitations' folder, contact the Editorial Office. This can be done using the 'Contact Us' link in the menu bar at the top of any Editorial Manager page.

**Q: I accepted an invitation to review, but the submission is no longer in my 'Pending Assignments' folder.**

A: Some journals automatically 'un-invite' Reviewers who have accepted an invitation but who have not submitted the review by the due date. This may also happen if you have a partially saved review but it has not been submitted to the journal office. If you have any questions regarding your assignment, contact the Editorial Office. This can be done using the 'Contact Us' link in the menu bar at the top of any Editorial Manager page.

**Need more help with Editorial Manager?**  
[Search the Online Knowledge Base](#)

## APPENDIX P

### MANUSCRIPT SUBMISSION AND CORRESPONDENCE WITH JHQ

#### Abstract

**Objective:** To use lean methodology and Plan-Do-Study-Act (PDSA) along with patient flow dashboards to identify barriers in patient flow and improve timely treatment for forensic psychiatric patients.

**Background:** The United States (US) has an ever-growing incarcerated population. The sheer volume of this population coupled with inefficient patient flow through the judicial and health care system create a large imbalance between the high demand for services and the capacity to deliver health care. There are significant delays that criminal defendants experience accessing mental health services, attributable to patient flow barriers throughout the forensic, psychiatric inpatient hospital system. An additional limiting factor of a static supply of resources, results in longer treatment once a forensic patient is finally able to access the hospital. Identifying and removing barriers to patient flow, could mean that capacity and demand mismatch could be reduced, resulting in lower wait times to access inpatient treatment and care.

**Study Design:** Lean methodology and Plan-Do-Study-Act (PDSA) cycles will be used, along with patient flow dashboards to improve waitlist and times, time to treatment, and time to discharge for forensic psychiatric patients needing care at a 236-bed state run psychiatric mental health hospital in Southeastern region of the U.S. Information on

patient disposition, average length of stay within the psychiatric hospital, type of admission, and demographics will also be monitored.

**Study Population:** Incarcerated criminal defendants with both unmet psychiatric and chronic disease treatment needs.

Versie Bellamy

From:

Sent:

Versie Bellamy <jequittab72@aol.com>

Friday, March 16, 2018 6:27 PM

To: Versie Bellamy

Subject: Re: Potential Manuscript Submission

On Sep 18, 2017, at 1:10 PM, JHQ <jhq@jjedilorial.om> wrote:

Dear Dr. Bellamy,

Thank you for your recent presubmission inquiry to the Journal for Healthcare Quality.

The editor has reviewed your

abstract and would encourage you to formally submit your manuscript to the journal.

Please submit your new manuscript via our Editorial Manager submission system. You

may access the site via this

link:<http://www.editorialmanager.com/jhg/default.asp>

If you have submitted or reviewed with the journal before, you will have received a letter

welcoming you to Editorial

Manager with information on how to log in. Please do not create a duplicate account. If

you have any issues logging in,

try the "Forgot Password" link on the Editorial Manager home page. If you are a first-time submitter, please click "Register" from the menu at the top of the page to create a Username and Password. Please note that encouragement of your presubmission inquiry does not guarantee that your complete manuscript will be accepted for review or accepted for publication; your manuscript will be subjected to the same rigorous process that every manuscript undergoes in our journal. Thank you for thinking of JHQ. We look forward to receiving your submission. If you have any further questions, please do not hesitate to be in touch!

All the best,

Aquila Blackwell

From: Versie Bellamy [<mailto:jequittab72@aol.com>]

Sent: Saturday, September 09, 2017 3:02 AM

To: JHQ <[jhq@jjeditorial.com](mailto:jhq@jjeditorial.com)>

Subject: Re: Potential Manuscript Submission

Dear Ms. Blackwell-

I am submitting the attached abstract at your request and in follow-up to my inquiry regarding a potential manuscript submission.

Please let me know if my topic fits within your journal's interest.

Thank you!

Versie J. Bellamy

> On Sep 6, 2017, at 12:07 PM, JHQ <lhq@jjedltorial.com> wrote:

>

> Hello Dr. Bellamy,

>

> Thank you for your message and interest in submitting to JHQ. In order to better assist you, may you please provide us with an

1

abstract?

>

> All the best,

> Aquila Blackwell

>

> -----Original Message-----

> From: Versie Bellamy [mailto:jequittab72@aol.com]

> Sent: Friday, September 01, 2017 8:25 PM

> To: ihq@nahq.org

> Subject: Potential Manuscript Submission

>

> Dear Editor-

> I am currently working on a DNP proposal project, implementing lean methodology and PDSA in a large forensic hospital environment located in the South Eastern United States. Specifically, the project will focus on reducing wait time and removal



of other barriers impacting patient flow. Many of the articles listed in my evidence table are from previously published articles. I anticipate completing my project by January, 2018 and will have a manuscript ready for submission by February, 2018.

>

> Does this topic fit within your journal's interest?

>

> Versie J. Bellamy, MN, RN, DNP Candidate, Deputy Director, South Carolina  
Department of Mental Health