Communication of Hazardous Precautions with Patients on Hazardous Drugs

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has been approved

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Abstract

This was a quality improvement project related to the administration of hazard drugs and the manner in which a local hospital was able to alert all staff that the patient had received this type of medication and the precautions that they needed to remain safe while caring for the patient. The administration of hazardous drugs can pose serious risks for those who come in contact with the medication. This quality improvement project looked at having an order triggered in the electronic medical record alerting the nurse and/or secretary that the patient should be put in hazardous drug isolation.

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Chapter I: Introduction

The safe handling and disposal of all hazardous drugs in the inpatient hospital setting is a priority for the safety of the patient, the staff, and all others in direct and indirect contact with the patients. Administrators at this Magnet recognized hospital identified the need for a written policy on safe nursing procedures of hazardous drugs class 2 (HD2). The formal policy was established by and for the staff to align the hospital with the United States Pharmacopeial Convention (USP) 800 guidelines. The implementation of USP 800 was for the protection of nurses and other health care workers from hazardous drug exposure, to promote safety and reduce exposure (Friese, 2019). The USP is a pharmacy centered organization that sets standards for quality and purity of medications (Friese, 2019). The administrators had advised a written policy was necessary which follows the guidelines of the National Institute for Occupational Safety and Health (NIOSH). The policy was enforceable as of December 1, 2019. The goal was for safe administration of HD2 medications for all patients, by the staff after education, the implementation of automated order alerts, and visual signage placed on doorframes of patient rooms.

Background & Significance

The literature reported that upwards of eight million health care workers are potentially exposed to hazardous drugs annually (Diamond, 2017; He. Mendelsohn-Victor, McCullagh, & Friese,2017). This project was a priority for the organization due to the absence of a formal policy relating to the administration of HD2 medications safely. Nurses without an oncology background may have been administering HD2. Staff may not have been aware of the severity of the possible harmful side effects these drugs may have on themselves, patients or any other

who may have been coming in contact with the patient (Lawrence, 2016). This project helped to identify gaps in the current knowledge base for all staff members who came into contact with these HD2s and the precautions required. The nurses in the hospital administering these HD2 medications needed to be aware of the harmful effects of handling hazardous medications (J.Williams, personal communication, June 4, 2019). At this time, the current practice allowed the registered nurse to administer HD2 medications without regard to wearing gloves. The nurse disposed of packaging probably containing hazardous waste in the normal trash. Under the new policy, after administering hazardous drugs nurses were required to use a designated container for waste, perform hand hygiene, and complete education with the patient and family on any necessary precautions. However, residual amounts of hazardous drugs may still be found on surfaces in the room and may unknowingly impact another person or staff member who has not taken the proper precautions. One study discovered that 36% of samples taken were positive for cyclophosphamide, in random places such as a computer mouse and elevator button (Lawrence, 2016).

Needs Assessment

The hospital had guidelines in place for the administration of hazardous drugs 1 (HD1): how to administer who can administer, and what type of personal protective equipment (PPE) is worn for intravenous chemotherapy. At that time, the staff were lacking formal training and competencies on the safe handling of HD2 drugs, because there was no policy guiding them on how to administer these medications (J.Williams, personal communication, June 4, 2019). HD2 medications include oral antineoplastic, oral medications handled like chemotherapy such as biotherapies, and other injectable hazardous medication that are compounded like chemotherapy. These medications are filtered and excreted in the kidneys, and it is essential to handle waste

carefully, as there could be small amounts of medication in the urine. If patients were to become ill, all bodily fluids can have traces amounts of hazardous medication. Since there was no policy for the administration of HD2 medications, staff in the hospital were unaware of the precautions and risks which should be used when administering these medications or handling body fluids.

The Strength, Weakness, Opportunities, and Threats (SWOT See Appendix F) analysis of the proposed quality improvement project was positively impacted by initiating an order in the electronic medical record which would alert staff this patient received a hazardous drug and should be put in hazardous drug precautions. Educating staff on use of personal protective equipment practices with all patient who received a hazardous drug from class one or class two. There was considerable teamwork between departments willing to join resources and work together to accomplish a goal. It is a strength when everyone comes to the table with his or her ideas on how to accomplish complicated tasks. Upper management which includes, nurse managers, directors and hospital administrators supported this opportunity for USP 800 compliance and ensured this project will continue in perpetuity. A weakness was obtaining the "buy-in" from current staff members, as nurses averse to changing his or her workflow. All staff will always need continuing education on the safety precautions according to hospital policy. A threat to the implementation was computer-based learning exams which were due to be completed at the same time.

Problem Statement

Prior to the DNP project being implemented, there was no policy for the administration of HD2 medications at this hospital. The USP 800 was to be enforceable on December 1, 2019. These guidelines were intended to protect healthcare workers and patients from residual exposure to hazardous drugs (Mekoba, Turingan, Roberts, & Mason. 2018). Most of the US

pharmacies continued to fall short of compliance with USP 797 that defined quality standards for compounded sterile preparations (Kastango, 2019). The survey found only 38% of US hospitals were achieving full USP 797 compliance (Katango, 2019). The state board of pharmacy regulated USP compliance, where fines can reach hundreds or thousands of dollars (Kastango, 2019). The goal was to provide the hospital community the information and safety principles for the administration of HD medications to meet the standards of excellence at the hospital, the USP 800 and the Joint Commission.

Project Aim

The purpose of this quality improvement project was essential to all of the hospital staff who have patient contact. Staff must have education regarding hazardous drug precautions and have an awareness of safety measures and how to implement them properly. This project aimed to create an order to be generated in the electronic medical record (EMR) to alert nursing staff and/or the unit clerk that a patient received a hazardous drug and needed signage placed on the door. The nurse or unit secretary hung hazardous drug warning signs (see Appendix C) on the door frames for all patients who received HD, because residue from hazardous drugs can remain in the patient's room. Therefore, those who came in contact with the patient and room needed to utilize protective equipment in order to not be exposed to these HDs. Education to other departments was critical, because they provided care for these patients also. These others must have the necessary protective equipment and knowledge of how to handle patient body fluids. Prior to this project, there was no in room or door frame signage to alert staff that the patient received or was receiving a hazardous drug. Creating a new sign similar to the current hospital used signage, such as with contact, droplet and/or enteric isolation, visually alerted all staff from all disciplines and family members, that this patient had received a hazardous drug. The specific

project objective was conducted in collaboration with the information technology department, and a communication order was established to automatically trigger an alert once the physician had entered an order for the hazardous drug. The project encompassed hazardous medication in class one and two given at the hospital. The project attained a successful visual cue sent from the computer for staff to place signage on the doorframe. The relevance was to alert any staff member that this patient has received or is receiving a hazardous medication and the precautions that they should take to remain free from hazardous drug exposure. The specific goal is to have greater than 50% compliance of signage on the door of patients who have received a hazardous drug. The initial goal was to have greater than 50% compliance with increasing compliance over time. Measureable by visual observation of the doctoral student during weekly audits over approximately four to eight weeks. Through a computer order alert and by visually placing a sign outside on the patient's doorframe, staff knew that an HD medication was administered within the last 48 hours. The objective was to have greater than 50% of the patients with signage on their doors by December 1, 2019.

PICOT

The PICOT statement is: At a Midwest magnet hospital, how does a communication order to place a hazardous drug precaution sign compared to current practice, affect the percentage of times a hazardous drug precaution sign is in place for 48 hours after medication administered when evaluated over 60 days?

Congruence with the Organizational Strategic Plan

From an organizational perspective, this project aligned with the mission of the hospital for improving the health of the people and communities we serve (Memorial Medical Center, 2019). This quality improvement project improved the health of the staff by keeping them free

from exposure to hazardous medications. The vision of the hospital is to be a national leader for excellence in patient care (Memorial Medical Center, 2019). By aligning with the guidelines set forth from USP 800, we as a hospital also aligned with the primary mission of any pharmacy to provide optimal patient safety (Kastango, 2019). The mission and values of the hospital state it is paramount that individual employees are valued and respected. The hospital values the nurses and all who come in contact with the patient, and demonstrate safety in ensuring that staff was adequately aware of the hazards they came in contact with before entering the patient's room (Memorial Medical Center, 2019). Staff was trained in the administration of drugs with HD2 classification and provided with safety education through computer-based learning, open discussions and with learning opportunities presented at unit-based council meetings. The organization's goal was to have all staff remain free from exposure to hazardous drugs while providing care to patients in the hospital.

Synthesis of Evidence

Search strategies included the following databases: Elton, B. Stephens Co (EBSCO) host, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Elsevier's Clinical Key, and PubMed. All articles were published within the last seven years. The search words used for research articles included keywords such as administration of hazardous drugs, safety, personal protective equipment teaching, and USP 800. Articles included in the literature search focused on the dangers associated with administering hazardous drugs and what thee effects may be. This project included the definition of USP 800 along with the standards set forth from the Oncology Nursing Society (ONS). About 36 articles were examined and twenty were included in this study. Six articles were geared toward the processes/steps of handling these types of medication versus the implementation of the precautions for handling these medications. Five

articles did not discuss proper disposal of the medication or importance of handling these medications properly. Two articles were not peer-reviewed, and the last three deleted articles were removed for lack of evidence based practice.

Hazardous Drugs Class 2. Hazardous drugs are medications known to cause adverse health effects because of exposure in the workplace, according to the National Institute for Occupational Safety and Health (NIOSH) and the Center for Disease Control and Prevention (CDC) (Polovich, 2018). Hazardous drugs include chemotherapy, hormones, anesthetic agents, or antiviral agents, and/or have one or more of the following properties as being carcinogenic, teratogenicity, or developmental toxicity, reproductive toxicity, organ toxicity, or genotoxicity (Connor, Celano, Frame, & Zon, 2017; Hennessy & Dynan, 2014; Nunes, Gulten, Evke, Ercan, Evrensel, Kurt, & Manavoglu, 2011; Wyeth, 2013). Many oral chemotherapies are cytotoxic agents (Barbor, 2015).

Every year approximately eight million health care workers are potentially exposed to hazardous drugs including registered nurses (RNs), pharmacists, care technicians, housekeepers, dietary servers, dock workers, physicians, and families (Diamond, 2017; He et al. 2017). Unintentional absorption can occur through dermal and mucosal contact by consuming contaminated food, touching contaminated surfaces where there was a spill or a dropped pill, and contaminated hands (Connor et al., 2017; Eisenberg, 2016). Common acute symptoms of exposure to hazardous drugs include nausea, vomiting, headache, dizziness, hair loss, and liver damage (Barbor, 2015; Greave, McGovern, Arnold, & Polovich, 2017; He et al. 2017 Hennessy & Dynan, 2014; Nunes et al., 2011). Long-term effects of exposure to hazardous drugs include chromosomal alterations, hepatotoxicity and abnormal reproductive outcomes (Hennessy, & Dynan, 2014).

Studies have also shown that it may take longer to conceive a child when the mother has been exposed to a hazardous drug (Greave et al., 2017). Others studies have documented a two-fold increase in spontaneous abortions and a three and a half fold increase in spontaneous abortions when it was the first child to an exposed mother (Connor et al., 2017). Reported exposure has presented as damages on chromosomes five, seven and eleven with progression to the development of acute myeloid leukemia in the study of 109 hospital employees who had exposure to hazardous drugs (Eisenberg, 2016). Another study confirmed traces of chemotherapy found in the urine of other healthcare workers positive for cyclophosphamide (Eisenberg, 2016). Exposure risks for nurses include preparations, transportation, administration, and disposal of chemotherapy waste and body fluids when dealing with hazardous drugs (Hennessy & Dynan, 2014). Nurses should wear gloves and wash their hands after administration of medication. If possible, the patient should swallow hazardous drugs whole, and patients should also wash their hands (Barbor, 2015).

Personal protective equipment (PPE) There is no publically available exposure limits for hazardous drugs (Connor et al., 2017; Crickman & Finnell, 2017). Standard infection prevention includes hand hygiene, use of personal protective equipment (PPE) as indicated, environmental hygiene, and safe use and disposal of sharps (Wyeth, 2013). Personal protective equipment includes gowns, gloves, aprons, surgical face masks, protective eyewear, and/or face shields. These items provide a physical barrier between the user and the microorganisms by preventing them from contaminating the mucous membranes of the airways, skin, clothing, hair, and/or shoes of healthcare workers (Neo, Edward, & Mills, 2012).

NOISH guidelines recommend the use of PPE while receiving and/or storing hazardous drugs, when preparing or administering hazardous drugs, and during waste disposal of hazardous

drugs (Hennessy & Dynan, 2014). All health care professionals should wear PPE while managing hazardous drugs to include cutting, manipulating, or administration of tablets (Barbor, 2015). Protection of the nurse during chemotherapy administration through the use of PPE, has a tangible impact on the safety of an institution (Pirchel, 2019). The majority of PPE education is taught in nursing school and reinforced with on the job training (Diamond, 2017). PPE is considered the last line of defense in protecting nurses and other healthcare workers who handle hazardous drugs (Crickman & Finnell, 2017). Another line of defense comes from the Becton Dickinson Company. The Becton Dickinson Company has developed a product which assesses the residual chemotherapy left on a surface. Although useful, it is expensive and does not cover all chemotherapy drugs yet (Polovich, 2018). Although this type of product can prove to be useful to patients taking oral hazardous drugs at home, it is not an economical option at this time in an inpatient hospital setting.

USP 800 deadline was December 1, 2019 and was designed to protect healthcare workers from any repercussions associated with handling hazardous drugs (Mekoba et al., 2018). The United States Federal Government follows NOISH recommendations. They allow state governments to regulate how they are handling hazardous drugs. Currently, Illinois does not have specific rules related to the USP guidelines, therefore some nurses avoid PPE due to low risk of exposure (Hennessy & Dynan, 2014). Also nurses have multiple patients which impacts their workflow, and the administration of hazardous drugs may become fragmented (Eisenberg, 2016; Neo, Edward, & Mills, 2012). There is a recommendation for the use of a single pair of gloves being acceptable when administering hazardous drugs (Silver, Steege, & Boiano, 2016). Poor compliance with hand hygiene remains the most significant challenge in infection prevention (Wyeth, 2013). Additional challenges include high acuities and the lack of donning

proper PPE due to time constraints and how PPE is uncomfortable, not available, or difficult to access (Hennessy & Dynan, 2014; Neo, Edward, & Mills, 2012).

Strengths of the literature include the recommendation for some type of policy or protocol to be in place at all hospitals for the handling of hazardous drugs. A primary strength in several articles was the detailed explanations clearly identifying the risk of the hazardous side effects of these medications and all of the toxicities accompanying them. An in-depth discussion was provided into the use of PPE to protect staff from exposure and all contamination.

Weaknesses of the literature are evident with no formal testing having been completed on staff members who are administering or compounding hazardous medications daily. Therefore, it is difficult when the symptoms arise years later to blame the condition on a workplace injury from exposure to a hazardous medication. There are no pre-employment physicals performed or blood tests scheduled to ensure staff are remaining healthy and free from exposure. Lastly, the USP 800 guidelines are long and lengthy and do not give specific recommendations for testing.

A gap in the literature is no published data is discussing the exposure of nurses or pharmacists handling hazardous medication over a period of time. Policies and protocols are constantly changing with new drugs being produced weekly, monthly, and yearly. Evidence based practice is also changing habitually. With new guidelines for all hospitals taking effect on December 2019, there is no documentation of how other hospitals are going to handle these new changes. Toxic side effects of these hazardous medications may not manifest for years and published literature on these long term studies may not yet be available.

Conceptual Framework

Lewin's conceptual framework is based on the acceptance and execution of change. Lewin discussed the unfreezing stage as describing the need for change (Tinkler, Hoy, & Martin,

2014). With the USP 800 guidelines approaching there was a need for change, and the organizations gathered individuals from each discipline to create the plans for the upcoming changes. In the moving and changing stage, attitudes and behaviors can be readjusted towards a new idea, changing current practice (Tinkler, Hoy, & Martin, 2014). The moving and changing phases includes establishing a joint workforce between IT and pharmacy in finding ways to alert staff hazardous drug have been given (Tinkler, Hoy, & Martin, 2014). The refreezing stage is the relearning of new behaviors and this can sometimes be very difficult for hospital staff. Having the information allows staff to make informed, accountable decisions with the existing education. For this project, Lewin's model audits were implemented as a refreezing strategy and were used to evaluate if the project is working or if adjustments need to be made to the program (Tinkler, Hoy, & Martin, 2014). Driving forces were the need to implement an improved standard of practice before the December 2019 deadline, and restraining forces were related to staff turnover and new nursing staff.

Chapter II: Methodology

Project Design

The project was a quality improvement project providing a visual cue to all care providers for patients who received a hazardous drug, but this project went beyond a simple sign. The project included an actual communication order set to trigger within the electronic medical record providing the initial alert for staff to place the signage. The education of staff was essential so when a new visual alert was placed on a patient door staff knew how to respond, and the lack of knowledge a hazardous drug is being used on this particular patient becomes depleted. Thus, ensuring signage was placed after the triggering of the order so all people caring for the patient knew what precautions to implement and there was a need to protect themselves.

Setting The setting of the project will be at a Midwestern Magnet hospital. This hospital is a 500-bed Level One trauma center. This project took place at the hospital on each of the thirty nursing units covering approximately five thousand staff members. The targeted staff included anyone handling hazardous drugs, with direct patient care to patients who received hazardous drugs or with access to the triggered hazardous drug alert in the electronic medical record.

Population/Sample The population included all patients within the quality improvement project who received HD1,and HD2 medications. Excluded in this sample were patients under the age of eighteen who received a HD1, and HD2. A recent pharmacy report from the hospital determined approximately 200 hazardous drugs were administered in a thirty-day time frame on thirty different nursing units.

Tools A simple audit tool (See Appendix B) was used to document the Financial Identification Number (FIN) of the patient receiving the medication, the room number, whether the required signage is posted, the medication classification, and evaluation of the communication order. The sign had a yellow banner as it is the most common color for hazardous material. The sign was close in design to other isolation type signs currently used by the hospital.

Project Plan. This project was a collaborative effort involving nursing, pharmacy and information technology. Once a physician's order for a hazardous medication was placed, it triggered a communication order alerting staff [nursing and unit secretaries] the patient was now receiving a hazardous medication. This communication order triggered the staff to place the patient on hazardous drug precautions. The unit secretary or nurse then obtained the hazardous medication precaution signage and placed it on the patient's door frame before the patient

actually received the medication. Utilizing more than one staff member would ideally increase the likelihood of the hazardous drug precaution signage being placed on the door. The nurse and unit secretary were expected to communicate to each other once the task is completed. The sign was highlighted with yellow, thereby creating a link between the hazardous medication coming up in a yellow package from the pharmacy, and the disposal was in a yellow hazardous waste container. The sign was created and states all healthcare workers should be wearing gloves when handling body fluids and that families should not be handling any body fluids. The sign was placed on the door notifying patrons a hazardous medication was received, and body fluids were contaminated for forty-eight hours after the last dose was taken. The communication order notifying staff the patient was on hazardous drug precautions then flowed to the SBAR report and was provided as an electronic handoff tool each time the patient left the floor. This allowed the receiving unit to be aware of the hazardous drug precautions the patient falls under and implement their own use of signage to alert staff in their department.

The outcomes were measured by visual observation of the room and the electronic medical record was reviewed for the communication order, and current medication order. This process occurred and after the education, teaching, and policy was applied or implemented in the department beginning November 12, 2019. Evaluation of the outcome looked at the number of rooms that have the hazardous drug precaution signage, compared to the rooms that did not. Also, evaluation was be based on if the communication order was originally triggered as intended based on the medication being entered in the EMR. Each department received enough signs to cover all the people receiving hazardous medication and provided education on how they were to get additional signs if needed. Signage was displayed prior to the medication being administered. The staff was trained using a computer-based learning module sent to staff no later

than October of 2019. The go-live date was November 12, 2019 and continued throughout December of 2019.

Long term evaluation of the project will be continued by the nursing educators and nurse managers. If a unit fails to meet the goal of 100% of signs on the door frame for patients receiving hazardous medications, immediate resolution of the problem will be required. Nurses will be asked if they know where the hazardous drug precaution signs are kept on the unit, and if they are aware that their patient was receiving a hazardous drug. Unit secretaries will be asked if they viewed the order placed in the EMR and if they were able to obtained the signage for the primary nurse. The overall project goal is to ensure the hazardous drug precaution signage is placed on 100% of door frames as a visual cue that hazardous medications have been administered in this room See Appendix D for the project timeline.

Data Analysis. Data was gathered by the doctoral student regarding the use of hazardous drug precautions signage on door frame weekly for a two-month time frame. A random audit was conducted weekly to ensure the communication order triggered appropriately. Statistical data was gathered based on the number of medications given versus the number of signage placed on the door. Data was quantitative as it was assessing the number of signage placed on doors compared to the number of hazardous medications ordered. The goal of the project was 100% compliant with the signage on the door, prior to any hazardous medication being administered.

Institutional Review Board. No personal health information of the patients was required. No informed consent was required because this is a quality improvement project designed to improve the safety of staff caring for the patients receiving hazardous medications. The doctoral student had access to only the room number of patients requiring hazardous

medications. The review board application was required due to human subjects to ensure all ethical and privacy concerns were addressed. It was determined by the committee on the use of human subjects in research that this is a quality improvement project and not human subject research, thereby being exempt from IRB review.

Chapter III: Organizational Assessment and Cost Effectiveness Analysis

Organizational Assessment. Organizations providing care for patients must be ready for continuous learning and change. This project was supported by upper management directors and leaders of the organization. Being a national leader in healthcare, this organization was the first in Illinois to obtain the American Hospital Association-McKesson Quest for Quality Prize in 2016 (MMC, 2019.) Interprofessional collaboration comes from information technology, pharmacy, nursing, and all other disciplines caring for the patient to provide a safe environment. Non-oncology nurses may be more aware of the medications once they are conscious of the hazards repetitive exposure may cause. One risk was that the order fired is not seen by the nurse or unit secretary, and there could have been a delay in placing the patient in hazardous drug precautions.

Cost Factors. The budget (See Appendix A) included 200 copies of isolation sign to be printed in color and laminated, costing approximately $1/each. Cost of asking IT to build an order set to trigger when a hazardous medication was entered approximately $50 per hour, at this time it is unknown how many hours it took to complete the project. Long term cost savings will be ensuring that staff will remain healthy, prevent any future lawsuits, and improve the overall quality of care patients are receiving from better educated staff.

Chapter IV: Results

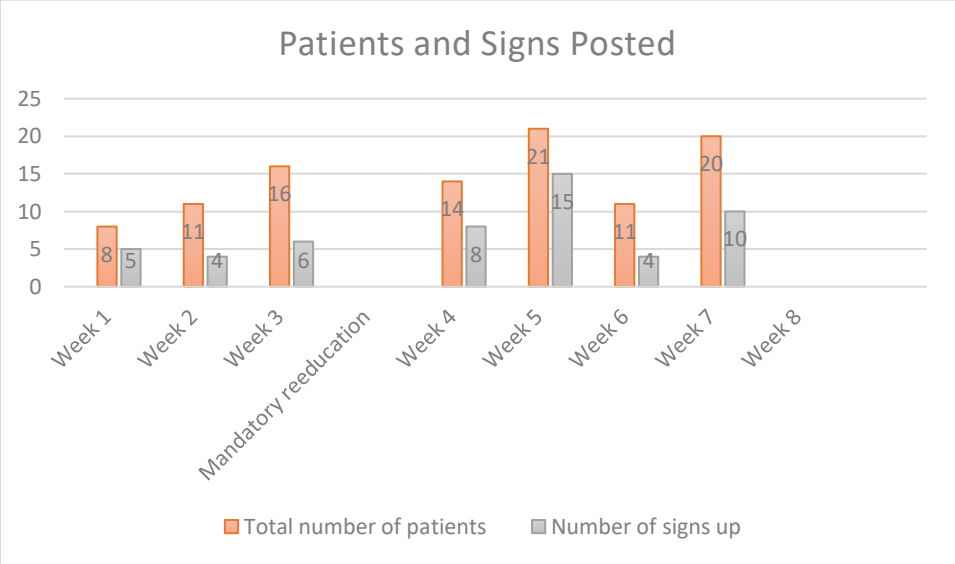
Outcomes

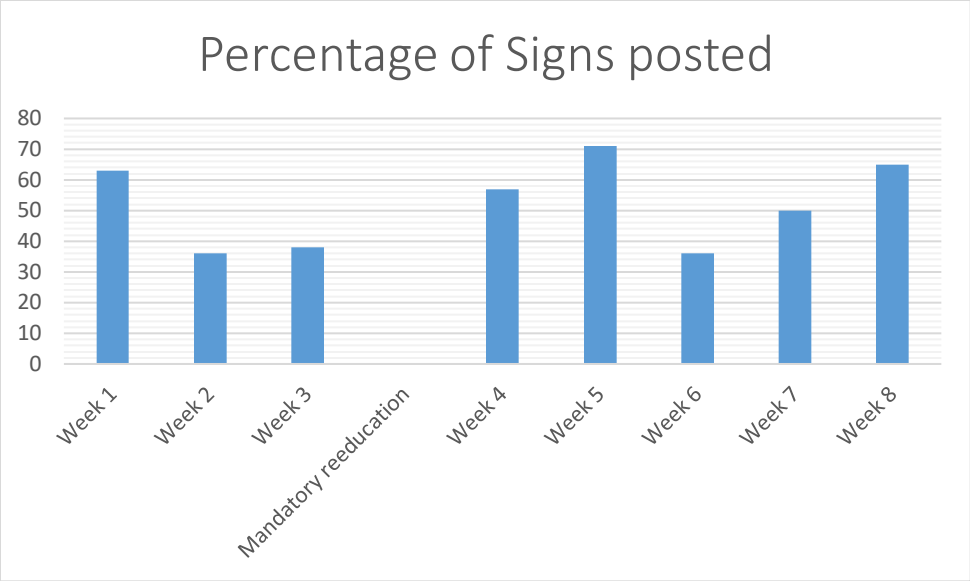
The project started in the testing system utilizing the information technology team to ensure when a hazardous drug (HD) was ordered for a patient the order to place the patient in hazardous drug precautions would fire. Then, this was transitioned into the live health care record system. In concurrence, a computer-based learning module was established and issued to staff on Oct 11, 2019 with an expected completion date of November 11, 2019. A slight delay was noted as the learning module was not ready for staff by the originally anticipated date of Oct 1, 2019. When the project went live approximately 70% of participating staff had completed the computer-based learning module (See Appendix D).

Two days after the project went live, data was collected from week one. The electronic medical record was reviewed to assess if a patient was on an HD1 or HD2 medication (See Appendix G). There were an estimated eight patients who should have had signs posted for HD precautions; however, only five were actually present and posted on the door frames for an average of a 63% compliance rate noted. During week two, there were around 11 patients who should have had HD signs displayed; yet, only four patients had signs visible and present with about a 36% compliance rate noted. Next, week three had approximately 16 patients who should have had HD signs exhibited, but only six were present and posted on the door with a 38% compliance rate noted. After the week three fallout, the project manager documented compliance had fallen to less than 50% for two weeks in a row. The project manager decidedly required a mandatory “one on one reeducation” to be held for all the registered nurses on the unit.

After remediation, week four indicated of the 14 patients who received HD only eight HD precautions signs were posted and present during audits with an estimated 57% compliance

rate noted. During week five, of the 21 patients who received HDs only 15 signs were displayed properly on the required door frames with a 71% compliance rate noted. For week six, there were 11 patients taking HD but only four doors were clearly marked with a 36% compliance rate noted. Through week seven, there were 20 patients receiving HDs and only 10 HD precaution signs were found appriopriately placed with a 50% compliance rate noted. Upon speaking with the project manager, she reported there was approximately a 65% compliance rate with the last survey completed during week eight.





The total number of patients for this quality improvement project was 101. The average compliance rate over eight weeks was 52% with weeks one through three demonstrating an average of 45.6% compliance rate. After the mandatory education provided during week four, the average compliance for weeks four through eight was approximately 55.8% with an increase of 10.2% from the prior week's one through three. The most important lessons learned included remembering to be flexible, not everyone is working on this project entirely, and there are other projects which may take important people away from focusing solely on the particular project. Two final lessons are to remember dates can be flexible with project implementation and when presenting feedback to staff the project manager should always discuss the rationale and why this is important which will help to get the new behavior as part of his or her new routine.

Chapter V: Discussion

Discussion. This quality improvement project began after an order for hazardous drug(s) was entered in the electronic medical record. An order would trigger and alert nursing staff to place the HD precaution sign on the triggering patient's door. The signage was created similar to existing signs regarding hazardous drug precautions. They were distributed on all units and

allowed staff to be attentive of the isolation status of this patient. When the isolation period (48 hours post-administration) ended, there was no need for removal of the sign as typically patients had discharged. The changes for nurses included the trigger alert and to place the signage on the door for HD precautions which was a change to their normal routines for these patients. The initial education only demonstrated an average of a 45.6% compliance rate and weekly compliance rate below 40%; therefore, additional education was required to improve compliance rates among staff. At the completion of this survey, an average of 55.8% did have signage in place on the door frames; although, the deadline was not met as continued evaluation continued after education was complete. Successes in implementation were that the order fired when a hazardous drug was entered. There was success in seeing that the nurses were able to implement the changes into their current practice. Difficulties were that if a second order for hazardous drug was entered and the first not completed out it would not fire a second time. Also if the hazardous drug report was pulled it would look at all hazardous orders that have been fired, if the patient was no longer taking the medication the order would not complete when the medication was discontinued or even 48 hours after medication discontinued, producing a long list of patients with hazardous orders, but may not be taking the medication currently. The intervention was successful as signage did appear on doorframes and there was increase in compliance.

Limitations. There were some limitations with the current project. The initial timeline was delayed due to additional projects requiring attention at the time of implementation. Also, there were areas of the hospital who were operating at a 24% reduction in the operational vacancy of the capacity of nurses for their units. This caused a reduction in the number of nurses available to care for the patients. This resulted in an increase in the nurse to patient ratio of these units and ended with a new policy being established. Ultimately, this allowed for a higher

incident of people forgetting to display the correct sign(s). Finally, there was also a limited amount of hazardous drugs given during the weekly evaluations.

During this study, the doctoral student was employed by the organization; consequently, her unit was under "high alert and increased awareness" when completing the audits for displayed signage by the doctoral student when she was working on the unit. Another challenge presented when a second order for a HD was placed in the computer and the first was not deactivated, a new order for HD precautions did not trigger. The previous order had to be completed out, and unfortunately this was not taught to staff. The quality improvement project was small in nature and did not reach 100% compliance. However, during data collection there was an increase in compliance rate and weekly compliance rates after education were mostly greater than 50%. Although the sample size was small, there is still relevance for needed signage and education regarding hazardous medication(s) and the precautions needed to maintain a safe work environment.

Implications. Continued evaluation of the project through weekly or biweekly audits, with continued education of nurses at the time audits are completed, will increase the sustainability of the project with increased compliance. These audits will be completed by the nursing outcome facilitator, with results given to the project manager who will follow up on outcomes, and modifications as needed. Nurses and pharmacists are also having additional lab work completed as baseline measurements to ensure they are not having any increased exposure which is being monitored yearly. A modification to improve performance would be to change the color of the type face in the electronic medical record as a visual cue the order was placed. Another suggestion for future performance would be in 48 hours a box could appear inquiring if HD precautions were completed. If yes, the order would self-complete. This quality

improvement project could be implemented at the satellite hospitals following the same steps. These hospitals use the same electronic medical record, CBLs and education could be provided to nurses at these hospitals to improve their compliance with USP 800 and how they handle hazardous drugs.

Future research could look at the yearly laboratory values of the nurses and pharmacists who administer or prepare hazardous drugs, and continued research could follow these results over the course of a few years. Do nurses and pharmacists who handle hazardous drugs have an increased risk of medical complications the longer they handle these medications? Ultimately, improving and proving the actual risk to the pharmacist and nurses who handle these hazardous drugs. Currently, blood work is ordered annually for all staff who handle hazardous drugs. This project is monitored by a nursing project manager with assistance from pharmacy and an information technologist for continued dissemination throughout the organization.

Nursing education is paramount when new staff members arrive to the organization. Under the guidance of nurse mentors, new staff will be educated related to appropriate PPE worn when administering these medications. Nurse mentors will educate new staff on the acknowledgement of the computer order triggering of HD isolation and everything related to HD isolation. An advanced practice nurse typically does not administer hazardous drugs, but is able to monitor patient side effects. With these requirements initiated by the USP-800,and enforced through Joint Commission Surveys, it is imperative that we adhere to these guidelines and follow the protocols for safe handling of hazardous drugs. These are the steps that caregivers need to practice to remain healthy. Failure to comply in following USP-800 can result in loss of Medicare funding, accreditation status and potential pharmacy licensure (Prichel, 2019).

The health policy that would be forthcoming though this quality improvement project would be the regulation of PPE that all staff are required to use when caring for a patient who has received a hazardous drug. The will ultimately improve the health of the caregiver, and keep them safe from possible exposure to hazardous drugs. Staff who remain safe, free from exposure should not have health care problems related to their contact with hazardous medication.

Chapter VI: Conclusions

The value to health care professionals is to minimize exposure to hazardous drugs. Following the guidelines from USP-800 all hazardous drugs must be handled under conditions which promote patient safety, worker safety and environmental protection (Pirchel, 2019). There by providing a safe work environment for all employees, and a safe community where hazardous drugs are disposed of properly.

The DNP essentials provide guidance to the advanced practice nurse through foundational competencies. Essential I: Scientific Underpinning for Practice: Choosing a nursing theory help to guide the implementation of the quality improvement project. Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking: The opportunity to be part the formation of a team of people who came together with different skill sets to discuss what the USP 800 regulations state, and how we as a hospital are going to put these into practice. Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice: The doctoral student was able to provide real time feedback related to quality improvement project. These provided insights to the adjustments that could be made to the EMR. The doctorial student was also a resource for clinical staff to ask questions related to their own safety based on information gathered through literature review. Essential IV: Information Systems/Technology and Patient Care Technology for Improvement and Transformation of

Health Care. By having knowledge of the current computer system the DNP student was able to suggest ways to improve the electronic medical record solution. Essential V: Health Care Policy for Advocacy in Health Care: The knowledge of health care practices helped to guide the doctoral student into a further leadership role in the organization. Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes: Implementation of the project found ways to educate staff regarding HD2 medications they were administering to patients. Staff were also made aware of the PPE and precautions they need to take to remain free from exposure to hazardous medication. Essential VII: Clinical Preventions and Population for Improving the Nation's Health: The quality improvement project incorporates the goal of improving the health of the hospital employees. Essential VIII: Advanced Nursing Practice: Improving the nursing practice of staff who are administering hazardous drugs through education increased their knowledge-base and allowed them to provide improved safe care.

Plans for Dissemination: The results of this quality improvement project were disseminated to the managers of individual units regarding their compliance. The plan for dissemination will also be a virtual presentation to faculty and peers at Bradley University, submission of a final paper to national DNP repository, and continued education of staff at the hospital.

Personal and Professional Goals: Completion of the DNP project has brought to completion my study to become a nurse practitioner. This project has challenged my personal leadership and encouraged me to become an integral part of decision making at the hospital. Professionally obtaining the doctoral degree is the highest achievement in the field, this will allow me to care for patients or move into education if desired.

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Appendix A

Budget

Department	Cost	Total
Print shop for printing signs and laminating	Approx. $1	Approx. 200.
Hours for IT building orders	Approx $35-50 per hour	24 hours to build the order set
Organizational development	Approx $35 hour	80 hours to build computer-based learning for staff.

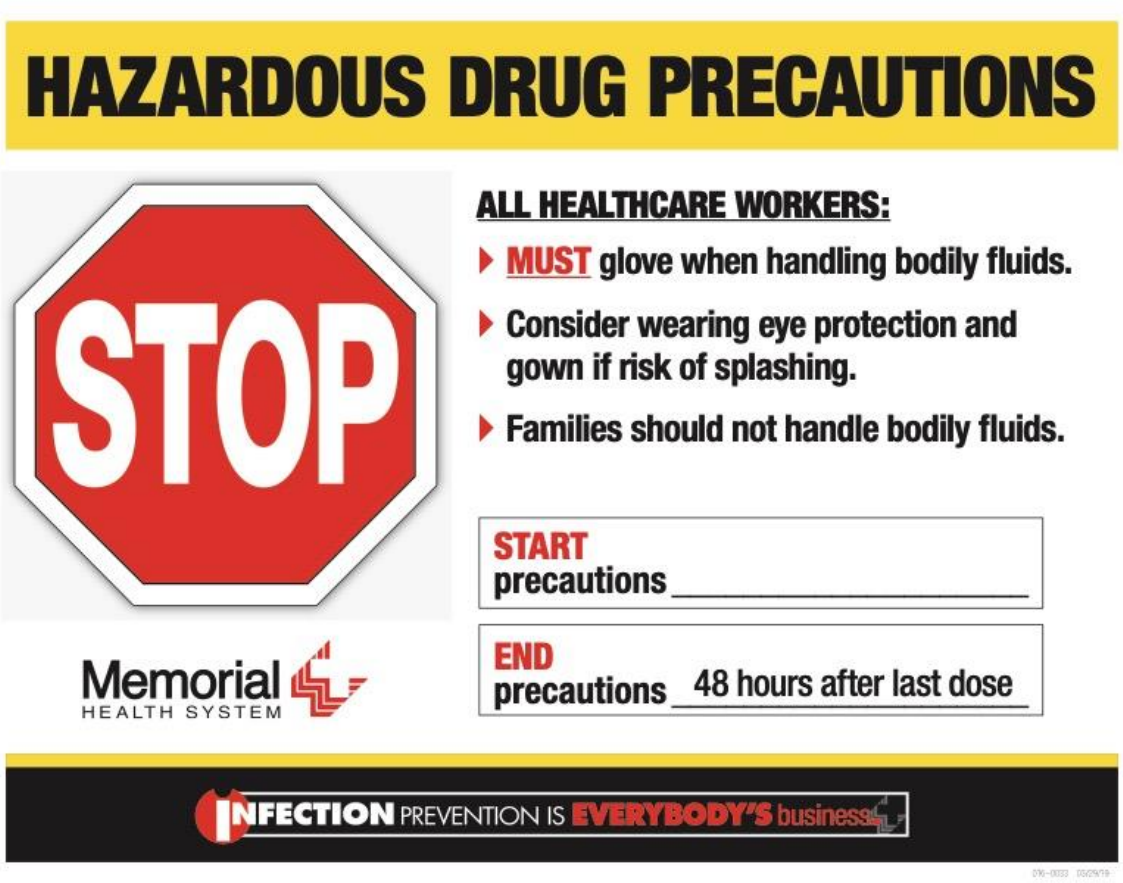
Appendix B

Audit tool

FIN number	Room number	Is the sign present on the door frame?	Class of medication given HD1, HD2, .	Did the order fire in the EMR?

Appendix C

Door Signage



Appendix D

Timeline of Project.

July 2019- Signs complete laminated and ready to be distributed to the units.

August 2019-October 1, 2019- Creation of computer-based learning project, continued planning for implementation.-To be completed in September 2019 for IT to be able to place test alerts for staff to see when orders are placed.

October 1-Oct 31, 2019 Staff completes a computer-based learning module.

(Actual)Module out to staff Oct 11, 2019 with a completion deadline of Nov. 11

November 1, 2019—Go live. Distribution of signs and orders.

(Actual) Go-live date Nov 12, 2019

November 1-December 31, 2019—Data collection

(Actual) Nov 14- Jan 31, 2020—Data Collection with break in December for 1:1 re-education of staff.

Jan 2020-May 2020—Final conclusion of the project.

Appendix E

DATE: 25 AUG 2019

TO: Erin Rachford, Sarah Silvest-Guerrero

FROM: Bradley University Committee on the Use of Human Subjects in Research

STUDY TITLE: Communication of hazardous precautions with patients on hazardous drugs

CUHSR #: 55-19

SUBMISSION TYPE: Initial Review

ACTION: Approved

APPROVAL DATE: 25 AUG 2019

REVIEW TYPE: Quality Assurance

Thank you for the opportunity to review the above referenced proposal. The Bradley University Committee on the Use of Human Subject in Research has determined the proposal to be NOT HUMAN SUBJECTS RESEACH thus exempt from IRB review according to federal regulations. CUHSR concurs with the determination of the local entity (Memorial Medical Center Springfield IL) that this project is quality improvement initiative and not human subjects research. Memorial Medical Center affirms that the project does not Collect any protected health or identifiable information.

The study has been found to be not human subject research pursuant to 45 CFR 46.102(i), not meeting the federal definition of research (not contributing to generalizable knowledge). Please note that it is unlawful to refer to your study as research.

Your study does meet general ethical requirements for human subject studies as follows:

1. Ethics training of research personal is documented.
2. Adequate provisions are made for the maintenance of privacy and protection of data.
3. Your study is exempt for HIPAA regulations in that the covered entity will de-identify the health information used in your study pursuant to 45 CFR 164.502 (d).

Please submit a final status report when the study is completed. A form can be found on our website at https://www.bradley.edu/academic/cio/osp/studies/cuhsr/forms/. Please retain study records for three years from the conclusion of your study. Be aware that some professional standards may require the retention of records for longer than three years. If this study is regulated by the HIPAA privacy rule, retain the research records for at least 6 years.

Be aware that any future changes to the protocol must first be approved by the Committee on the Use of Human Subjects in Research (CUHSR) prior to implementation and that substantial changes may result in the need for further review. These changes include the addition of study personnel. Please submit a Request for Minor Modification of a Current Protocol form found at the CUHSR website at https://www.bradley.edu/academic/cio/osp/studies/cuhsr/forms/ should a need for a change arise. A list of the types of modifications can be found on this form.

While no untoward effects are anticipated, should they arise, please report any untoward effects to CUHSR immediately.

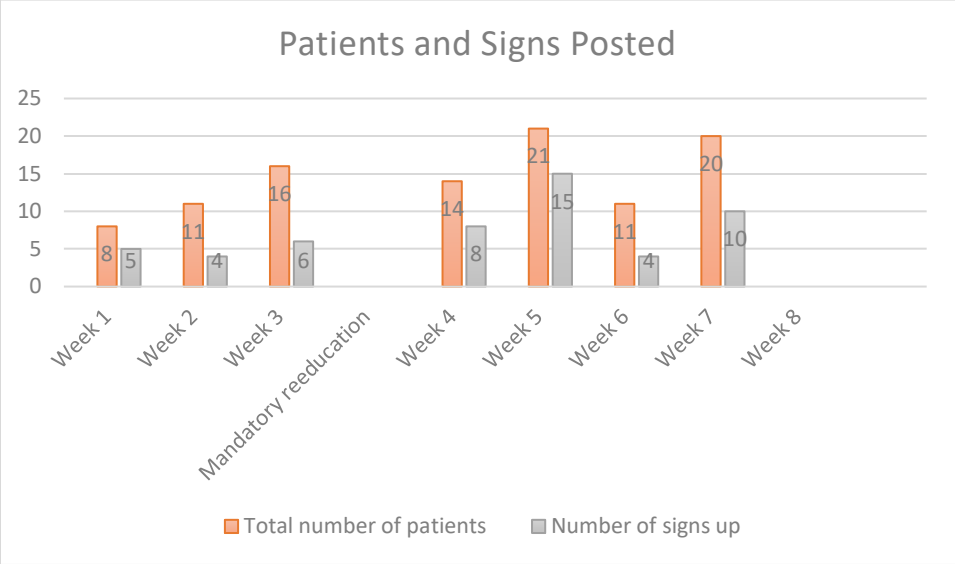
This email will serve as your written notice that the study is approved unless a more formal letter is needed. You can request a formal letter from the CUHSR secretary in the Office of Sponsored Programs.

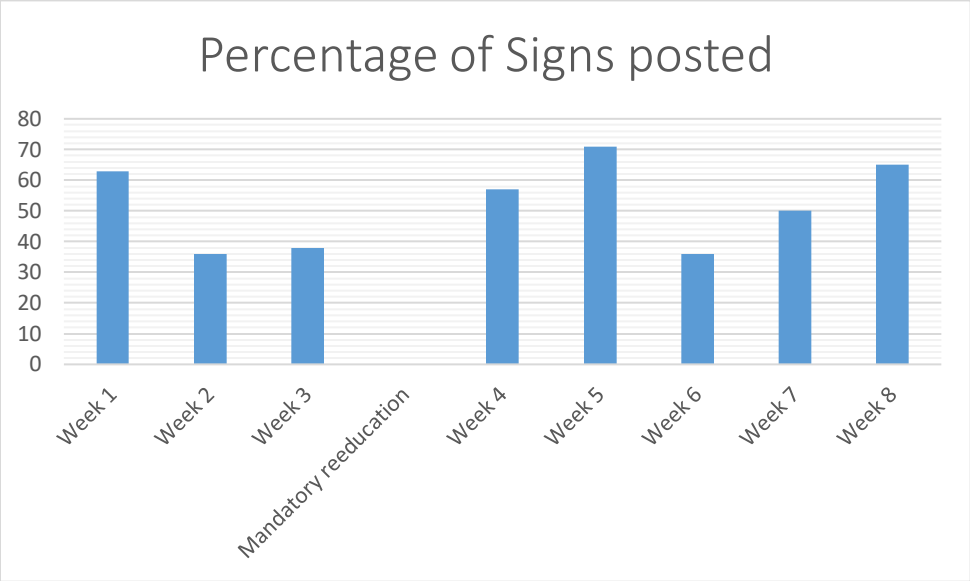
Appendix F

SWOT ANALYSIS

Strength	Weakness
-teamwork -initiate order to alert staff re hazardous drug -educate staff on safe PPE needed to provide care for these patients. -support from upper management	-obtaining a buy in from current staff
Opportunity -positively impacted the safety of all who care for the patients	Threats -Continuing education computer based learning -New staff education

Appendix G


Patients and Signs Posted
25
20
15
10
5
0
8
5
11
4
16
6
14
8
21
15
11
4
20
10
Week 1
Week 2
Week 3
Mandatory reeducation
Week 4
Week 5
Week 6
Week 7
Week 8
Total number of patients
Number of signs up


Percentage of Signs posted
80
70
60
50
40
30
20
10
0
Week 1
Week 2
Week 3
Mandatory reeducation
Week 4
Week 5
Week 6
Week 7
Week 8