Reducing Medication Errors through Addition of a Pharmacist and Standardized Communication to Interdisciplinary Team Rounding: A Quality Improvement Project

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"To Err is Human," a report set forth by the Institute of Medicine (IOM), significantly underestimated the magnitude of medication error impact on patient morbidity and mortality (IOM, 2001; IOM, 2015). To improve healthcare quality, IOM established five competencies to improve the quality of healthcare delivery: relationship-based care (RBC), evidence-based practice (EBP), quality improvement, interdisciplinary teams (IDT), and use of informatics. According to The Joint Commission (2015), communication errors are identified among top three root causes of sentinel events. The synchronized approach of utilizing core competencies translates into quality patient-centered care through effective communication and therapeutic relationship between patients and healthcare providers.

Background and Significance

The magnitude of medication error-impact on patient quality of care, morbidity, and mortality remains under appreciated. To enhance the quality of healthcare delivery, the Institute of Medicine introduced interdisciplinary teams, evidence-based practice, quality improvement, relationship-based care, and informatics as five core competencies for health care professionals (IOM, 2001). The Institute for Healthcare Improvement advanced the Triple Aim Initiative to address most pressing healthcare issues which are improving population health, per capita cost, and patient care experience (IHI, 2018). Integrating a pharmacist into interdisciplinary treatment teams is vital to help decrease medication errors, enhance relationship-based care, and improve patient outcomes.

Medication errors are described as any error which occurs during medication use process (Sherwood & Barnteiner, 2017). For this project, the definition encompasses incomplete or incorrect medication reconciliation, adverse drug effects, incorrect dosing, administration, or wrong patient (Wittich, Burkle, & Lanier, 2014). The Institute of Medicine estimates that 1 of 854 inpatient deaths results from medication errors increasing healthcare cost to two billion dollars in the year 2000 (IOM, 2007). Evidence-based research indicates significant decrease in adverse drug events in the presence of a unit-designated pharmacist who functions as part of the interdisciplinary team. Similarly, the lack of a designated pharmacist can impact patients' safety and outcome. Medication errors are considered preventable, but ineffective communication remains a pitfall for their occurrence (Foppe van Mi et al., 2016).

World Health Organization (WHO) defined the role of a pharmacist as "communicator" (as cited by Kerr, et al., 2017). The concept of pharmacist involvement in patient care includes pharmacist led medication reconciliation, pharmacist as rounding team member, and pharmacist involved in direct patient care. However, the need for effective communication between healthcare provider and patient is not limited to pharmacy, it is also needed on the level of nurses, physicians and other professionals involved in direct patient care. (Nedfors, Borg & Fagerstro, 2016). Effective communication is the framework for effective interdisciplinary teamwork (Gluyas, 2015).

Purpose

The overall goal for this Quality Improvement project is to reduce medication errors to incident rate below 11.35% on an inpatient behavioral health unit and interprofessional communication. The project process objectives are the following:

1. Add a pharmacist to the interdisciplinary rounding team on the inpatient psychiatric unit.
2. Implement Situation-Background-Assessment-Recommendation (SBAR) for standardizing communication.

Literature Review

Search Process

Research evidence was evaluated for the focus on inpatient client population, team communication, bedside rounding, and utilization of a dedicated pharmacist for patient medication reconciliation, medication management and rounding. Articles were then classified to ensure that only peer-reviewed publications were utilized. Inclusion criteria consisted of (1) English language, (2) studies conducted in an inpatient setting, and (3) publication range from 2013-2018. Selected research articles were then evaluated for the level of clinical evidence, most ranging from level II to level VI and were of various research designs including meta-analysis, clinical trial, case studies, qualitative and quantitative data research. Moreover, research studies were not limited to United States data, but included research-based evidence from other medically advanced countries for comparison.

The literature search was conducted using textbooks, Journal Articles, and online search engines: ProQuest, PubMed, and CINAHL. Additional research data was extracted from MEDSCAPE and Institute of Health Improvement web sites. The databases were searched for peer-reviewed articles and research studies published between 2013 and 2018 using specific key words: effective communication, team-based rounding, interdisciplinary teams, medication errors, psychiatric pharmacist, inpatient psychiatry rounding, and bedside rounding. Twenty-five research studies were uncovered. One of the studies focused more on isolated pharmacist-patient

communication as a variable and did not include the team approach, therefore it was excluded. Another study was performed on an ambulatory patient population and did not meet inclusion criteria. The third study was performed on UK inpatient psychiatric patient population but did not have a pharmacist involvement in patient care, resulting in study being excluded. Lastly, the fourth study focused on effective team communication, and did not address pharmacy interventions or medication management; therefore, it was also excluded. Additional peer-reviewed articles were used to support and critically evaluate the research evidence. Several common themes emerged throughout the research evidence: medication errors, communication, interdisciplinary teams, bedside rounding, and patient centered care.

Comprehensive Literature Review Findings

Dedicated pharmacist. A research study published by Wolf and others (2015) used a prospective, controlled trial approach to evaluate the impact of pharmacist-led medication reviews of drug-related problems (DRP) on an inpatient psychiatric ward. The effects were measured in medication appropriateness index (MAI) and documented solved or unsolved DRP from 269 admissions. Findings concluded that direct pharmacist involvement resulted in 86.3% of solved DRP in the intervention group compared to only 27.9% in the control group. This study is a level III clinical evidence. Current healthcare delivery is focused more on patient-centered care and the literature suggests that communication should be a core competency for pharmacists. A study by Kerr and others supports this notion by their realist review approach to explore the connection between contextual factors and mechanisms of triggers in achieving an outcome (Kerr, et al., 2017). The authors conclude that a theoretical framework focusing on relationship and communication, such as Salmon's Theory, should be built into the Doctor of Pharmacy program as pharmacists are required to be competent communicators within their

scope of practice with patients and other professionals as they engage in team-based patient care. The level of clinical evidence for this study is VI.

Richardson, O'Reilly, and Chen (2014) conducted a mixed methods research study to measure types of DRPs identified by mental health pharmacists, their perceived role on the unit, and the recommendations and implementation of such by treating providers. This was a level V qualitative study which incorporated provider and pharmacist interviews. The results showed evolving positive change in providers' perspectives on clinical pharmacist's role and contributions to safe and improved medication treatment plans for admitted patients, where 60.8% of pharmacy recommendations to change medication treatment plans were implemented, and of those 56.1% entailed psychotropic drugs. A cluster randomized controlled study was performed on an ambulatory unit. The intervention was a process of collaborative medication management among pharmacists, physicians, and home care specialists. This study of 142 randomly selected patients showed that physicians were more likely to change the dose of a given medication based on pharmacy recommendations than to start or stop a drug. Final evaluation of results supported the benefit of having an integrated collaborative approach to a patient's medication management plan (Rose, et al., 2016). This is a clinical evidence II research study.

The role of the pharmacist does not stop at reviewing mediation treatment plans and making necessary recommendations. Angeles and others (2013) conducted a large study with 2,473 participants to evaluate pharmacist-led mediation reconciliation with goal to decrease medication errors during transition of care such as admissions, discharges, and transfers. The most common medication error was "incomplete prescriptions." The evidence stands that a pharmacist is an integral part of the care team and demonstrated high value in reduction of

medication errors when the pharmacist assumes primary role in medication reconciliation. This study meets criteria as Level IV clinical evidence.

One of the largest studies conducted to evaluate the effect of psychiatric pharmacy service on patients' clinical outcomes was by Canales, Dorson and Crismon (2001). The study was conducted at a 350-bed State Hospital, Austin, TX and lasted 15 months. Ninety-three participants all had similar baseline scores using Brief Psychiatric Rating Scale (BPRS) and Clinical Global Impression (CGI). At discharge, 93% of patients in the experimental group had 20% BPRS score improvement, 62% had 30% improvement and 22% of patients had 40% improvement; while the control group showed that 23% of patients had 22% BPRS score improvement. Findings using the Hamilton Psychiatric Rating Scale for Depression (HAM-D) were even more pronounced with significantly better improvement in the experimental group. Moreover, the control group showed higher incidence of extrapyramidal symptoms and side effects including akathisia and tardive dyskinesia. The study was concluded with a review of patient surveys, 97% of which in the experimental group were positive responses highlighting patient-pharmacist communication and patient satisfaction score of "agree to strongly agree". This study has clinical evidence level of II.

Having a designated pharmacist as part of the interdisciplinary team improves patient flow, decreases potential adverse drug events, reduces medication errors, and decreases hospital length of stay concluded Gray, Wallett, and Fletcher (2017) in their Dedicated Pharmacy Project study. Results were astonishing after the pilot phase on a cardiac unit, so the project was carried out for the second phase on a general gastroenterology inpatient unit. The designated unit pharmacist was stationed on the unit for the entire day of work, rounded on all patients and collaborated with other team members caring for the patient. The study project underwent

statistical analysis and data was published: length of stay decreased by four percent for patients whose hospitalization required seven days or longer, medication reconciliation was completed for 96% of the patients, discharged occurred earlier in the day, health care providers initiated starting rounds 30 minutes earlier, and readmissions for the same diagnosis amounted to zero at 7, 14, and 28 days. The underlying changing factor for decreased length of stay was felt to have been prompted by the pharmacist appropriately preventing events which may potentially result in prolonged hospitalization. If not for effective interdisciplinary teamwork or patient satisfaction, the approach of including a dedicated unit pharmacist on the team during rounding is beneficial from financial perspective. Moreover, drug acquisition costs were reduced, patients experienced more engagement with pharmacist and reported greater satisfaction rates. The study provides a level III evidence being well-designed, replicable, and without randomization.

Medication errors. Medication errors are not limited to prescription writing or drug administration. They include omission, duplication, unreported medication errors, incomplete or incorrect medication reconciliation and all preventable adverse drug events related to medications (Scott & Henneman, 2017). Stewart and Hand (2017) describe medication errors as an epidemic affecting United States healthcare. The presence of medication errors does not occur in the United States alone. A study published by Hewitt, Tower, and Latimer (2015) reported that adverse drug events affect 1.5 million Australians annually. Medication errors may occur during the patient treatment continuum: dispensing, administration, or prescription. Human and system errors should also be considered when analyzing risks for medication errors.

Psychiatric patients endure an even greater potential risk for adverse drug events and drug-related problems (DRP) due to high incidence of treatment noncompliance, relapses in mental illness, poor social support, and limited healthcare resources (Wolf, et al., 2015). Ryan

and others (2017) have conducted a cohort study consisting of 821 polypharmacy adult patients in the United States. Through liquid chromatography-tandem mass spectrometry assay the investigators were able to quantify 38 common medications indicated to treat chronic diseases. The study concluded that 23 % of patients' medications were not on their medical record, 30% of prescribed medications were not found in patients' blood stream, whereas psychotropic medications were identified as most disproportionately detected. This study qualifies as clinical evidence level III.

Effective communication and SBAR. Communication errors are identified among the top three root causes of sentinel events by The Joint Commission (2015). The World Health Organization (WHO) defined the role of a pharmacist as "communicator" (Kerr, et al., 2017). The concept of pharmacist involvement in patient care includes pharmacist led medication reconciliation, pharmacist as a rounding team member, and pharmacist involved in direct patient care. However, the need for effective communication between the healthcare provider and patient is not limited to the pharmacist, it is also needed on the level of nurses, physicians and other professionals involved in direct patient care.

Nedfors, Borg, and Fagerstro (2016) conducted a qualitative study, of level VI clinical evidence, which involved nine qualitative unstructured interviews with nurses. This research concludes that communication failure increases the risk for patient safety and miscommunication threatens teamwork as interdisciplinary teams are based on trust and shared goals. A total of nine interviews from surgical nurses were conducted by the author, transcribed verbatim and evaluated. The results concluded that communication between nurses and doctors is brief and often lacks a common goal. The consensus from the nurses was an absence of a standardized communication tool and unshared information such as adding a prescription medication without

communicating with a nurse or electronically signing prescriptions. The strength of this study is that it attempted to capture the new concepts of nursing perception of nurse-provider effective communication as the means to ultimately prevent medication errors and improve quality of care. Effective communication is the framework for efficient interdisciplinary teamwork (Gluyas, 2015). The Situation-Background-Assessment-Recommendation (SBAR) tool was initially developed by the U.S. Navy to improve their communication, reduce errors, and maintain a simple and focused pattern of information delivery (Stewart & Hand, 2017). Stewart and Hand (2017) performed an integrated literature review to analyze research data on SBAR use and its implication in communication and patient safety. Their findings concluded that SBAR improves efficacy and accuracy of patient handoff report, increases the confidence of speaker and receiver during patient handoff, is well-received among healthcare staff, and improves the perception of effective communication (Herawati, et al., 2018). The large data base was a strength of the randomized control trial study by Joffe et al., (2013) which analyzed the after-hours calls to physicians using SBAR based form. There is strong research evidence that the SBAR tool should be systematically implemented to create a safer environment for the patient and improve communication among healthcare providers. Refer to Appendix A. This is a level II evidence study with only one randomized control trial cited.

Gluyas (2015) concluded that ineffective communication results in poor cooperation and collaboration of team members and is a major cause for errors in patient care after conducting a comprehensive literature review. A cross-sectional survey conducted by Hailu, Chanyalew, and Mirkuzie (2014) used a self-administered questionnaire among 341 nurses and 168 physicians employed in the Jimma zone. Their findings revealed that only 50% of participants were content with physician-nurse communication, while one-third of participants were angry and frustrated

with the current level of communication. Statistical data analysis showed a significant difference in independent t-scores between physicians and nurses indicating that physicians voiced higher satisfaction with communication. Interestingly, ANOVA and linear regression analysis performed, suggested that higher salary was a positive predictor value for physician-nurse communication. This was a level IV evidence study; however, its weakness was geographical area confinement to only three hospitals and mostly qualitative data used to draw conclusions.

Bedside rounding. Bedside rounding has emerged as a phenomenon supporting evidence-based practice within the last decade. The literature does not reflect agreement on one best way to practice bedside rounding. Nonetheless, given that effective communication is crucial among healthcare providers caring for the same patient, bedside rounding has been studied in various clinical settings (Burleton, 2013). For example, Holodinsky et al. (2015) conducted a mixed method design cross sectional research study which included surveys of Canadian adult intensive care units (ICU). The participants of 111 ICUs included medical directors, nurses, respiratory therapists, pharmacists, and midlevel providers/doctors. Data was collected using open-ended surveys and interviews. The interviews were then repeated in seven cases as a follow-up. Four themes emerged from the qualitative response analysis: multidisciplinary, bedside teaching, client participation, productivity factors, and bedside learning. The results indicated that less than half of ICUs (48%) utilized tools during rounds; most ICUs (86-94%) used an open, collaborative, interprofessional approach, 82% took place at patient's bedside, and 67-83% welcomed patients and families to attend rounds. The most prevalent barrier to efficient bedside rounding was frequent interruptions in more than half of patient cases. The study concluded that although most ICUs have adapted interdisciplinary teamwork, collaboration and bedside rounding, the organizations lacked tools to facilitate

effective communication during rounding. The limitation of this study is that it was not longitudinal. Though follow-up interviews were attempted, there was a low response rate. The study also lacks an experimental component. This was a level IV evidence of research as the study followed a cohort of professionals practicing in the same geographical area and involved in ICU patient care.

Canales, Dorson and Crismon (2001) studied the extent of psychiatric pharmacy effects on patient outcomes in acute care inpatient psychiatric units. The authors tested two hypotheses: (1) intensive clinical services by psychiatric pharmacist will have a greater positive effect on patient outcomes; and (2) there will be no increase in hospitalization costs. The study was conducted for 15 months at a state psychiatric facility in two phases. Phase I patients served as a control group receiving standardized treatment with psychiatrist managed medications and treatment plan while pharmacy was consulted on as needed basis only. Patients from phase II of the study received full participation of a psychiatric pharmacist in patient medication reconciliation, treatment, rounding, morning reports and patient counseling prior to discharge. Psychiatric assessment tests were administered to every participant within 72 hours of admission and prior to discharge including the Clinical Global Impressions (CGI) scale, Mini-Mental State Exam (MMSE), Hamilton Psychiatric Rating Scale for Depression, and Brief Psychiatric Rating Scale (BPRS) to keep clinical outcomes measurable and uniform. Adverse drug events were assessed using Barnes Rating Scale for Drug-Induced Akathisia, Simpson-Angus Rating Scale for Drug Induced Extrapyramidal symptoms, and Abnormal Involuntary Movement Scale (AIMS). The results indicated 30% improvement in BPRS. Drug-induced akathisia and extrapyramidal symptoms were significantly decreased with pharmacist involvement which improved patient safety and future adverse drug events which are commonly associated with

medication noncompliance. This study has level II clinical evidence as patients were randomly selected, data was objective, reproducible and well-designed. The limitations of the study included confinement to a single hospital and duration of the study was not appropriate for longitudinal results.

Bedside rounding has also been studied in conjunction with effective communication among interdisciplinary team members to evaluate the association of effective communication to length of stay and patient outcomes (Huynh, Basic, Gonzalez, & Shanley, 2016). The study was conducted on two aged-care wards; patients were evaluated twice weekly. This study concluded that ineffective communication among interdisciplinary team members was associated with negative patient outcomes. However, effective communication among team members was not effective in decreasing patient's length of stay or significantly improving rates of readmission at 28-days after discharge (20.3% prior to intervention and 19% during the study implementing structured interdisciplinary bedside rounds). A limitation of this study was that only the elderly population was studied with multiple comorbidities and admitting diagnoses of delirium, recurrent falls, failure to thrive, functional decline, malnutrition, and polypharmacy. The study provided level IV clinical evidence for that specific cohort of patients. However, the results should not be generalized or applied to all patient situations in clinical practice.

Interdisciplinary teams. Most hospitalized patients require more than one discipline to contribute to their care. Aside from nursing and medicine domains, psychiatry prevails on inpatient psychiatric wards, though pharmacy collaboration has been documented as crucial to maintain safe patient care. Olaf and others (2016) conducted a cluster-randomized controlled study to identify and provide evidence-based criteria for medication review patient selection to be performed by a pharmacist in collaboration with the patient's physician. The duration of

medical therapy and medication appropriateness index score ($p<0.001$) were used to classify patients as requiring collaborative medication reviews by healthcare providers and pharmacy. The study found that physicians were accepting of the direct pharmacy collaboration and input; and most elderly, and patients with multiple comorbidities requiring polypharmacy qualified for pharmacy intervention. The study had discrete strengths: it was longitudinal, of three-year duration, the patients of twelve general practice physicians were evaluated during the study duration. Limitation to this study is that it was conducted in Germany and in outpatient setting of primary care practice. This was a level II evidence study as it used a well-designed controlled randomized trial spread over a period of three years.

Literature suggests that interdisciplinary teams cut costs on comprehensive care while exemplifying evidence-based practice in a clinical setting (Melnyk & Fineout-Overholt, 2015; O'Reiley, et al., 2017). A recent integrative review of literature was conducted using PRISMA by O'Reilly and others (2017). The search included 10 databases and analyzed extracted data according to Normalization Process Theory. In the settings of strong communication and respect, the experience of interdisciplinary collaboration developed. Mixed methods reviewed of qualitative and quantitative data concluded that an interdisciplinary team was perceived as a positive idea in healthcare, but it was reported as a working team in only three countries: USA, Sweden, and United Kingdom. Moreover, clear communication was key to strong collaboration among team members as they focused on patient goals. This was a level V evidence study as it evaluated mixed methodologies of quantitative and qualitative studies.

Patient centered care. Patient-centered care has been the aim of healthcare for many years. It is achieved through effective patient-provider therapeutic relationships to build trust and respect during their interactions. Literature suggests that patients who feel that healthcare

providers are meeting their needs are more satisfied, whereas, patient inclusion and respectful environment contribute to quality interactions between patients and providers (Burleton, 2013). Garfield and others conducted a qualitative research study to evaluate patient involvement during rounds at two different hospitals. Doctor-led rounds, nursing rounds and ward pharmacy rounds were observed and analyzed. The study concluded that despite electronic records being readily available during bedside rounds, the patient's inclusion in viewing their record with a clinician while asking questions about their medications is limited and often affected by the clinician's belief regarding the appropriate patient level of involvement and the underlying culture. This study poses clinical evidence level V given that the study was qualitative and well-designed (Garfield, et al., 2016).

Patient-centered care technology is an emerging term in healthcare informatics. Lesselroth and others (2013) conducted an ethnography research to design the supporting technology to help clinical pharmacists deliver patient-centered care during medication reconciliation. This study was the first to implement a serviceable computer system, which is patient-centered and uses pharmacy computerized system and electronic patient record combined. This study was not without limitations, it was conducted and applied in one federally sponsored healthcare facility. The computerized system has not been tested in outpatient setting and it is unclear if the design would be transferrable to other settings or disciplines. This study provides level IV clinical evidence as it uses a well-designed cohort study to analyze the effect of patient-centered care technology.

Another research study by McMullen et al. (2017) analyzed patient centered nursing care in examining errors of omission. The cross-sectional study analyzed missed care in a patient community of central New York using the MISSCARE Survey, replicating a Midwestern study

design to evaluate a northeastern patient population and nursing care. A sample of 537 nurses participated in the study and identified omitted nursing care as patient turning, mouth care, bathing, feeding, toileting, and patient assessment. According to research, this can increase hospital adverse events such as nosocomial infections, falls, pressure ulcers, and decreased patient satisfaction. The results of the study emphasized implementing teamwork to increase patient-centered care, reduce missed care, and improve patient outcomes. This study provides level VI evidence as it used descriptive and qualitative research design.

Just as missed nursing care decreases patient satisfaction and increases risk for adverse hospital-acquired events such as medication errors, patient hand-off is a vulnerable time for hospitalized individuals. Serksnys, Nanchal and Fletcher (2017) conducted a qualitative research study analyzing interprofessional input during patient handoffs. Data was collected using interviews and observing afternoon rounds in the MICU. Many issues were identified as barriers including negative attitude, varying interests for patient information during rounds by healthcare providers compared to nurses, and geographic proximity. The results indicated that joined nurse and physician patient rounding decreases miscommunication and fosters patient trust. This study is a level VI clinical evidence.

Baathe and others (2016) conducted a study in Sweden based on empirical data from interviews with physicians who practice patient-centered and team-based care in an inpatient setting. Eighteen physicians were interviewed and revealed two empirically different physician perspectives: “we”-perspective and “I”-perspective, the latter focused on improving patient care and reducing medication errors by working harder. Those embracing the “we”-perspective were more open to work in teams and believed in patient engagement in their own care and viewed patient care outcomes because of synchronized effort of every team member partaking in patient

care delivery. The findings uncovered that paradoxical view toward increased patient centeredness continue to exist among health care providers affecting provider becoming. The study contains level V evidence, providing descriptive and qualitative data.

Finally, Givens, Skully and Bromley (2016) piloted a quality improvement project on bedside handoff on a neuropsychiatric inpatient unit of a large Midwest academic medical center. The authors then studied nurses' perceptions, responses, and barriers to implementing bedside shift report practice in the presence of a psychiatric patient. The study evaluated the unit's traditional standard of acquiring a shift report, which was held at shift change in the conference room amongst nurses only. Participants were three seasoned nurses and all patients of neurocognitive unit. The nurses were then educated over three designated meetings between management and nursing staff on study project details, which was carried out over 12 weeks. Data was collected using a 5-question survey seeking the nurse's perception on client involvement, client being informed of progress and treatment plan, nurse satisfaction with length, style and content of shift report, and barriers to current practice. This study helped uncover the perception barriers of psychiatric nurses to change and patient involvement in clinical rounds. The study provided level IV clinical evidence. Its limitation was a very small cohort, consisting of three nurses, and no survey to evaluate patient's perception of implemented change.

Synthesis of Significant Findings from the Literature Review

A total of twenty-one peer-reviewed published research studies ranging in clinical level of evidence from II to VI were integrated into this current Literature Review focusing on medication errors in current healthcare setting and integrated care on inpatient psychiatric units. Throughout the research common themes emerged: bedside rounding, interdisciplinary teams,

dedicated pharmacist, effective communication, and patient-centered care. Numerous research studies have concluded that ineffective communication results in increased risk in medication errors and patient adverse events (Foppe van Mi, et al., 2016, Gluyas, 2015). The Joint Commission (2015) made the association of ineffective communication and medication errors resulting in poor patient care outcomes, clear. Moreover, World Health Organization as cited by Kerr (2017) has identified the pharmacist as a communicator. Incorporating a dedicated pharmacist into the process of patient and interdisciplinary team interaction during rounds to improve the level of expertise was a successful strategy in many studies targeting medication error reduction. Research evidence concluded that bedside rounding results in higher patient involvement in their own care and increased patient satisfaction scores. The range of services offered by the pharmacist on inpatient psychiatric unit was identified as monitoring for drug interactions, identifying potential drug events early, educating patients and families, pharmacy-led medication reconciliation, and discharge medication teaching (Richardson, O'Reilly & Chen, 2014). Creating a team-care approach has been shown to improve interpersonal communication, patient engagement and patient care outcomes.

Conceptual Definition of Key Terms

Interdisciplinary team. The target population is the interdisciplinary treatment team of an inpatient adult behavioral health unit. The interdisciplinary team is a group of qualified professionals directly involved in patient rounding and care. This team consists of a psychiatrist or psychiatric nurse practitioner, pharmacist, charge nurse and registered nurse assigned to the client. The Affordable Care Act (Inman, et al., 2016) emphasized a team approach to patient care referring to physicians, nurses, and allied healthcare providers all taking care of the same patient while each performing his/her own duties within the scope of their practice. The Institute of

Medicine (2015) identified interdisciplinary teams as comprised of health professionals trained to deliver patient-centered care based on evidence-based practice and quality improvement.

Bedside rounding. Bedside rounding is defined as information exchange in the presence of a patient and about the patient including medications, results, and changes among team members involved in patient care (Masters, 2016). This process takes place during team treatment on Behavioral Health Unit. The patient is included as an active participant in his or her treatment plan.

Medication errors. National Coordinating Council for Medication Error Reporting and Prevention as cited by Mansur (2016, p.215) defined medication error as any preventable event involving inappropriate medication use. For this project medication error refers to errors of omission, administering wrong medication, adverse drug events such as allergic reactions, drug interactions, severe side effects, incomplete medication reconciliation, wrong medication dose, time or route, and incorrect prescriptions at client discharge. Medication reconciliation means detecting and maintaining an accurate list of patient's medications (Kothari, Maidment & Haygarth, 2016).

Effective communication. The concept of effective communication refers to utilizing SBAR to aid in standardized and structured communication among team members (Herawati, et al., 2018).

Pharmacist. A designated pharmacist is a pharmacist who is assigned to the inpatient Behavioral Health Unit and is responsible for medication reconciliation, monitoring for drug interactions and adverse events, reviewing patient medications for appropriateness, providing patient education and pharmacy consultations (Bullock, et al., 2019).

Framework

Model for Improvement

The Model for Improvement (MFI) developed by the Institute for Healthcare Improvement is systematic in identifying the aim, measures, and proposed changes to achieve desired outcomes. Since the change required to reduce medication errors calls for daily application of the same patient evaluation process on an inpatient psychiatric unit, the use of recurrent multiple Plan-Do-Study-Act (PDSA) cycle is appropriate (Sherwood & Barnsteiner, 2017). Refer to Appendix B. Key terminology elements within the context of the Model for Improvement have been defined considering the research question and clinical setting. Whereas:

Plan – a timeframe during Quality Improvement (QI) project during which a plan is developed and objectives are defined.

Do – a phase of actual implementation of the plan and gathering of related data.

Study – data analysis is instituted, and conclusions are drawn.

Act – the plan is revised to optimize success.

The aim reflects an outcome of the project: a decrease in medication errors during acute hospitalization stay and implementation of structured communication on an inpatient psychiatric unit. Measures included a team-based patient rounding with a dedicated pharmacist and effective structured communication among team members. The key changes tested were having a dedicated pharmacist as part of the interdisciplinary team on an inpatient psychiatric unit and standardization of structured communication using SBAR. During the planning stage the DNP project review committee approved the project's proposal, letter of permission from project site hospital was granted, JU Institutional Review Board (IRB) granted permission for project

implementation, informed consent from nurses on psychiatric unit was obtained, staff was education on SBAR implementation, and benchmark data medication errors was collected.

The actual project implementation stage was the 'Do' step process within the Model for Improvement. Structured communication technique using SBAR was taught to staff involved in patient care on an inpatient psychiatric unit at the start of the project. This training took four weeks to complete. The staff had a chance to role play presenting patient cases to each other using SBAR as a guide. During the twelve weeks of project implementation stage, staff members were directly observed during interdisciplinary team rounding. Patient rounding occurred in a form of dialogue among healthcare professionals and patient focusing on individualized patient's treatment plan. Pharmacy continued to collect data on medication errors during patient admission, hospitalization and at discharge.

The phase of 'Study' entailed gathering and analyzing project data. Inpatient pharmacy has been collecting, categorizing, and analyzing data on medication errors. The data was stored on the hospital password-protected pharmacy computer system. After the project completion, the data was statistically analyzed. Finally, the phase referred to as 'Act' will bring forth the necessary changes to be implemented into the refined process of practice change.

Peplau's Theory of Interpersonal Relations

Overview of Peplau's theory. The theory of interpersonal relations was developed by Hildegard E. Peplau, a professor emeritus at Rutgers University, a president of American Nurses Association (ANA), and a devoted mental health nurse. Her theory is a descriptive classification theory influenced by the work of Harry Stack Sullivan (Hood & Leddy, 2006). The psychodynamic approach of this model suggests that as the patient and nurse engage in therapeutic relationship focusing on problem resolution. They both grow and mature through the

process. This theory illuminates nursing in the light of interpersonal therapeutic interaction between two or more individuals sharing a common purpose and goal. The framework allows for a systematic process to occur in achieving the common purpose or goal through carefully identified steps: orientation, identification, exploitation, and resolution (Chinn & Kramer, 1999).

The theory of interpersonal relations defines four aspects contributing to the theoretical model framework: person, environment, health, and nursing. The person is defined as an organism influenced by anxiety due to stress of the needs. Environment encompasses things surrounding the person, which may include physical, social, and cultural aspects. Health is defined as an evolving process affecting personality development toward productive and creative living. Finally, Nursing is an interpersonal therapeutic process that nurtures community and individual health (Hood & Leddy, 2006).

All concepts are interdependent and focus on maintaining a balance of reciprocity fostering growth and development of those involved in the process. As the patient and nurse(s) enter the process of interpersonal relationship they establish trust and open communication. The nurses use their professional knowledge and roles to deliver competent care and engage the patient in effective communication patterns. Some examples of therapeutic communication techniques are acknowledging, reflecting, clarifying, offering self, giving information, checking perception, validating, summarizing, giving information, and focusing. As a result, the patient develops understanding, self-confidence, and competencies directed toward self-efficacy. The nurse is also influenced by this process and develops better self-understanding, maturing professionally and personally. During the orientation phase trust is established and the client accepts the realization of needing assistance. Identification phase provides the client an environment of acceptance to voice their concerns, problems, and preconceptions. This phase

established mutual understanding of treatment goals and expectations. Exploitation phase is the working phase of this model. It involves close collaboration between the nurse and client as they work on problems together with the goal to improve health. Resolution phase constitutes an opportunity to redefine goals and client independency (Hood & Leddy, 2006). Please refer to Appendix C.

Application of Peplau's Theory. The application of Peplau's Theory of Interpersonal Relations was evident throughout the duration of this Quality Improvement Project. Orientation phase occurred when the interdisciplinary team met with the patient. All team members including the patient became participants in dialogue reflecting a two-way communication among professionals and patient. Participants all introduced themselves to the patient and described their roles in patient's treatment. Identification took place next as the patient was encouraged to briefly share what led him/her to the hospital. Together the team members assisted the patient in identifying modifiable risk factors which lead to destabilization of patient's condition. These factors included examining patient's medications, environmental factors, medical problems, and social support system. The team then focused on assisting the patient in developing a plan for his/her stabilization and recovery during the phase of exploitation. At the end of the treatment team meeting, resolution phase was evident in that team members and patient evaluate the patient's recovery progress and re-establish new goals to achieve. Throughout this process all participants were involved in dialogue and evolved together in their interdependent relationship focused on patient stabilization and recovery.

Project Design

Objectives

The overall goal for this quality improvement project was to decrease psychotropic medication errors on an inpatient behavioral health unit through addition of a pharmacist to the interdisciplinary rounding team and standardization of communication with SBAR.

Process objectives. 1) Increase Knowledge: lunch and learn during mandatory staff meetings to educate nurses and staff on purpose, process, and tools of QI project. 2) Enhance Skill: role play SBAR during the mandatory staff training meetings, utilize SBAR badge clip as quick guide, directly observe staff to ensure adequate training takes place. 3) Improve Attitude: achieved through interdisciplinary staff engagement and evaluated through TeamSTEPPS assessment questionnaire.

Outcome objectives. 1) Reduce medication errors incidence rate to less than 11.35% through inpatient pharmacy centralized EMR incident report system. 2) Integrate a pharmacist into treatment team rounding. and 3) Standardize communication through SBAR.

Project Intervention

The main intervention for this Quality Improvement Project was two-fold. First, a dedicated pharmacist was integrated into interdisciplinary treatment team rounding. His role was to interact with patient and treatment team participants during rounding, answer questions pertaining to medications, check for medication interactions, educate patient and staff on latest data pertaining to patient's medications, and enter any modifications on medication treatment directly into computer system during treatment team rounding. Second, SBAR was utilized to improve communication among team members.

Setting and Facility Support

This quality improvement project was designed to translate evidence-based research into practice. According to literature, one must allow a minimum of eight to twelve weeks of data collection to be able to extract meaningful data and attain a sample large-enough to represent the total population (Sherwood & Barnsteiner, 2017). Prior to initiating the project changes, three months of retrospective data was evaluated as recorded by the pharmacy detailing medication errors to establish a pre-implementation benchmark. This included the time of established practice where the pharmacist was not included as an active participant of treatment team. The project took place on a behavioral health unit of a local hospital. The unit's capacity was twenty-seven patients, averaging 810 patient encounters monthly. This unit has eight full-time Registered Nurses working day shift, six full-time Registered Nurses working nights, and five part-time nurses. The unit is also staffed with one internal medicine physician, two psychiatrists and one Advanced Practice Registered Nurse (APRN) during day-shift hours. Patients are admitted to the unit for inpatient evaluation and acute stabilization. Most clients require medication adjustment or initiation during their admission stay. The unit is equipped with two private exam rooms, and most rooms are private allowing patients to meet with their treatment team without interruptions and in the privacy of their own space.

Outcome Groups

For the purpose of this project two outcome groups were identified: staff nurses and indirectly, adult patients admitted to Behavioral Health Unit. The latter outcome group constitutes medication errors measured by the hospital statistics report pre and post project implementation. Staff Registered Nurses of the unit comprise an outcome group which is targeted for utilizing the services of the rounding pharmacist and communication improvement

through SBAR attitude changes measured by T-TAQ. Clinical experience of the staff ranges from one year to over fifteen years in psychiatric nursing.

Assurance of Privacy

Privacy and confidentiality of patients and staff was ensured through using a hospital computer and secured hospital email to communicate with pharmacy and key stakeholders. All data was encrypted and stored on a two-password protected computer on hospital grounds. Nursing staff were asked to submit a signed consent prior to completing T-TAQ questionnaire to grant the investigator permission to utilize data from their responses to the survey (please refer to Appendix D). The surveys contained no personal or identifiable information, instead these were assigned a random number known only to the nurse completing the survey before and after project implementation. No identifiable patient data was collected for this Quality Improvement Project. All medication errors data was collected in numerical form correlated to a specified date range.

Permission to implement this Quality Improvement project was obtained from Jacksonville University Institutional Review Board to DNP student. HIPAA was maintained to ensure privacy and confidentiality to personal and identifiable information of participants. Consent forms were signed by participants who were willing to partake in the TeamSTEPPS Questionnaire. Completed Questionnaire forms were stored on-site, in possession of the unit clinical director. No personal or demographic data was collected.

Information technology. Information access was granted to the investigator by Clinical Pharmacist, Vice President of Behavioral Health Unit and Risk Management in order to make the data available for mining. The investigator accessed the data collected by hospital's pharmacy as it pertains to mediation errors. All the data accessed and collected was stored on the

hospital computer, and on hospital grounds protected by unique personal identification and password.

Pharmacy data. Pharmacy data was collected by a clinical pharmacist. The process of information gathering was governed by the hospital's policies. All adjustments to the data collected were made by the hospital-appointed staff involved in data tracking.

Project Implementation

Implementation process. Pre-project medication error data was extracted with the help of a pharmacist and hospital Information Technology (IT) Management. This data remained stored on hospital grounds, in the pharmacy department, accessed by the pharmacist and investigator. The data was further collected using an already established auto-prompt process built into Electronic Medical Records (EMR) system to track medication errors and medication discontinuation. At the end of twelve weeks, the data was accessed by the pharmacist and this investigator under IT monitoring for safe data handling. Unit staff was educated on SBAR guided communication during mandatory staff meetings every two weeks prior to the actual project implementation. This was an eat-and-learn experience for the staff with food provided by the administration to encourage attendance and participation. At the end of each educational session, the staff was encouraged to practice presenting patients to their peer Registered Nurses while being supervised by the interviewer, unit director and Clinical Director. Staff members received a copy of SBAR tool for their personal review and an SBAR clip-on card to wear on their badge ID for quick reference.

The facility provided support by providing pharmacy-collected data on medication errors resulting in medication discontinuation. The facility's computerized electronic medical information system software was utilized and facilitated by Information Technology

management to grant and govern information access and utilization. The gathered data was stored on site and on the hospital's password-protected computer. Furthermore, the data was encrypted. The participants were protected further as no direct patient or staff member identifiable information was collected except names of medication associated with errors or adverse drug events. The information pertaining to interdisciplinary teams only included the total number of participating physicians, registered nurses, nurse practitioners, social workers, and pharmacists. The facility provided a dedicated pharmacist for interdisciplinary team rounding, already trained and familiar with current hospital electronic medical records system eliminating the additional cost of training.

Verbal support was obtained from several stakeholders. First, the unit Interim Director has worked with the implemented utilization of a designated unit pharmacist as an active member of treatment teams during patient rounding and has first-hand witnessed success at other hospitals. Regional Medical Director and the team of psychiatrists have voiced positive response regarding having a designated pharmacist be an active treatment team member. Next, the pharmacist currently assigned to cover pharmacy consultations on inpatient psychiatric unit is willing to broaden his scope of involvement both timewise and professionally. A formal agreement was established between the Head Pharmacist and Medical Director of Behavioral Health. Moreover, the hospital's Intensive Care Unit has successfully utilized a designated unit pharmacist as an active member of the interdisciplinary team during patient rounding for the past few years. This change was deeply supported by the Intensivist, who was willing to share the unit's positive experience of clinical practice change. The Vice President of Behavioral Health voiced positive remarks and is interested in success of the program. Her final approval was granted before Jacksonville University Review Board issued its approval.

The medication data was collected by the inpatient pharmacy as usual and categorized to become minable. Cost-containment is vital to the healthcare system as well as each healthcare organization. Implementation of this Quality Improvement Project did not incur direct additional cost as the pharmacist is already employed by the facility and the base of treatment teams has been implemented on behavioral health units. Staff training in the use of SBAR tool was done by the investigator during the mandatory monthly staff meetings. The facility incurred the cost of compensating their employees for attending the training during their mandatory staff meeting (an established and expected occurrence).

The intervention was direct involvement of a pharmacist during treatment team and implementation of SBAR as a guide to standardize communication. The results were provided to the Vice President of Behavioral Health Unit to determine the need for further assessment or intervention. The project was implemented on an acute adult psychiatric unit of a local hospital over a period of twelve weeks. During the initial stages of this project, all treatment team participants of the Behavioral Health Unit were trained in using SBAR to standardize the communication among team members. The training was provided by the investigator in collaboration with clinical and unit directors during mandatory staff meetings over a period of four weeks. Nursing staff who missed attending the mandatory staff meetings were provided SBAR training on an individualized basis. SBAR cards which clipped onto staff badges were distributed for participants to utilize as reminders of SBAR guided standardized communication. An interdisciplinary team comprised of psychiatrist and/or psychiatric nurse practitioner, pharmacist, social worker, charge nurse and registered nurse assigned to the patient performed patient rounds. To facilitate clear and effective communication, SBAR, a standardized and validated tool was used as a guide to facilitate effective communication as they discussed

treatment plans and addressed necessary changes (Stewart & Hand, 2017). A dedicated pharmacist was assigned to the unit and assumed the lead responsibility of patient medication review during treatment team rounding and throughout their hospital stay. He reviewed all patient medication changes, performed medication interaction checks, and provided additional medication teaching as necessary to patient and staff.

The team communication and functionality were evaluated using TeamSTEPPS assessment questionnaire tool. All nurses were encouraged to participate in filling out the questionnaire pre and post project implementation to evaluate for changes in individual attitudes, perception, and communication. The participants were assigned random numbers and received the questionnaire with the same number pre and post project implementation to capture the differences on individual as well as team basis.

Instrument Measures

Two instruments were selected for this project: SBAR and T-TAQ. Both were found to have high reliability and validity.

SBAR. Joint Commission (2015) had identified communication errors to be one of the most common causes of reported patient sentinel events. Adapted from the U.S. Navy, the Situation-Background-Assessment-Recommendation (SBAR) is a structured tool, which allows for effective communication among members of the interdisciplinary team. According to Achrekar and others (2016), the inter-rater reliability of SBAR was established at $k=0.91$, $p<0.001$, using the kappa statistic to determine consistency among raters. Its content validity index was reported as 0.92 based on a study examining interprofessional communication (Foronda, et al., 2015). In this Quality Improvement Project SBAR was be implemented as a focused communication guide to be used by the interdisciplinary team during bedside rounding.

It eliminated hierarchical communication pattern, focused on objective findings, and organized the data into a predictable format (Stewart & Hand, 2017). The SBAR tool provided a versatile framework for focused communication applicable to all healthcare disciplines. The clinical site of this project has already implemented the use of SBAR tool on medical floors and under the careful guidance of Risk Management team has trained the nursing staff from all departments except inpatient psychiatry. To upkeep the nationally recognized goal of standardizing structured communication, SBAR application was taught to all staff on inpatient behavioral health unit in preparation to the actual project implementation phase. The nurses became active participants in interdisciplinary treatment teams, which gave them a voice and an opportunity to contribute to their patient's care. SBAR was found to have both high validity and reliability by U.S. Navy, Institute for Healthcare Informatics and The Joint Commission, which has identified it as the gold standard tool for effective communication (The Joint Commission, 2015).

During implementation phase, SBAR was introduced into treatment teams and utilized during patient rounding. Nursing staff was educated on tool meaning, purpose and utilization. SBAR badge ID cards were provided to nurses to assist them in implementing the process of standardized communication. The ID card included a brief step-by-step process with examples of case presentation. Registered nurses were expected to implement SBAR as a guide during their patient handoff and treatment team rounding while sharing information in an organized manner. Social workers were also trained in implementing SBAR during treatment team rounding and encouraged to adhere to standardized communication to increase cohesiveness in interprofessional communication. A seasoned pharmacist, versed in hospital computer system, was integrated into utilizing SBAR-guided communication as he become in active participant in patient rounding and engaged in dialogue.

TeamSTEPPS Attitude Assessment Tool. Agency for Healthcare Research and Quality (AHRQ) has developed TeamSTEPPS tools and curriculum to improve patient safety and improve quality of care. TeamSTEPPS Attitude Assessment Tool (T-TAQ) has been implemented throughout disciplines within healthcare including anesthesia, internal medicine, primary care, emergency medicine, women's health, pediatrics, and behavioral health. Refer to Appendix D. It was proven to produce reliable results in all settings as the tool was found to offer systematic and reproducible results. The total reliability of T-TAQ was 0.80 using Cronbach's alpha (Najafi, et al., 2014; Wolk, et al., 2019). The validity of this tool is high, and its use is not limited to the aforementioned areas of practice. Instead, this tool is versatile and can be effectively utilized in both broad spectrum clinical practice area and specific situations (Gaston & Short, 2016; Lee at el., 2017; Vertino, K.A., 2014). For example, AHRQ has published multiple studies in which T-TAQ tool has been utilized to improve teamwork attitudes and communication in a specialized or specific setting: physician to nurse communication, operating room, interdisciplinary teams, and even trauma (TeamSTEPPS, 2015). The Agency for Healthcare Research and Quality has granted permission to utilize T-TAQ tool for the purpose of this quality improvement project. This tool was self-administered by the participants and numerical data collected by the project investigator.

Teamwork among staff members is not synonymous to effective communication. The Joint Commission has identified poor communication as the leading cause of sentinel events, thus recommending cultivation of effective communication and teamwork (Gaston, Short, Ralyea & Casterline, 2016). Moreover, highly functional teams result in fewer errors and TeamSTEPPS has shown to improve staff attitudes in teamwork (Vertino, 2014). After obtaining a letter of approval to utilize Team Attitudes Questionnaire (T-TAQ) from the Agency for

Healthcare Research and Quality (AHRQ), it was administered to the nursing staff on the inpatient psychiatric unit. The nurses were given an opportunity to voluntarily participate in the T-TAQ before the implementation of the project to allow for establishment of baseline in the staff's perception of attitude and communication under current rounding practices. Each T-TAQ form was assigned a unique number which the individual filling out the questionnaire was asked to use on the post-implementation T-TAQ at the end of twelve weeks.

Interdisciplinary Treatment Team Rounds

A designated pharmacist became an integrated participant in the interdisciplinary treatment team rounds on an inpatient psychiatric unit for a period of sixteen consecutive weeks. His role was to utilize hospital approved computerized system to make the following data available during patient treatment team rounding: a) medication reconciliation, b) drug-to-drug interaction, c) medication cost, d) availability of the medication according to hospital formulary, and e) medication side effects and warnings. All the changes to patient medications discussed during interdisciplinary rounding were entered in by the pharmacist eliminating the delay in carrying out physician orders. The data of medication errors, changes, initiation, and discontinuation continued to be tracked by the inpatient clinical pharmacist.

Timeline

Initial permission was obtained from Jacksonville University in July 2018 for this DNP Quality Improvement Project. Please refer to Appendix E for steps on project evolvement. The process was delayed due to approvals needed from the hospital, division of Behavioral Health, the hospital's research committee, inpatient hospital pharmacy director, and risk management department. The formal letter of approval was received in November of 2018. Due to upcoming holidays the decision of JU IRB was pushed into early 2019 and final approval received in April

2019. Because the hospital has already accepted and approved SBAR training for medical-surgical and ICU units, nursing staff training on Behavioral Health Unit in standardized communication using SBAR began in October 2018 and held monthly during mandatory staff meetings for three consecutive months. Project Implementation began May 1, 2019 and continued for three consecutive months. Numerical data on medication errors was collected by the inpatient pharmacy as usual. Their clinical pharmacist communicated with the investigator by email, phone, and face-to-face visits to discuss the progress at least on a monthly basis. This data was then compared to the benchmark computerized data collected during the year of 2018 and results were organized by table form in Appendices F and G.

Staff T-TAQ survey responses were evaluated and organized in table forms based on response ratings from 0=strongly disagree to 5=strongly agree. Additional narrative responses of participants were evaluated, and common themes were extracted. The results of T-TAQ survey questionnaires were organized into tables and charts for easier visualization.

Unexpected Institutional Changes

In November 2018, an unexpected change took place, the unit lost its program director and clinical director. This change had a negative effect on unit's staff nurses. Registered nurses felt unprotected and vulnerable without the leadership's presence. Two nurses resigned, one left her position to work in the Emergency Department, and one seasoned nurse was let go. Charge nurses were noted to be under a lot of pressure managing the unit and staff. After the final approval was in place from Jacksonville University IRB, the implementation of the actual project began May 1, 2019. On day one, the nurses were invited to participate in the voluntary T-TAQ survey questionnaire which focused on team communication and effectiveness. Nursing staff gravitated to forming two solid teams, which preferred to work together in three to four-day

stretches. One group of staff volunteered to partake in the survey without hesitation, while the second group was very reluctant after the Charge Nurse questioned the potential benefit of this Quality Improvement Project to nursing staff given that all nurses felt their main issue was staffing and not communication or medication errors. The situation was diffused by educating the staff that all persons involved in direct patient care need to feel part of the team. The staff was reassured that all their opinions matter and administration was interested in their success as staff and Behavioral Health Unit as a whole.

Stakeholders Assessment

Overview. The main stakeholder for this Quality Improvement Project was the organization itself. It is comprised of Registered Nurses involved in direct patient care, who are vested in delivering safe patient care while working in a safe and cohesive environment as a team. Physicians and Advanced Practice Registered Nurses are entrusted with maintaining patient safety while delivering high-quality patient care according to National Standards of Practice. Organization's administrators are dedicated to improving patient satisfaction, increasing staff retention, and decreasing any potential for medical errors even more so, when the process of instituted safety saves cost. Finally, inpatient pharmacy takes pride in eliminating medication errors and staying in communication with treating providers and nursing staff. Organizational readiness was evident when few months prior SBAR training was provided to all medical-surgical and ICU nurses to improve and standardize staff communication.

Key facilitators. Administrative support was crucial for the success of this project. Change innovation is difficult to implement when the remaining team members do not share the vision. According to Sherwood and Barnsteiner (2017), safety compliance improves when leaders choose to engage in cooperative relationships with employees. The stakeholders for this

Quality Improvement Project were Vice President of Behavioral Health Unit, Director of Pharmacy, physicians, APRNs, RNs, and hospital administration. For eighteen months, the organization's leadership and administration have been in active correspondence with project investigator and participants throughout the duration of preparation phase, active implementation of project and evaluation period. Active implementation phase of this Quality Improvement Project took sixteen weeks. During this time, many changes took place. First, a designated pharmacist was assigned to cover inpatient psychiatric units to manage inpatient medication orders, medication reconciliation, and in-person treatment team rounding. Next, Unit Director and Clinical Nurse Manager, staff in-service sessions were set up on a monthly basis to include SBAR training over a period of three months prior to project implementation. With their support, the use of SBAR tool was encouraged and accepted as standard practice on Behavioral Health Unit for patient handoff, treatment teams, and staff communication. The identified stakeholders have been verbally supportive of the project and found the project to be beneficial not only to patients but also to the organization.

Fiscal Considerations

There were no direct costs acquired by the hospital or the unit to implement this Quality Improvement Project. The pharmacy made minor changes in allocating a dedicated pharmacist availability for Behavioral Health Unit to one hour a week for face-to-face treatment team rounding. He was otherwise available upon request by phone or email to providers and staff. Thus, the availability of the pharmacist did not cost the organization any additional expenses.

Ethical Considerations

Patients with mental illness are considered a vulnerable population, subject to an increased risk for medication noncompliance, medication errors and lack of follow-up due to

ineffective communication or poor patient judgement. This QI project was intended for a behavioral health unit and may benefit all future inpatient psychiatric patients who experience the changes of being treated in an environment of enhanced knowledge and communication through the addition of a pharmacist and in a setting of effective communication. The expectation was these changes could decrease medication errors and increase the positive communication experience of both the interdisciplinary treating team and the patient.

IRB Approval

This project was granted approval by the hospital and IRB of Jacksonville University. Its sustainability was realistic and timely given that the new standard of best practice entails integration of multiple disciplines into patient care and positively reflects bedside rounding. Moreover, the utilization of SBAR is encouraged by The Joint Commission as a tool to improve communication among staff members and thus decrease medical errors (The Joint Commission, 2015).

Evaluation

The first objective to reduce medication errors incidence rate to less than 11.35% was met. Post project implementation the incidence of medication errors was 11.06%. However, though there was an improvement, it has not proven to be statistically significant. The data was tracked and carefully monitored through centralized EMR system. A clinical pharmacist reviewed data quarterly noting that medication errors logged as 5 at benchmark, have dropped to 4 post-project implementations, and below 4 the following quarter. It is likely that improvement in communication effectiveness and availability of a designated pharmacist contributed to this change.

Second objective of adding the pharmacist to treatment team rounding was met when a designated pharmacist was integrated into the interprofessional rounding team on Behavioral Health unit. The pharmacist became a vital part of the treatment team providing guidance to patients and team on medications, side effects, interactions, and cost. He was able to provide meaningful information to providers backed by research and clinical studies. The organization further benefitted financially as the providers were more likely to choose medications currently on hospital formulary, while patients reaped the benefits of being more informed and given medications which they could afford.

Third objective was met by implementing SBAR to standardize communication among team members. Dialogue occurred in a systematic way to ensure important information was covered such as current symptoms of presenting situation, background data leading to symptoms, assessment of situation and recommendations. All treatment team participants followed this structure while engaging the patient in ongoing dialogue. This allowed the team to cover critical information in a non-threatening manner of conversation. The patient was invited to ask questions and partake in his/her own treatment plan recommendations.

Method of Analysis

Staff survey. The questionnaire offered an opportunity for nursing staff to voice their perception of communication before and after SBAR was implemented. Prior to SBAR, treatment teams utilized a method of questioning a patient to allow him/her to express what led to current admission and their progress. The team then made recommendations and the patient was encouraged to voice any questions or concerns. Through implementing SBAR, the participants were set up to function as a team as they followed a structured method of communication. TeamSTEPPS T-TAQ tool provided 30 questions targeting the nurses'

perception of teamwork and communication. The analysis became even more meaningful with the questionnaire administered before and after project implementation.

Pharmacy data. The inpatient pharmacy had a function of collecting, maintaining, and analyzing data pertaining to all medications dispensed at the hospital. This data is collected automatically as part of an established process. Electronic Medical Records computer system is defaulted to trigger an alert for the providers and pharmacists to enter the reason for discontinuing any medication. These were then reviewed by the clinical pharmacist dedicated to Quality Assurance and adjustments in processes are made accordingly. All data pertaining to patient medications was stored by the pharmacy on hospital grounds under two-password protected computer systems. Data released to the investigator was comprised of numerical values. No patient or identifiable information has been released.

Data analysis. For the purpose of this project, data gathered by the pharmacy on medication errors was statistically evaluated for mean, median, frequency, standard deviation and converted into table form to aid visualization. Moreover, statistical data was converted into graph forms, tables, and charts and was carefully interpreted using objective findings. T-TAQ surveys were administered to staff nurses pre- and post-project implementation. All nurses were encouraged to participate; however. only nine nurses filled out pre-project implementation surveys and seven nurses participated in post-project implementation surveys. The nurses were asked to submit a signed informed consent prior to participating in the survey. They were then provided two copies of the survey and asked to label both with same random number known only to them to help identify changes in teamwork and communication perception at the end of project completion.

Data collection and protection plan. Data collected from T-TAQ nursing surveys was collected through independent and voluntary nursing staff participation. Copies of surveys with instructions were made available to all nursing staff on the Behavioral Health Unit during the first week of project implementation. Staff placed completed forms in a yellow envelope at the end of the week and delivered it to the Clinical Nurse Manager. This process was repeated during the last week of project implementation phase. The surveys were stored on hospital grounds, in the office of Clinical Nurse Manager under the lock and key.

The data on medication errors was collected as part of inpatient pharmacy protocol utilizing a secure, two-password protected information technology system. This data was available only to the inpatient pharmacy team and upon completion of the project was analyzed by the Chief Clinical Pharmacist. The numerical data was then retrieved by the Clinical Pharmacist to be utilized without any identifiable patient data in this Quality Improvement Project. All data was stored on the hospital two-password protected computer system and on hospital grounds.

Findings

T-TAQ Findings

The T-TAQ survey is divided into five areas with six questions in each: team structure, leadership, situation monitoring, mutual support, and communication. Questions number 24 and 30, required inverse response. There were nine participants pre-project implementation and six at the completion of the project. Three nurses were transferred off the unit and therefore could not take the survey post project implementation. Only two surveys carried over from the pre-implementation phase. The rest of participants were nurses hired during project implementation phase and had no benchmark survey data. Since one survey could not provide statistical

significance, surveys were evaluated based on individual responses and in graph form. The results of T-TAQ surveys administered to staff prior to project implementation were notably focused more on leadership and administration's responsibility of maintaining the unit, teams, and patients safe. The responses correlated to staff feeling that the administrative arm was their external locus of control. Please refer to Appendix H, Table H1.

Following project implementation, the surveys were again administered to staff and evaluated. Improvement was noted in areas of team structure, leadership within the team, and communication. After project implementation, the responses were more consistent in identifying that each team member held the responsibility of being a team leader in caring for their patients. They identified a sense of ownership over their patient assignment and reported feeling more empowered to advocate for their patients. The most change in perception was observed in team structure and to a lesser extent the area of communication. For example, more nurses recognized poor communication as the most common cause of reported errors by rating it "strongly agree" following project implementation, than pre-implementation. Also, survey responses indicated that staff recognized the importance to have standardized method for sharing information when handing off patients as "agree" and "strongly agree" in the post project implementation phase. Overall, survey responses shifted from placing responsibility of team functionality on leadership to recognizing team members as vital parts of the effective treatment team. However, the area of mutual support and situation monitoring was noted to have acquired more negative responses from staff. This was likely a result of significant staff turnover, new staff training, and the unit losing its clinical director and program director at the same time. Please refer to Appendix H, Table H2.

Medication Data

Findings. Statistical evaluation of prescriptions by drug class revealed that compared to benchmark data, antipsychotic and SSRI use decreased, tricyclic and tetracyclic use remained unchanged, while GABA and benzodiazepine use slightly increased. The change in antipsychotic use was likely largely due to the paradigm shift incorporating more utilization of long-acting injectable antipsychotics to ensure that medication delivery continues as a steady rate over weeks or months. Dosing, monitoring, and timely medication availability was directly influenced by the pharmacist. Therefore, although the number of occupied inpatient beds remained unchanged, there was evidence of a two percent decrease in antipsychotic prescriptions. Another interesting phenomenon was observed in the use of clozapine, a medication which requires strict, continuous monitoring and national registry. Its utilization doubled. A few of the commonly used antipsychotics remained unchanged from baseline to include lurasidone, quetiapine, paliperidone, and ziprasidone. The two most common tricyclic antidepressants were noted to change direction in the rate of their use on inpatient basis; amitriptyline frequency more than doubled, while doxepin utilization decreased from 58 to 14 percent. Tetracyclic antidepressant numbers showed no change. There was noted a decrease in most antidepressant prescriptions: of these paroxetine use decreased by 50 percent. Citalopram and escitalopram prescriptions were the only two noted to display an increase of 6 percent and 10 percent, respectively. The decrease in benzodiazepine prescriptions was most appreciated in the 9 percent decrease of lorazepam. In opposition to that, chlordiazepoxide utilization increased by 11 percent. This change was likely triggered by an increase in alcohol withdrawal cases admitted for inpatient care. Please refer to Appendix F.

Analysis. Prescribed medications before and after the intervention were summarized by drug class in Table 1. In total, there were 6617 prescriptions. Among those, 3800 (57.4%) were prescribed before the intervention between May and July 2018; and 2817 (42.6%) after the intervention between May and July 2019. The antipsychotic medications represented 54.5% of the total prescriptions followed by benzodiazepine and GABA receptors (30.4%), and SSRI (11.1%). The distribution of prescribed medications by period of intervention and class are summarized in Appendix G. The results displayed here show similar distributions of the number of prescriptions between pre- and post-periods.

During the study period, there were nine medication errors reported, five during the pre-intervention period and four during the post intervention period. The percentages of medication errors were 0.13% (100 x 5/3800) at pre-intervention period and 0.14% (100 x 4/2817) which occurred during project implementation period. The difference between the two percentages was not found to be statistically significant using Fisher's exact test at 5% significance level (i.e. p-value= 0.7524 > 0.05). The incidence rates of medication errors per 100 prescription-years are summarized in Table 1.

Table 1

Incidence Rate of Medication Errors per 100 Prescription-Years

Period	Number of medication errors	Number of prescriptions	Total Exposure (in Days)	Percent (%)	Incidence Rate (%)
Pre	5	16084	16084	0.13	11.35
Post	4	13205	13205	0.14	11.06

Percent (%) = 100 x Number of medication errors / Number of prescriptions

Incidence rates of medication errors were calculated per 100 prescription-years.

Incidence rate (%) = 100 x Number of medication errors x 365.25/ Total Exposure

Total exposure was calculated as the total duration of prescription

As shown in Table 1, the estimated incidence rate of medication errors at pre-intervention period was approximately ~11 errors per 100 prescription-years compared at both pre- and post-intervention periods. The test for the difference between the two incidence rates was not found to be statistically significant using Wald Chi-square test (see Table 2)

Table 2

Test for the Difference between Pre- and Post- Incidence Rates of Medication Errors

Period	Incidence Rate (%)	StdErr	95% Lower	95% Upper	P-value	Significantly Different
Pre	11.35	5.078	4.73	27.28		
Post	11.06	5.532	4.15	29.48		

Period	Incidence Rate (%)	StdErr	95% Lower	95% Upper	P-value	Significantly Different
Difference (Post – Pre)	-0.29	7.509	-14.43	15.01	0.9691	No

StdErr: Standard error

Incidence rates of medication errors were calculated per 100 prescription-years.

Test for difference between pre and post incidence rate was conducted using Wald Chi-square test at 5% significance level.

Conclusion. The results did not show evidence of statistically significant reduction of medication errors at the post-intervention period compared to the pre-intervention period likely due to the numerous changes in staffing taking place on the unit.

SBAR Implication Findings

The effects of SBAR application to clinical setting of Behavioral Health were observed on many levels. First, direct staff communication among nurses and interdisciplinary team members became more organized and goal oriented. This was directly reflected in treatment teams. These became more goal-oriented, concise and took less time to cover the vital information effectively. Second, nurses were able to utilize SBAR during patient handoff at the end of the shift. This created a systematic approach to their communication, and the process was reproducible regardless of patient needs, diagnosis, or presentation. Third, organizing information according to Situation, Background, Assessment and Recommendation model gave staff more voice power when communicating with providers during the night or when facing an emergency. Presenting the essence of situation at hand using SBAR format took no more than two minutes allowing for faster and efficient resolution of situation. Through the process of

using SBAR tool, interprofessional perception of effective communication was improved as evidenced by T-TAQ survey results.

Sustainability

The proposed change was highly sustainable throughout disciplines involved in patient care. Improved communication resulted in nurses having more time with their patients, creating dialogue among interdisciplinary teams in the presence of a patient, and the plan of care remained clear throughout the patient's hospital stay. Moreover, this practice has already been established in healthcare as evidence-based and effective.

Dissemination of Results

The results of this Quality Improvement project were presented to the hospital stakeholders during monthly provider meeting during a round table discussion allowing for questions, comments, and constructive critique. In collaboration with the hospital's leadership and administration arm, appropriate changes in the newly established interdisciplinary team rounding were implemented to include the physical presence of a designated pharmacist during treatment team rounding as effective and safe practice. The staff was again encouraged to maintain their communication of patient care in SBAR format to maintain consistency and information flow. Finally, an article manuscript was submitted for publication to American Journal of Nursing, whose mission is to enhance nursing practice, promote excellence in healthcare through the dissemination of evidence-based, peer-reviewed clinical research relevant to current practice and patient-centered care.

Conclusion

Change is rarely welcomed by the staff who had been accustomed to already established routine. Many nurses have worked in their positions from the birth of current Behavioral Health

Unit and felt content with care delivery and processes. Most of them were seasoned Registered Nurses, who did not see the need for change in their practice. Younger nurses, however, welcomed integration of a pharmacist and implementation of standardized communication. Help and support came from the unit director and Vice President of the Behavioral Health Unit. The staff were educated on the importance of standardized communication during their interaction with patient, providers, and other staff members. Leadership and administration not only encouraged, but modeled utilization of SBAR on the unit.

Based on the statistical data collected during this Quality Improvement Project, few elements were uncovered. First, medication error incidence rate decreased after project implementation. According to statistical analysis the change was minimal, measured at 0.29%. Nonetheless, there was clear evidence of decrease in the number of psychotropics used to stabilize the same number of patients. There has been no statistically significant improvement in medication error reduction pre-project implementation and throughout its duration, with P-value calculated at 0.9691. However, medication error rate during the quarter following project implementation, has decreased to 3.27 per 1000 patient days. This is strongly indicative that if the project duration were extended, a more positive trajectory could be evident in communication and adverse drug events improvement. Moreover, the review of adverse drug events categorized into medication errors during the duration of this Quality Improvement Project, revealed, that these were adverse reactions to the medication itself rather than a mistake by staff, system, or organization. Second, as a result of this project, the unit has built a growing relationship with the inpatient pharmacy and established open lines of communication among disciplines and staff members. At three months post project intervention, the pharmacist was no longer present for all interdisciplinary team rounding but remained readily available both by phone and in person.

Based on staff surveys, at the end of the project, nurses felt more empowered, had improved sense of belonging and stronger communication skills. Second, the SBAR communication technique was maintained by the staff and organization as a guide for structured and effective information delivery. Incoming medical residents and nursing students now receive thorough education on its utilization prior to presenting their cases to providers and staff. It is utilized on Behavioral Health Unit and throughout the organization. Finally, this Quality Improvement project opened the door to great potential of elevating current practice and standards of care in accordance to evidence-based practice. This was reflected on greater patient and staff satisfaction measures by patient and staff surveys.

Recommendations

Extend Implementation Phase

A recommendation should be made to extend this project and data collection for a minimum of six to twelve months in order to better assess the trend of medication errors. The duration of this project was twelve weeks, allowing a brief time for implementation of change. Statistical analysis showed minimal improvement in incidence of medication errors translated to one less medication error during project implementation period. It was noted that the decrease in medication errors continued to be evident during the following three months, though the project data collection ceased. Furthermore, type of medication errors should be carefully assessed. For example, it was noted that during the implementation phase of the project, all medication errors were defined as “adverse drug reaction” and “allergic reaction” rather than erroneous mistake of the system or staff member. It would be beneficial to assess for root causes for all documented adverse drug reactions or medication errors. This can be guided by the type of medication error

and description of documented event. Moreover, staff should be periodically educated on medication updates. Organization would benefit from involving nurses, providers and even patients in medication education, documentation, and safe processes of maintaining an updated medication list at admission and discharge.

Presence of Dedicated Pharmacist

Adding a pharmacist during treatment team rounding would elevate the level of care at this facility, a practice change which has already been successfully implemented by other healthcare organizations and is heavily supported by research evidence. For example, a recent evidence-based clinical research review confirmed that there is significant benefit of direct pharmacist intervention in relationship to improved patient outcome and even reduction of re-hospitalizations (Van der Linded, et al., 2020). The change implemented by this Quality Improvement Project carried no cost or expense to the organization. Therefore, continuing the implemented change of interdisciplinary rounding with pharmacist, will incur no cost to facility or organization. It does not require additional space, equipment, or staff. However, given that the designated pharmacist covers two more units, he cannot be available in person for rounding daily. Thus, an opportunity exists to create a full-time position for a dedicated pharmacy for inpatient Behavioral Health Unit. This would allow the pharmacist to engage in patient cases, round with interdisciplinary teams, lead medication-focused groups on the unit, monitor medications, perform medication reconciliation, and serve as an expert resource for providers, patients, and staff.

Financial Opportunities

The cost of designating a pharmacist to be present during interdisciplinary rounding has been estimated at $33,750 if a pharmacist spent three hours on Behavioral Health Unit three

times a week. However, the cost savings potentiated by implementing a pharmacist into interdisciplinary team rounding far supersedes the cost. For example, if an average length of stay is currently at 6.25 days; then at a cost of $2,500 per day and an average daily census of 27 patients, the healthcare facility should be collecting $637,500 yearly. However, given that up to 20 percent of mental health patients are uninsured and readmission rate is as high as seven to ten percent within the subsequent thirty-day period, the organization loses 27-30% of its profit or $6,652,125 dollars yearly. As described earlier, statistical data suggests that permanent addition of a pharmacist to interdisciplinary rounding not only decreases medication errors, but also decreases patient readmission rates due to patients are better educated about their medications and treatment regimen. Therefore, if the readmission rate were decreased by three percent, it would yield a potential cost saving of $739,125 yearly.

Summary

Adding a dedicated pharmacist as an active participant of interdisciplinary teams is a cost-effective strategy to continue working on reducing medication errors, ensure accurate medication reconciliation, provide expertise on emerging medications, and maintain open communication with the treating team. The findings of this Quality Improvement Project support that active participation of a pharmacist during treatment team rounding improved communication among interdisciplinary participants and increased patient engagement in their care. SBAR communication maintained by the staff and organization serves as a guide for structured and effective information delivery. Moreover, at the completion of the project, nurses reported improved sense of belonging, engagement and ownership contributing to improved teamwork cohesiveness.

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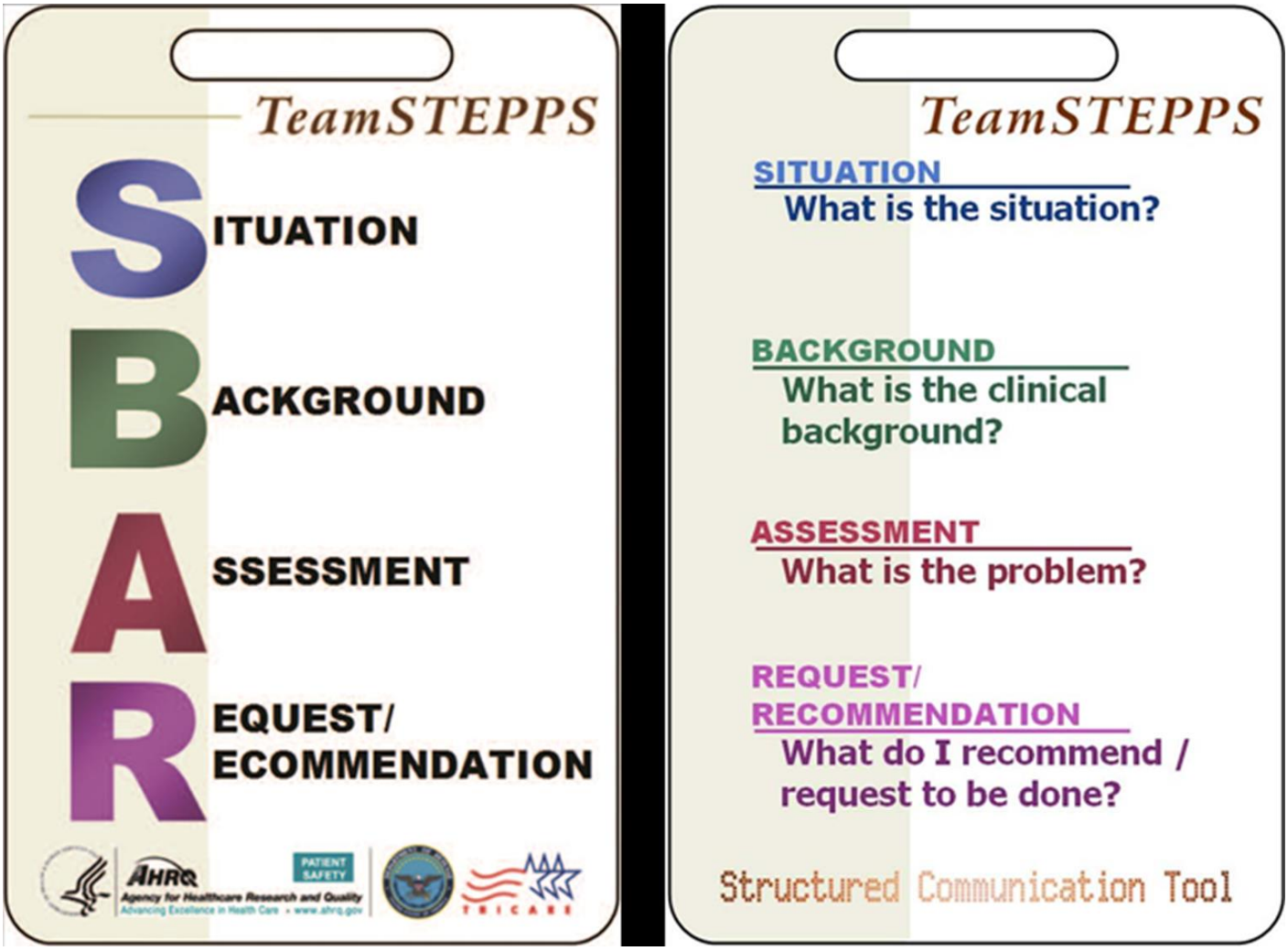
Appendix A

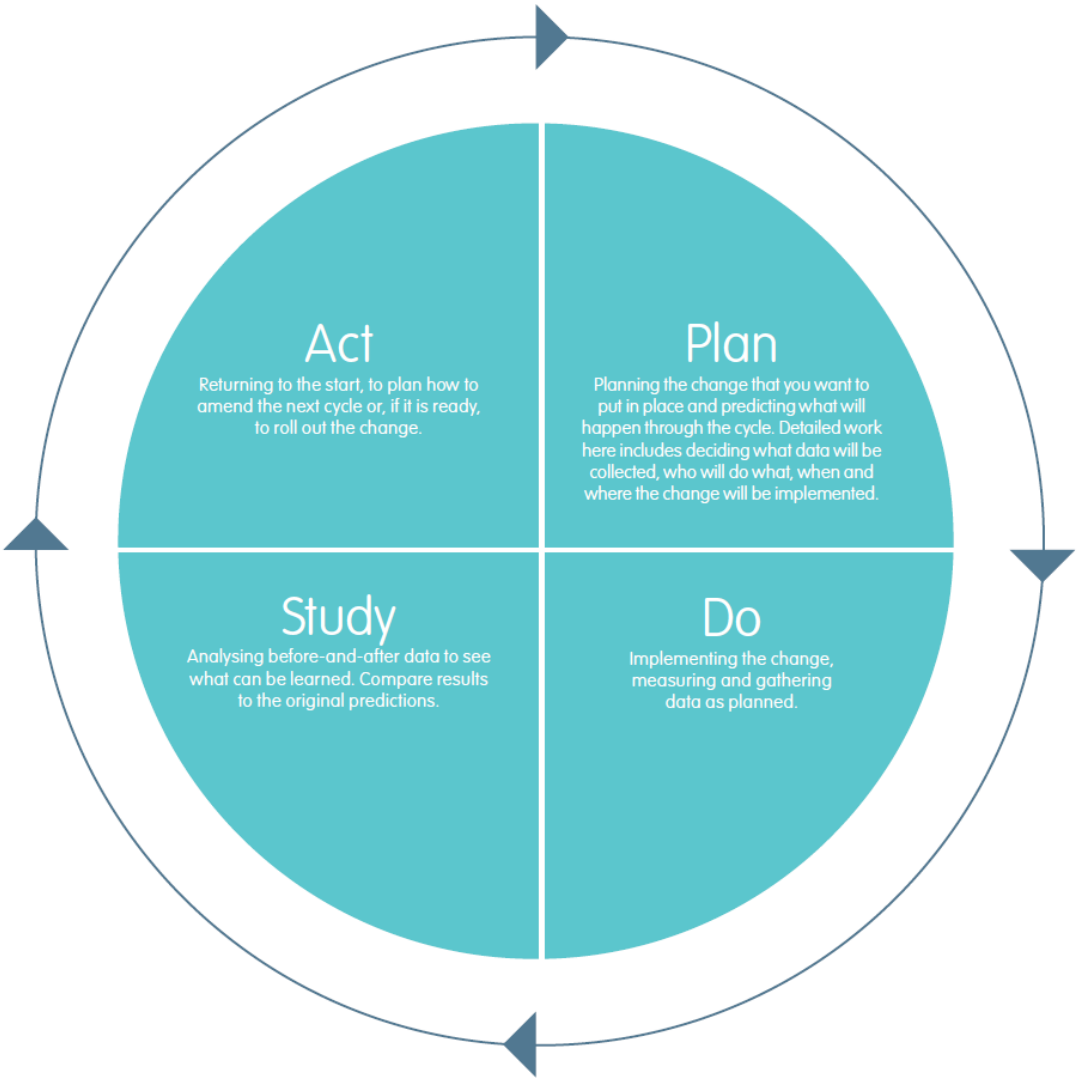
SBAR Tool

(IHI, 2018)



Appendix B

AIMS Model for Improvement



AIMS Model for Improvement
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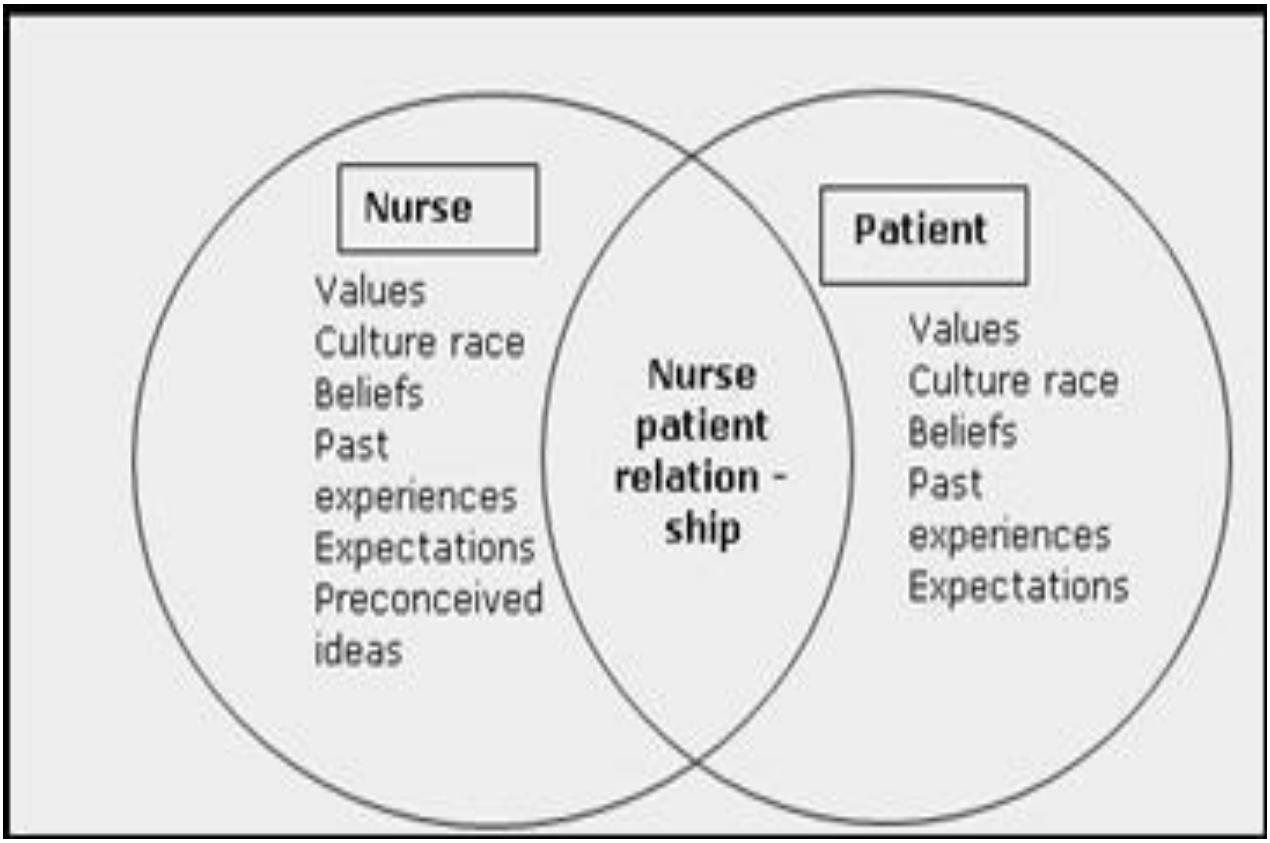
Appendix C

Peplau's Interrelationship Theory



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Appendix D

T-TAQ Survey Questionnaire

Teamwork Attitudes Questionnaire (T-TAQ)

TeamSTEPPS® Instructor Manual

Instructions: Please respond to the questions below by placing a check mark (√) in the box that corresponds to your level of agreement from *Strongly Agree* to *Strongly Disagree*. Please select only one response for each question.

Team Structure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. It is important to ask patients and their families for feedback regarding patient care.					
2. Patients are a critical component of the care team.					
3. This facility's administration influences the success of direct care teams.					
4. A team's mission is of greater value than the goals of individual team members.					
5. Effective team members can anticipate the needs of other team members.					

6. High performing teams in health care share common characteristics with high performing teams in other industries.					
Leadership	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
7. It is important for leaders to share information with team members.					
8. Leaders should create informal opportunities for team members to share information.					
9. Effective leaders view honest mistakes as meaningful learning opportunities.					
10. It is a leader's responsibility to model appropriate team behavior.					
11. It is important for leaders to take time to discuss with their team members plans for each patient.					
12. Team leaders should ensure that team members help each other out when necessary.					

Situation Monitoring	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. Individuals can be taught how to scan the environment for important situational cues.					
14. Monitoring patients provides an important contribution to effective team performance.					
15. Even individuals who are not part of the direct care team should be encouraged to scan for and report changes in patient status.					
16. It is important to monitor the emotional and physical status of other team members.					
17. It is appropriate for one team member to offer assistance to another who may be too tired or stressed to perform a task.					
18. Team members who monitor their emotional and physical status on the job are more effective.					
Mutual Support	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

19. To be effective, team members should understand the work of their fellow team members.					
20. Asking for assistance from a team member is a sign that an individual does not know how to do his/her job effectively.					
21. Providing assistance to team members is a sign that an individual does not have enough work to do.					
22. Offering to help a fellow team member with his/her individual work tasks is an effective tool for improving team performance.					
23. It is appropriate to continue to assert a patient safety concern until you are certain that it has been heard.					
24. Personal conflicts between team members do not affect patient safety.					
Communication	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

25. Teams that do not communicate effectively significantly increase their risk of committing errors.					
26. Poor communication is the most common cause of reported errors.					
27. Adverse events may be reduced by maintaining an information exchange with patients and their families.					
28. I prefer to work with team members who ask questions about information I provide.					
29. It is important to have a standardized method for sharing information when handing off patients.					
30. It is nearly impossible to train individuals how to be better communicators.					

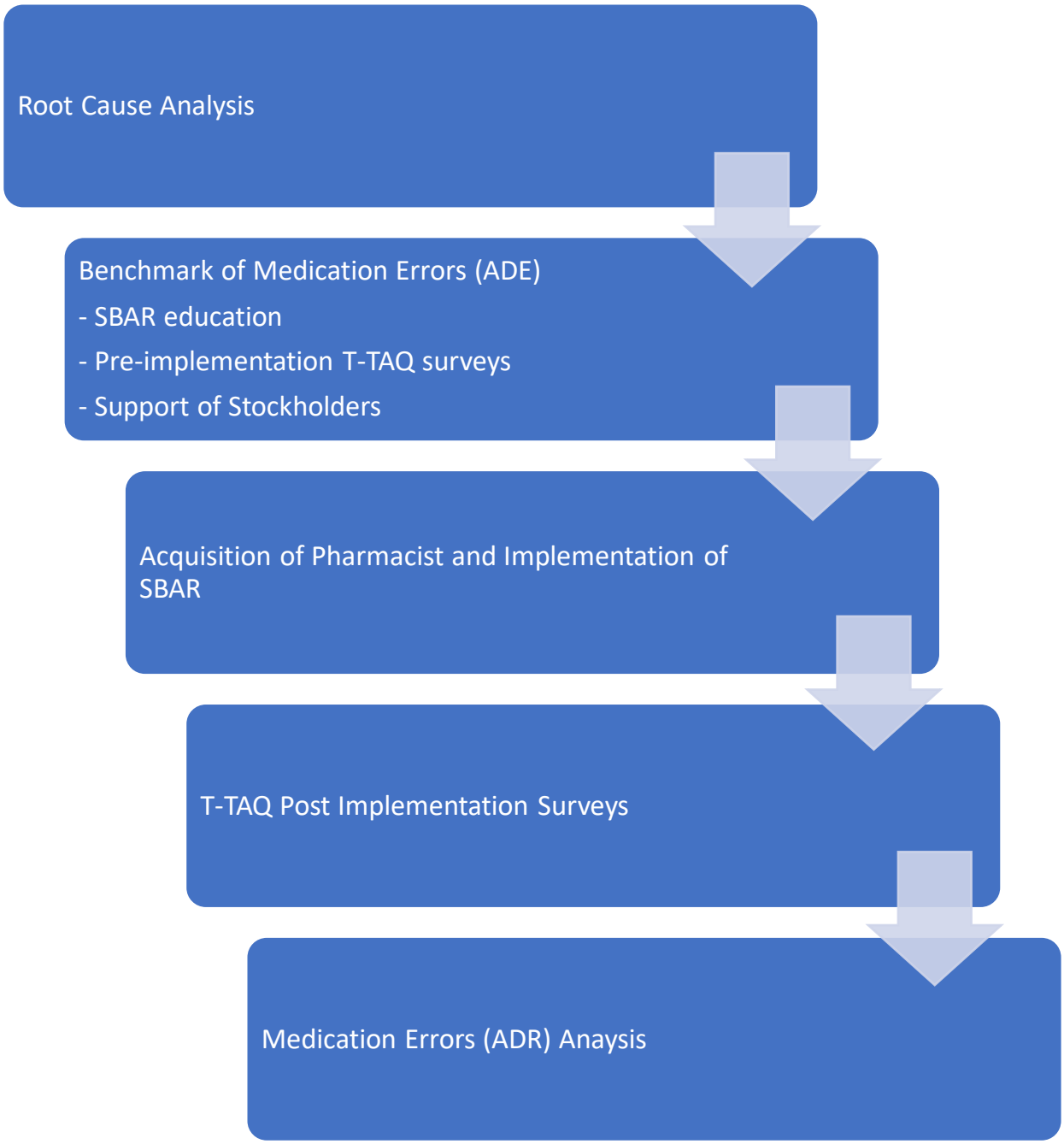
Please provide any additional comments in the space below.

Thank you for your participation!

Teamwork Attitudes Questionnaire (T-TAQ). Content last reviewed April 2017. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/teamstepps/instructor/reference/teamattitude.html

Appendix E

Project Evolvement Process



Appendix F

Statistical Analysis of Psychotropic Medications

Table F1 Summary of Treatment Duration (in days) by Treatment Class and Intervention Period

	Intervention Period		
	Pre	Post	
Variable	May-July 2018	May-July 2019	Total
Antipsychotics			
n	2106	1503	3609
Mean (SD)	4.75 (5.159)	5.41 (9.167)	5.03 (7.115)
Median	3.00	3.00	3.00
Min - Max	0.00 - 64.00	0.00 - 131.00	0.00 - 131.00
Benzodiazepine and GABA			
n	1126	887	2013
Mean (SD)	3.54 (3.656)	3.76 (4.937)	3.64 (4.268)
Median	2.00	2.00	2.00
Min - Max	0.00 - 37.00	0.00 - 79.00	0.00 - 79.00
SSRI			
n	448	293	741
Mean (SD)	3.40 (2.597)	3.82 (3.398)	3.57 (2.945)
Median	3.00	3.00	3.00
Min - Max	0.00 - 21.00	0.00 - 30.00	0.00 - 30.00
Tetracyclic Antidepressants			
n	101	98	199
Mean (SD)	4.59 (4.243)	4.95 (3.307)	4.77 (3.805)
Median	4.00	4.00	4.00
Min - Max	1.00 - 36.00	1.00 - 19.00	1.00 - 36.00
Tricyclic Antidepressants			
n	19	36	55
Mean (SD)	5.32 (3.181)	3.53 (1.828)	4.15 (2.505)
Median	4.00	3.00	3.00
Min - Max	1.00 - 12.00	1.00 - 10.00	1.00 - 12.00
Overall			
n	3800	2817	6617
Mean (SD)	4.23 (4.517)	4.69 (7.400)	4.43 (5.922)
Median	3.00	3.00	3.00
Min - Max	0.00 - 64.00	0.00 - 131.00	0.00 - 131.00

N/R: not Reported, % = 100 x (n/N)

Table F1 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
Tetracyclic Antidepressants

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Mirtazapine			
n	101	98	199
Mean (SD)	4.59 (4.243)	4.95 (3.307)	4.77 (3.805)
Median	4.00	4.00	4.00
Min - Max	1.00 - 36.00	1.00 - 19.00	1.00 - 36.00

N/R: not Reported, % = 100 x (n/N)

Table F2 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
Antipsychotics

Variable	Intervention Period: Pre May-July 2018	Intervention Period: Post May-July 2019	Total
Aripiprazole			
n	102	103	205
Mean (SD)	4.43 (5.532)	3.97 (4.023)	4.20 (4.827)
Median	3.00	3.00	3.00
Min - Max	1.00 - 36.00	1.00 - 28.00	1.00 - 36.00
Chlorpromazine			
n	75	95	170
Mean (SD)	4.69 (6.932)	7.66 (16.589)	6.35 (13.277)
Median	3.00	3.00	3.00
Min - Max	1.00 - 55.00	1.00 - 131.00	1.00 - 131.00
Clozapine			
n	26	28	54
Mean (SD)	7.46 (9.880)	5.71 (4.860)	6.56 (7.672)
Median	4.00	4.00	4.00
Min - Max	1.00 - 47.00	1.00 - 17.00	1.00 - 47.00
Fluphenazine			
n	35	17	52
Mean (SD)	2.80 (3.333)	7.18 (8.286)	4.23 (5.765)
Median	1.00	4.00	1.50
Min - Max	1.00 - 16.00	1.00 - 29.00	1.00 - 29.00
Haloperidol			
n	365	282	647
Mean (SD)	4.43 (5.342)	5.09 (7.853)	4.72 (6.559)
Median	3.00	3.00	3.00
Min - Max	1.00 - 64.00	1.00 - 83.00	1.00 - 83.00
Loxapine			
n	2	12	14
Mean (SD)	3.00 (2.828)	4.42 (2.875)	4.21 (2.806)
Median	3.00	4.00	4.00
Min - Max	1.00 - 5.00	1.00 - 10.00	1.00 - 10.00
Lurasidone			
n	35	34	69
Mean (SD)	2.69 (2.233)	7.82 (20.251)	5.22 (14.429)
Median	2.00	3.50	3.00
Min - Max	1.00 - 12.00	0.00 - 121.00	0.00 - 121.00
Olanzapine			
n	857	541	1398
Mean (SD)	5.34 (4.247)	5.43 (8.739)	5.37 (6.370)

N/R: not Reported, % = 100 x (n/N)

Table F2 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
Antipsychotics

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Median	4.00	4.00	4.00
Min - Max	1.00 - 38.00	1.00 - 131.00	1.00 - 131.00
Paliperidone			
n	125	87	212
Mean (SD)	6.69 (10.501)	8.70 (12.634)	7.51 (11.439)
Median	1.00	1.00	1.00
Min - Max	0.00 - 31.00	0.00 - 45.00	0.00 - 45.00
Perphenazine			
n	8		8
Mean (SD)	4.75 (2.765)		4.75 (2.765)
Median	4.00		4.00
Min - Max	1.00 - 9.00		1.00 - 9.00
Quetiapine			
n	263	173	436
Mean (SD)	3.82 (3.515)	4.31 (5.690)	4.01 (4.506)
Median	3.00	3.00	3.00
Min - Max	1.00 - 25.00	1.00 - 57.00	1.00 - 57.00
Risperidone			
n	135	77	212
Mean (SD)	3.73 (2.514)	4.56 (6.051)	4.03 (4.167)
Median	3.00	3.00	3.00
Min - Max	1.00 - 15.00	1.00 - 52.00	1.00 - 52.00
Thiothixene			
n		6	6
Mean (SD)		3.00 (1.549)	3.00 (1.549)
Median		3.00	3.00
Min - Max		1.00 - 5.00	1.00 - 5.00
Trifluoperazine			
n	5		5
Mean (SD)	3.20 (1.924)		3.20 (1.924)
Median	3.00		3.00
Min - Max	1.00 - 6.00		1.00 - 6.00
Ziprasidone			
n	73	48	121
Mean (SD)	3.05 (3.419)	3.25 (2.188)	3.13 (2.983)
Median	1.00	3.00	2.00
Min - Max	1.00 - 19.00	1.00 - 11.00	1.00 - 19.00

N/R: not Reported, % = 100 x (n/N)

Table F3 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
Benzodiazepine and GABA Receptors

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Alprazolam			
n	34	31	65
Mean (SD)	2.44 (1.501)	2.35 (1.723)	2.40 (1.599)
Median	2.00	2.00	2.00
Min - Max	1.00 - 7.00	1.00 - 7.00	1.00 - 7.00
Chlordiazepoxide			
n	11	108	119
Mean (SD)	1.82 (0.405)	1.81 (1.415)	1.82 (1.353)
Median	2.00	2.00	2.00
Min - Max	1.00 - 2.00	0.00 - 10.00	0.00 - 10.00
Clonazepam			
n	144	101	245
Mean (SD)	3.98 (3.918)	3.84 (4.460)	3.92 (4.142)
Median	3.00	2.00	3.00
Min - Max	1.00 - 35.00	0.00 - 31.00	0.00 - 35.00
Diazepam			
n	34	10	44
Mean (SD)	1.59 (0.925)	3.80 (2.530)	2.09 (1.696)
Median	1.00	3.00	1.00
Min - Max	0.00 - 4.00	1.00 - 8.00	0.00 - 8.00
Lorazepam			
n	834	578	1412
Mean (SD)	3.53 (3.495)	4.19 (5.598)	3.80 (4.487)
Median	2.00	3.00	2.00
Min - Max	1.00 - 35.00	1.00 - 79.00	1.00 - 79.00
Midazolam			
n	1	2	3
Mean (SD)	1.00 (.)	1.00 (0.000)	1.00 (0.000)
Median	1.00	1.00	1.00
Min - Max	1.00 - 1.00	1.00 - 1.00	1.00 - 1.00
Temazepam			
n	8	13	21
Mean (SD)	3.13 (0.991)	3.08 (2.431)	3.10 (1.972)

N/R: not Reported, % = 100 x (n/N)

Table F3 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
Benzodiazepine and GABA Receptors

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Median	3.00	2.00	3.00
Min - Max	2.00 - 5.00	1.00 - 9.00	1.00 - 9.00
Zolpidem			
n	48	44	92
Mean (SD)	5.73 (6.565)	4.05 (3.382)	4.92 (5.327)
Median	3.00	3.00	3.00
Min - Max	1.00 - 37.00	1.00 - 17.00	1.00 - 37.00

N/R: not Reported, % = 100 x (n/N)

Table F4 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
SSRI

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Citalopram			
n	74	67	141
Mean (SD)	3.47 (2.342)	3.54 (3.173)	3.50 (2.758)
Median	3.00	3.00	3.00
Min - Max	1.00 - 11.00	0.00 - 19.00	0.00 - 19.00
Escitalopram			
n	4	0	4
Mean (SD)	3.25 (2.630)		3.25 (2.630)
Median	3.00		3.00
Min - Max	1.00 - 6.00		1.00 - 6.00
Escitalopram			
n	2	29	31
Mean (SD)	1.50 (0.707)	3.48 (2.487)	3.35 (2.457)
Median	1.50	3.00	3.00
Min - Max	1.00 - 2.00	1.00 - 13.00	1.00 - 13.00
Fluoxetine			
n	191	113	304
Mean (SD)	3.55 (2.556)	4.10 (3.953)	3.75 (3.153)
Median	3.00	4.00	3.00
Min - Max	1.00 - 21.00	0.00 - 30.00	0.00 - 30.00
Fluvoxamine			
n	1		1
Mean (SD)	6.00 (.)		6.00 (.)
Median	6.00		6.00
Min - Max	6.00 - 6.00		6.00 - 6.00
Paroxetine			
n	28	8	36
Mean (SD)	2.04 (1.071)	4.38 (5.630)	2.56 (2.863)
Median	2.00	2.50	2.00
Min - Max	0.00 - 4.00	1.00 - 18.00	0.00 - 18.00
Sertraline			
n	148	76	224
Mean (SD)	3.45 (2.914)	3.72 (2.686)	3.54 (2.836)
Median	3.00	3.00	3.00
Min - Max	0.00 - 19.00	1.00 - 17.00	0.00 - 19.00

N/R: not Reported, % = 100 x (n/N)

Table F5 Summary of Treatment Duration (in days) by Drug Name and Intervention Period
Tricyclic Antidepressants

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Amitriptyline			
n	6	26	32
Mean (SD)	4.83 (3.488)	3.27 (1.218)	3.56 (1.883)
Median	3.00	3.00	3.00
Min - Max	2.00 - 11.00	1.00 - 6.00	1.00 - 11.00
Doxepin			
n	11	5	16
Mean (SD)	5.55 (3.387)	5.60 (3.362)	5.56 (3.265)
Median	5.00	5.00	5.00
Min - Max	1.00 - 12.00	2.00 - 10.00	1.00 - 12.00
Imipramine			
n	1	2	3
Mean (SD)	7.00 (.)	2.50 (0.707)	4.00 (2.646)
Median	7.00	2.50	3.00
Min - Max	7.00 - 7.00	2.00 - 3.00	2.00 - 7.00
Nortriptyline			
n	1	3	4
Mean (SD)	4.00 (.)	3.00 (2.000)	3.25 (1.708)
Median	4.00	3.00	3.50
Min - Max	4.00 - 4.00	1.00 - 5.00	1.00 - 5.00

N/R: not Reported, % = 100 x (n/N)

Table F6 Summary of Treatment Duration (in days) by Drug Name and Intervention Period Overall

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Alprazolam			
n	34	31	65
Mean (SD)	2.44 (1.501)	2.35 (1.723)	2.40 (1.599)
Median	2.00	2.00	2.00
Min - Max	1.00 - 7.00	1.00 - 7.00	1.00 - 7.00
Amitriptyline			
n	6	26	32
Mean (SD)	4.83 (3.488)	3.27 (1.218)	3.56 (1.883)
Median	3.00	3.00	3.00
Min - Max	2.00 - 11.00	1.00 - 6.00	1.00 - 11.00
Aripiprazole			
n	102	103	205
Mean (SD)	4.43 (5.532)	3.97 (4.023)	4.20 (4.827)
Median	3.00	3.00	3.00
Min - Max	1.00 - 36.00	1.00 - 28.00	1.00 - 36.00
Chlordiazepoxide			
n	11	108	119
Mean (SD)	1.82 (0.405)	1.81 (1.415)	1.82 (1.353)
Median	2.00	2.00	2.00
Min - Max	1.00 - 2.00	0.00 - 10.00	0.00 - 10.00
Chlorpromazine			
n	75	95	170
Mean (SD)	4.69 (6.932)	7.66 (16.589)	6.35 (13.277)
Median	3.00	3.00	3.00
Min - Max	1.00 - 55.00	1.00 - 131.00	1.00 - 131.00
Citalopram			
n	74	67	141
Mean (SD)	3.47 (2.342)	3.54 (3.173)	3.50 (2.758)
Median	3.00	3.00	3.00
Min - Max	1.00 - 11.00	0.00 - 19.00	0.00 - 19.00
Clonazepam			
n	144	101	245
Mean (SD)	3.98 (3.918)	3.84 (4.460)	3.92 (4.142)
Median	3.00	2.00	3.00

Table F6 Summary of Treatment Duration (in days) by Drug Name and Intervention Period Overall

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Mean (SD)	6.00 (.)		6.00 (.)
Median	6.00		6.00
Min - Max	6.00 - 6.00		6.00 - 6.00
Haloperidol			
n	365	282	647
Mean (SD)	4.43 (5.342)	5.09 (7.853)	4.72 (6.559)
Median	3.00	3.00	3.00
Min - Max	1.00 - 64.00	1.00 - 83.00	1.00 - 83.00
Imipramine			
n	1	2	3
Mean (SD)	7.00 (.)	2.50 (0.707)	4.00 (2.646)
Median	7.00	2.50	3.00
Min - Max	7.00 - 7.00	2.00 - 3.00	2.00 - 7.00
Lorazepam			
n	834	578	1412
Mean (SD)	3.53 (3.495)	4.19 (5.598)	3.80 (4.487)
Median	2.00	3.00	2.00
Min - Max	1.00 - 35.00	1.00 - 79.00	1.00 - 79.00
Loxapine			
n	2	12	14
Mean (SD)	3.00 (2.828)	4.42 (2.875)	4.21 (2.806)
Median	3.00	4.00	4.00
Min - Max	1.00 - 5.00	1.00 - 10.00	1.00 - 10.00
Lurasidone			
n	35	34	69
Mean (SD)	2.69 (2.233)	7.82 (20.251)	5.22 (14.429)
Median	2.00	3.50	3.00
Min - Max	1.00 - 12.00	0.00 - 121.00	0.00 - 121.00

N/R: not Reported, % = 100 x (n/N)

Table F6 Summary of Treatment Duration (in days) by Drug Name and Intervention Period

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Midazolam			
n	1	2	3
Mean (SD)	1.00 (.)	1.00 (0.000)	1.00 (0.000)
Median	1.00	1.00	1.00
Min - Max	1.00 - 1.00	1.00 - 1.00	1.00 - 1.00
Mirtazapine			
n	101	98	199
Mean (SD)	4.59 (4.243)	4.95 (3.307)	4.77 (3.805)
Median	4.00	4.00	4.00
Min - Max	1.00 - 36.00	1.00 - 19.00	1.00 - 36.00
Nortriptyline			
n	1	3	4
Mean (SD)	4.00 (.)	3.00 (2.000)	3.25 (1.708)
Median	4.00	3.00	3.50
Min - Max	4.00 - 4.00	1.00 - 5.00	1.00 - 5.00
Olanzapine			
n	857	541	1398
Mean (SD)	5.34 (4.247)	5.43 (8.739)	5.37 (6.370)
Median	4.00	4.00	4.00
Min - Max	1.00 - 38.00	1.00 - 131.00	1.00 - 131.00
Paliperidone			
n	125	87	212
Mean (SD)	6.69 (10.501)	8.70 (12.634)	7.51 (11.439)
Median	1.00	1.00	1.00
Min - Max	0.00 - 31.00	0.00 - 45.00	0.00 - 45.00
Paroxetine			
n	28	8	36
Mean (SD)	2.04 (1.071)	4.38 (5.630)	2.56 (2.863)
Median	2.00	2.50	2.00
Min - Max	0.00 - 4.00	1.00 - 18.00	0.00 - 18.00
Perphenazine			
n	8		8
Mean (SD)	4.75 (2.765)		4.75 (2.765)
Median	4.00		4.00
Min - Max	1.00 - 9.00		1.00 - 9.00
Quetiapine			
n	263	173	436
Mean (SD)	3.82 (3.515)	4.31 (5.690)	4.01 (4.506)

N/R: not Reported, % = 100 x (n/N)

Table F6 Summary of Treatment Duration (in days) by Drug Name and Intervention Period Overall

	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Median	3.00	3.00	3.00
Min - Max	1.00 - 25.00	1.00 - 57.00	1.00 - 57.00
Risperidone			
n	135	77	212
Mean (SD)	3.73 (2.514)	4.56 (6.051)	4.03 (4.167)
Median	3.00	3.00	3.00
Min - Max	1.00 - 15.00	1.00 - 52.00	1.00 - 52.00
Sertraline			
n	148	76	224
Mean (SD)	3.45 (2.914)	3.72 (2.686)	3.54 (2.836)
Median	3.00	3.00	3.00
Min - Max	0.00 - 19.00	1.00 - 17.00	0.00 - 19.00
Temazepam			
n	8	13	21
Mean (SD)	3.13 (0.991)	3.08 (2.431)	3.10 (1.972)
Median	3.00	2.00	3.00
Min - Max	2.00 - 5.00	1.00 - 9.00	1.00 - 9.00
Thiothixene			
n	0	6	6
Mean (SD)		3.00 (1.549)	3.00 (1.549)
Median		3.00	3.00
Min - Max		1.00 - 5.00	1.00 - 5.00
Trifluoperaz			
n	5	0	5
Mean (SD)	3.20 (1.924)		3.20 (1.924)
Median	3.00		3.00
Min - Max	1.00 - 6.00		1.00 - 6.00
Ziprasidone			
n	73	48	121
Mean (SD)	3.05 (3.419)	3.25 (2.188)	3.13 (2.983)
Median	1.00	3.00	2.00
Min - Max	1.00 - 19.00	1.00 - 11.00	1.00 - 19.00
Zolpidem			
n	48	44	92
Mean (SD)	5.73 (6.565)	4.05 (3.382)	4.92 (5.327)
Median	3.00	3.00	3.00
Min - Max	1.00 - 37.00	1.00 - 17.00	1.00 - 37.00

N/R: not Reported, % = 100 x (n/N)

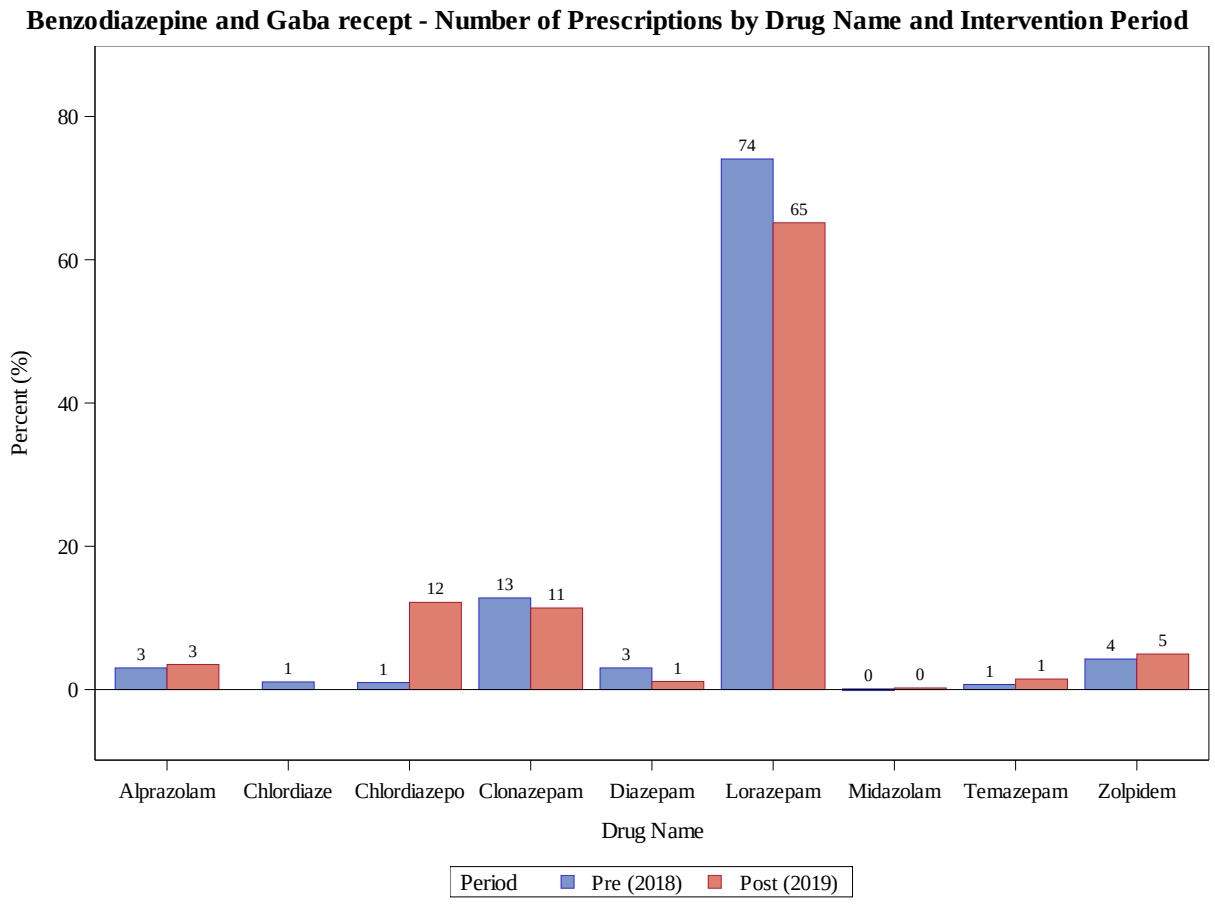
Table F6 Summary of Treatment Duration (in days) by Drug Name and Intervention Period Overall

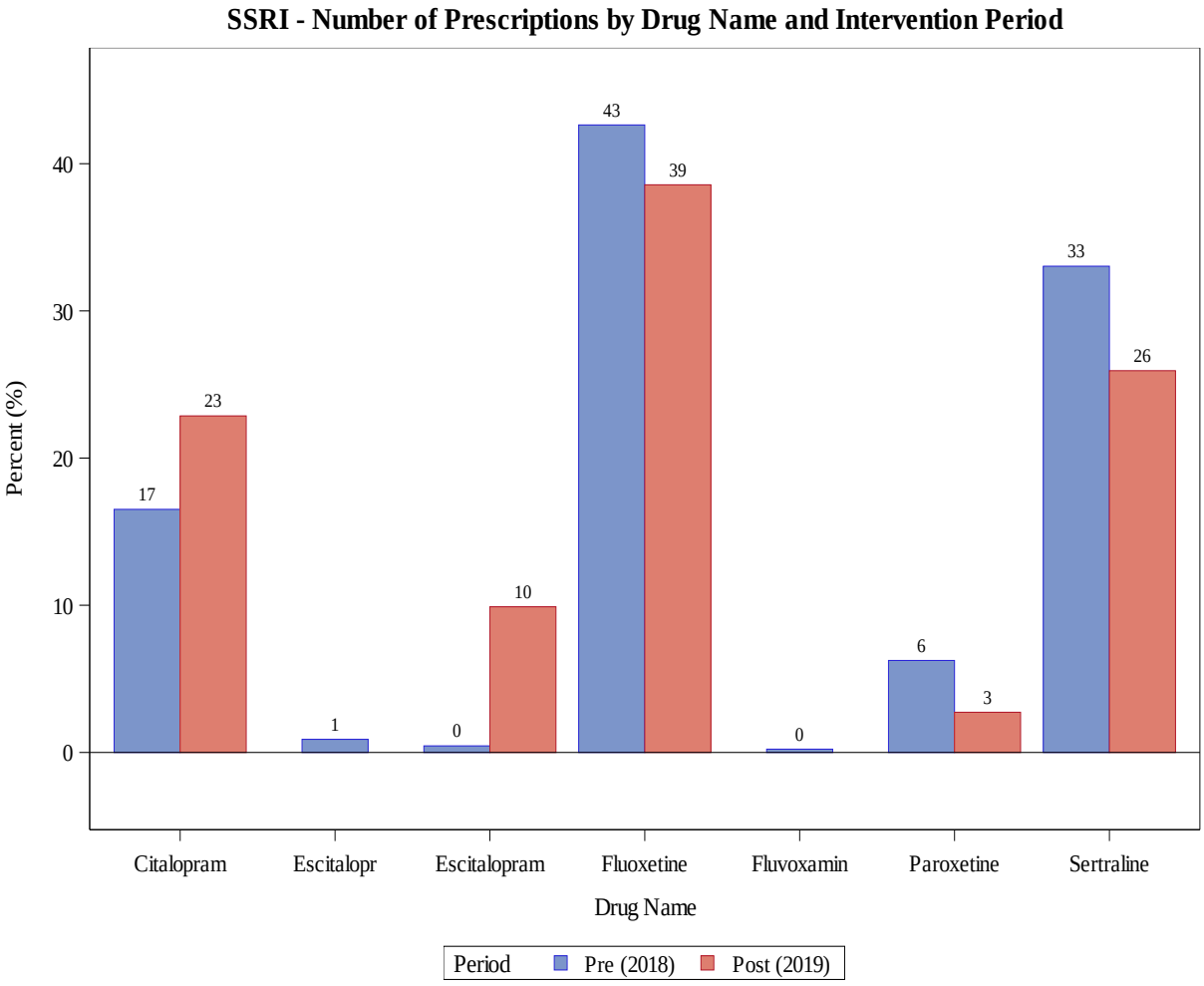
	Intervention Period		
Variable	Pre May-July 2018	Post May-July 2019	Total
Min - Max	1.00 - 35.00	0.00 - 31.00	0.00 - 35.00
Clozapine			
n	26	28	54
Mean (SD)	7.46 (9.880)	5.71 (4.860)	6.56 (7.672)
Median	4.00	4.00	4.00
Min - Max	1.00 - 47.00	1.00 - 17.00	1.00 - 47.00
Diazepam			
n	34	10	44
Mean (SD)	1.59 (0.925)	3.80 (2.530)	2.09 (1.696)
Median	1.00	3.00	1.00
Min - Max	0.00 - 4.00	1.00 - 8.00	0.00 - 8.00
Doxepin			
n	11	5	16
Mean (SD)	5.55 (3.387)	5.60 (3.362)	5.56 (3.265)
Median	5.00	5.00	5.00
Min - Max	1.00 - 12.00	2.00 - 10.00	1.00 - 12.00
Escitalopram			
n	2	29	31
Mean (SD)	1.50 (0.707)	3.48 (2.487)	3.35 (2.457)
Median	1.50	3.00	3.00
Min - Max	1.00 - 2.00	1.00 - 13.00	1.00 - 13.00
Fluoxetine			
n	191	113	304
Mean (SD)	3.55 (2.556)	4.10 (3.953)	3.75 (3.153)
Median	3.00	4.00	3.00
Min - Max	1.00 - 21.00	0.00 - 30.00	0.00 - 30.00
Fluphenazine			
n	35	17	52
Mean (SD)	2.80 (3.333)	7.18 (8.286)	4.23 (5.765)
Median	1.00	4.00	1.50
Min - Max	1.00 - 16.00	1.00 - 29.00	1.00 - 29.00
Fluvoxamin			
n	1		1

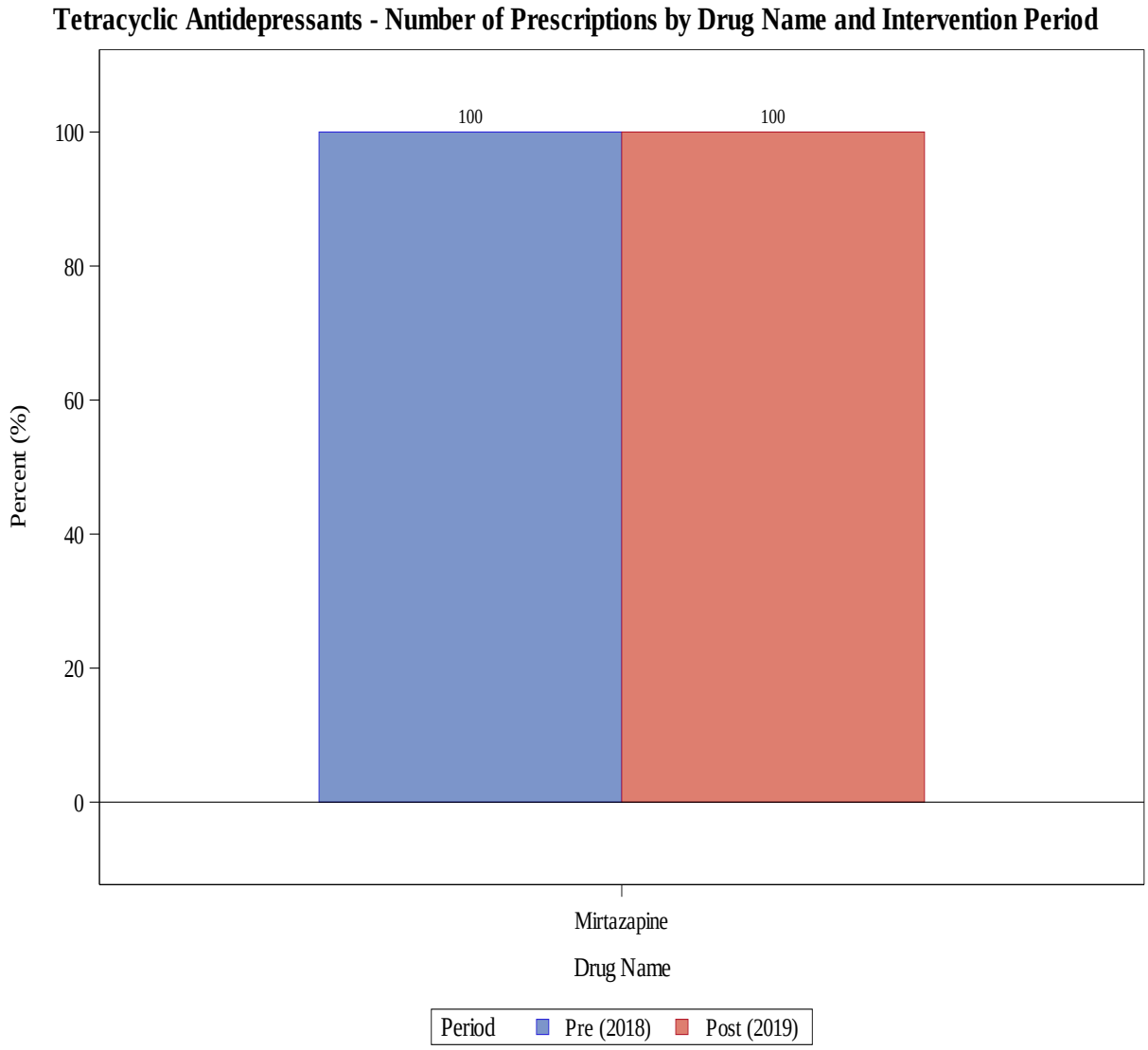
N/R: not Reported, % = 100 x (n/N)

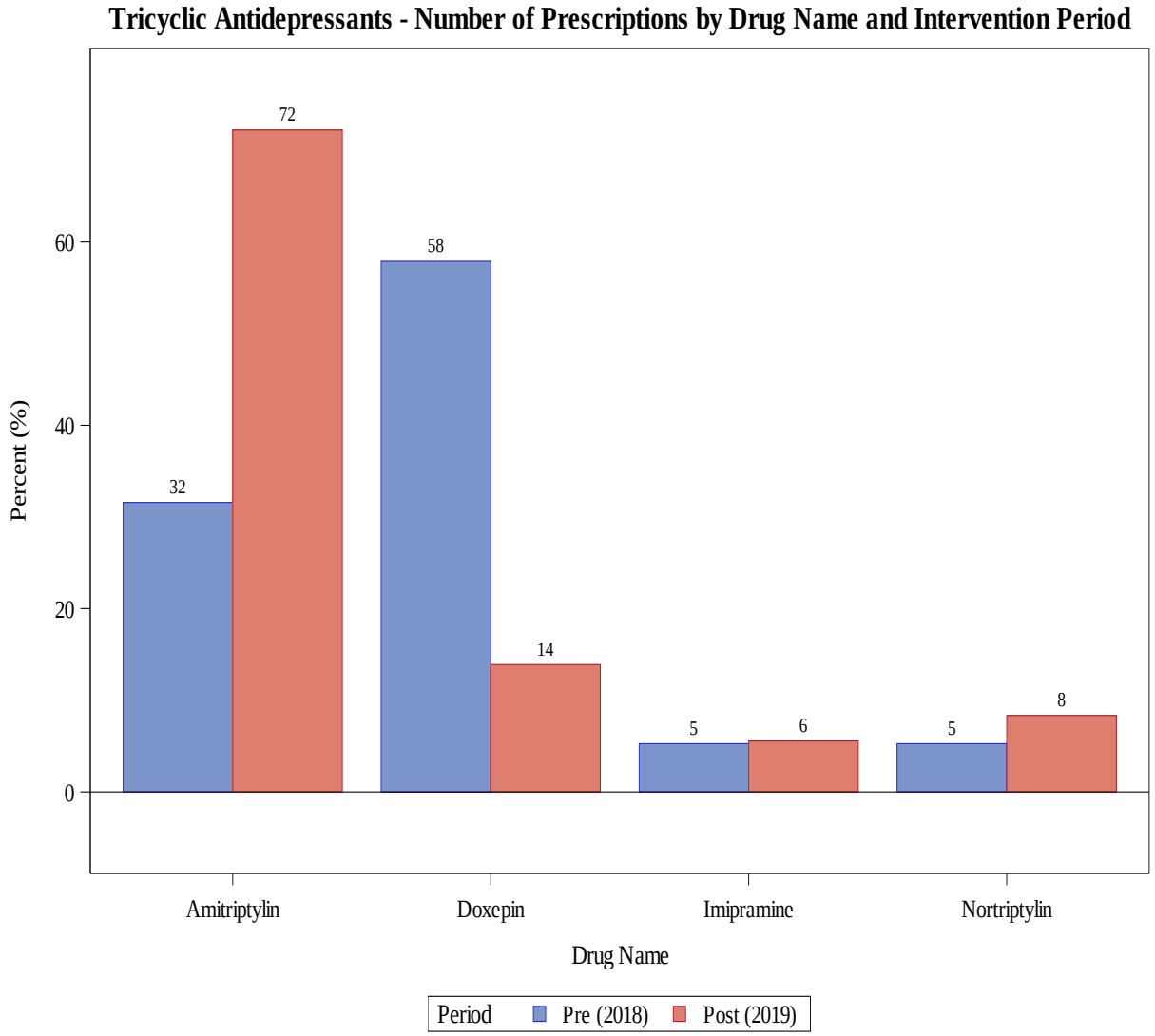
Appendix G

Prescriptions by Drug Class and Intervention




SSRI - Number of Prescriptions by Drug Name and Intervention Period
Percent (%)
0
10
20
30
40
17
23
1
0
10
43
39
0
6
3
33
26
Citalopram
Escitalopr
Escitalopram
Fluoxetine
Fluvoxamin
Paroxetine
Sertraline
Drug Name
Period
Pre (2018)
Post (2019)


Tetracyclic Antidepressants - Number of Prescriptions by Drug Name and Intervention Period
100
100
100
80
60
40
20
0
Percent (%)
Mirtazapine
Drug Name
Period
Pre (2018)
Post (2019)


Tricyclic Antidepressants - Number of Prescriptions by Drug Name and Intervention Period
Percent (%)
0
20
40
60
72
58
32
14
5
6
5
8
Amitriptylin
Doxepin
Imipramine
Nortriptylin
Drug Name
Period
Pre (2018)
Post (2019)

Appendix H

T-TAQ Survey Results

Table H1. Pre-Implementation Survey Results

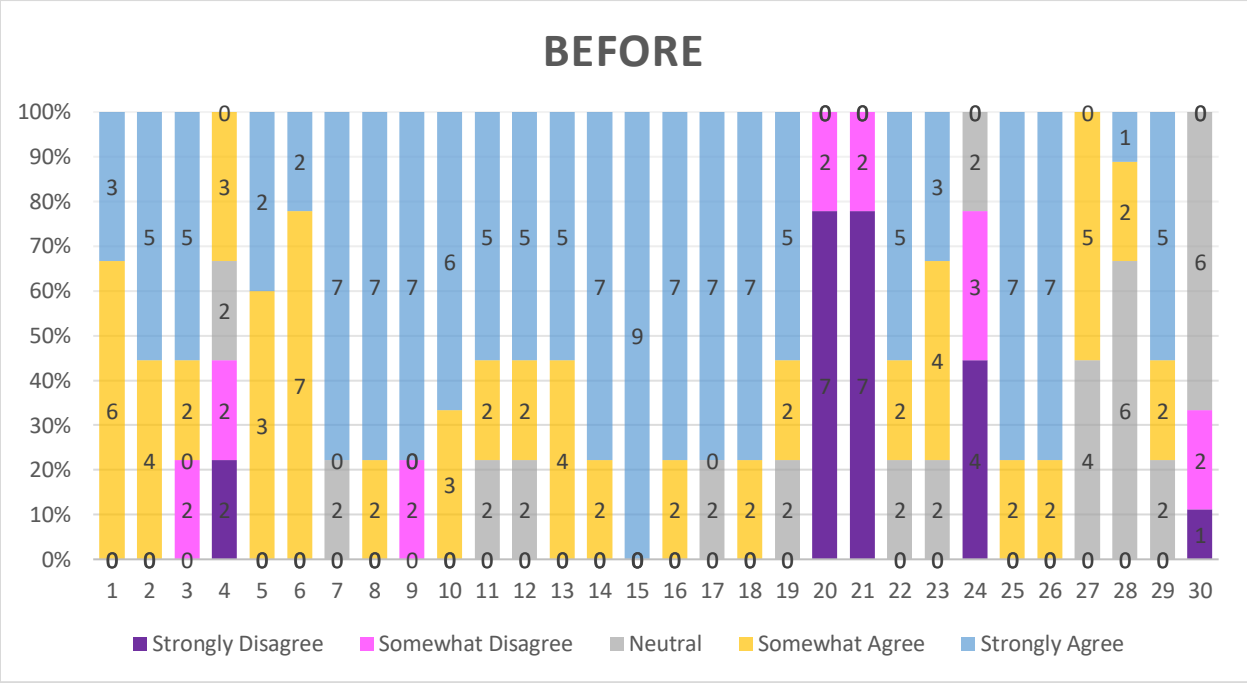


Table H2. Post-Implementation Survey Results