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**Increasing Adherence of Pump Integration with Electronic Medical
Record Through Simulation**

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Abstract

Problem: Intravenous (IV) medication errors account for one-third of the medication errors made by nurses in the United States. A measure to combat medication errors is the development of IV pump integration where the IV pump is electronically connected to the electronic medical record (EMR). With IV pump integration, the nurse is responsible for turning on the pump, scanning the medication and the IV pump, and confirming in the EMR. Human error is removed when the IV pump integration system automatically programs and starts the IV pump. This is a technical system which requires the nurse to have expertise in managing the IV pump. The purpose of the project was to evaluate the use of simulation (SIM) education in increasing the nurse's adherence in the use of IV pump integration.

Methods: A simulation scenario at a free-standing simulation center, was developed for a group of 16 nurses to increase adherence and success of the skills related to IV pump integration. The quality improvement project (QI) was instituted as an observational descriptive cohort design with a prospective adherence report ten weeks post education.

Results: Participants ($N=16$) demonstrated a significant improvement in the adherence rate ($M=92.75\%$) and successful use ($M=23.38$) of the IV pump integration at the ten-week interval. A decrease in the use of manual overrides and errors were noted, although the decrease in both rates were not significant due to the small effect size.

Implications: The use of simulation education significantly improved the adherence rate and appropriate use of IV pump integration. Results from this project can help to justify the utilization of simulation continuing nursing education.

Increasing Adherence of Pump Integration with Electronic Medical Record Through Simulation

According to the World Health Organization (WHO), medication errors are a leading global health concern (World Health Organization [WHO], 2017a). In the United States, WHO estimated 1.3 million people are injured annually by medication errors. It is estimated the annual cost of global medication errors is about 42 billion U.S. dollars (World Health Organization [WHO], 2017b). In 2017, WHO announced medication errors would be their third global patient safety challenge with the goal to decrease medication errors over the next five years (WHO, 2017a; WHO, 2017b). Intravenous medication errors in 2011 accounted for an estimated 37% of the medical errors in the United States (Giuliano, 2018a). In the United States, approximately 90% of hospitalized patients receive their medications via an intravenous infusion (IV) (Giuliano, 2018a, p. 215; Giuliano, 2018b, p. 17; Pham et al., 2016). The statistics on IV medication delivery identified a need for safer methods to administer the medications to patients.

The Institute of Medicine (IOM) identified medication errors as an issue in patient safety. The report, *To Err is Human* (2000), focused on development of strategies to ensure safe patient care, providing recommendations to health care facilities and health care professionals. One recommendation encouraged the use of electronic medical records (EMR) while another discussed safe administration of medications and accuracy in charting (IOM, 2000). After the IOM report, smart intravenous infusion pumps (smart pumps) with built-in drug formularies were developed to decrease IV medication errors (Giuliano, 2018a; Giuliano, 2018b). Smart pumps have continued to evolve to include an integration feature. The IV pump integration (pump integration) feature connects the

smart pump directly to the EMR via a scanned bar code (Pettus & Vanderveen, 2013). Scanning the bar code on the smart pump and IV medication or IV fluids (IVF) activates the drug formulary to find the right drug, dosage, volume, and recommended infusion time, based on the order received from the EMR (Harding, 2013; Institute for Safe Medication Practices [ISMP], 2020; Pettus & Vanderveen, 2013; Trbovich, Pinkney, Cafazzo, & Easty, 2010). The smart pump automatically programs itself; the only requirement of the nurse, to hang the IVF or intermittent secondary medications (IVPB), press start on the smart pump, and confirm in the EMR (Harding, 2013; ISMP, 2020). The required confirmation lets the EMR know the medication was given and how much volume infused (ISMP, 2020).

Nurses are often in a hurry and feel the required few extra minutes needed to start the pump integration will interrupt their workflow (Giuliano, 2015; Harding, 2013). This perception often leads to protocol deviations such as failure to scan the IVF / IVPB prior to administration, failure to include a primary infusion solution with an IVPB, manual programming of the smart pump and late entry of data into the EMR (Harding, 2013; Marwitz et al., 2019). The non-approved processes negate many of the safety features developed with the pump integration to the EMR system (Harding, 2013). Overriding these safety features can lead to wrong medication, wrong amount of the drug, and fluid overload, ultimately leading to death (Vanderveen & Husch, 2015; Wolf, 2016).

In the summer of 2019, pump integration was instituted at a large metropolitan Midwestern not-for-profit Catholic medical health care system. Approximately four months after adopting pump integration, the healthcare providers and educator on the cardiac telemetry unit noted inaccuracies in the fluid status of patients with IV infusions,

leading to potentially detrimental fluid overload issues. These inaccuracies led to an audit of adherence rates, which revealed a drop from 83% to 80% adherence since the inception of pump integration. The purpose of this quality improvement (QI) project is to evaluate whether the utilization of a SIM education experience improves the use of pump integration when scanning IV medications into the EMR on a cardiac telemetry unit. The aim of this project is to increase the nurse's adherence rate in the use of pump integration when scanning medications into the EMR to 85% and to decrease the manual overrides to less than 10% ten weeks after simulation education. The question of interest for this study is: In a cardiac telemetry unit in a metropolitan Midwestern not-for-profit Catholic medical health care system, what is the effect of a simulation education experience on the adherence rate of IV pump integration? Outcome measures for this study will include:

1. Rate of adherence in the utilization of the pump integration feature ten weeks after SIM education.
2. Rate of manual overrides decrease after SIM education.
3. Rate of pump integration attempts to successful confirmation
4. Work experience and pump integration experience.

Review of Literature

A literature search was conducted using Scopus, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline (Ovid), PubMed, and Cochran Review. Grey literature was also searched on the Institute for Safe Medication Practices (ISMP) and the Agency for Healthcare and Quality (AHRQ) sites. The searches included keywords and a combination of keywords such as: *smart pump*, *pump integration*, *electronic medical record (EMR)*, *electronic health record (EHR)*, *simulation*, *simulation*

education, intake and output, medication errors, and Epic. The search was filtered to include the years 2010 to 2020 with one historical report greater than ten years old. Publications included were scholarly and peer-reviewed or peer-reviewed alone. The initial search produced 255 articles which when reviewed the majority were found to be unrelated to healthcare. The filter for medicine and nursing was added to the search, which then produced from zero to 48 articles for the various search terms. In reviewing the titles and abstracts the list of articles for inclusion was decreased to 14 relevant articles. A review of the relevant articles produced the following themes: IV medication errors (Giuliano, 2015; Giuliano, 2018a; Giuliano, 2018b; Harding, 2013; ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Trbovich et al., 2010; Vanderveen & Husch, 2015; Wolf, 2016; WHO, 2017b), safe delivery of IV medications (Carayon, Hundt, & Wetterneck, 2010; Giuliano, 2015; Giuliano, 2018a; Giuliano, 2018b; Harding, 2013; ISMP, 2020; Marwitz et al., 2019; Pettus & Vanderveen, 2013; Pham et al., 2016; Vanderveen & Husch, 2015; Wolf, 2016), overrides and manually inputting data in the EMR (Giuliano, 2015; Harding, 2013; ISMP, 2020; Marwitz et al., 2019; Pham et al., 2016), IV pump integration (Giuliano, 2018a; ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Trbovich et al., 2010; Vanderveen & Husch, 2015), and lack of education of and trust in smart pump technology (Carayon et al., 2010; Giuliano, 2015; Giuliano, 2018a; Harding, 2013; ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Trbovich et al., 2010; Vanderveen & Husch, 2015).

Medication errors occurring with IV medication infusions are from IVPB, continuous IV drip medications (IV drips), and IVF (Giuliano, 2018a; Giuliano, 2018b; ISMP, 2020; Trbovich et al., 2010). Most hospitalized patients receive some form of IV

medications and/or IVF during their stay (Giuliano, 2018a; Giuliano, 2018b; Pham et al., 2016). Medication delivery has become increasingly complex, requiring the nurse to have a firm understanding of the medications being delivered to the patient. Issues in delivery of drugs include sound-alike medications, varying dosages, infusion time requirements, and weight-based requirements (Giuliano, 2018b; Harding, 2013; ISMP, 2020; Pettus & Vanderveen, 2013; WHO, 2017b). The Food and Drug Administration (FDA) reported 56,000 adverse drug events for the four years of 2005 to 2009 (Pham et al., 2016).

A survey conducted in 2012 found 77% of healthcare systems were using smart pumps with built-in drug formularies (Giuliano, 2018a). Drug formularies are part of the drug error reduction (DER) software embedded in the smart pumps, which identify correct dosage, time frame and whether a drug is weight-based. Smart pump drug formularies are now considered a standard of practice (Giuliano, 2018a; Giuliano, 2018b; ISMP, 2020; Vanderveen & Husch, 2015). Early literature indicated the development of smart pumps would decrease medication errors to a negligible amount, but subsequent surveys and retrospective case studies found this assertion to be inaccurate (Carayon et al., 2010; Wolf, 2016).

To decrease errors, smart pumps now have an IV pump integration feature which connects the pump directly to the EMR via barcode medication administration (Giuliano, 2018b; ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Vanderveen & Husch, 2015). The IV pump integration feature bypasses the need for the nurse to program the smart pump. Instead, programming is done via scanning in the data from the EMR after scanning the medication (ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Trbovich et al., 2010). The built-in safety features include the healthcare

provider's order entered in the EMR and verification by the pharmacist. The nurse then delivers the IV medication via barcode medication administration (ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Vanderveen & Husch, 2015). The last step of barcode medication administration, the verification step, is frequently forgotten. Without the verification, the EMR will not show the medication as given and the IVF, IV drip, or IVPB will not be entered as intake volume on the patient's fluid balance record (ISMP, 2020; Vanderveen & Husch, 2015). Pump integration creates an accurate medical record and removes many of the human errors associated with programming the smart pump (ISMP, 2020; Pettus & Vanderveen, 2013; Pham et al., 2016; Trbovich et al., 2010; Vanderveen & Husch, 2015).

The continuation of medication errors after the development of smart pumps led to several studies addressing smart pump medication error issues. Smart pumps without pump integration require programming every time a medication or IVF is delivered. The programming of the smart pump to deliver the IV medication allows human interaction with the smart pump often leading to human error (Baron, 2020; Carayon et al., 2010; Giuliano, 2015; Giuliano, 2018a; Giuliano, 2018b; Harding, 2013; ISMP, 2020; Marwitz et al., 2019; Pettus & Vanderveen, 2013; Pham et al., 2016; Vanderveen & Husch, 2015; Wolf, 2016). One issue of human error is overriding the pump safety features (Harding, 2013; Wolf, 2016). Smart pumps are programmed with soft-key limits and hard-key limits. The soft key limits are suggested parameters that can be overridden for a rate of infusion outside of the institutions' set parameters. The hard-key limits have a set upper and lower limit for dosages, duration, and rate that cannot be overridden (Giuliano, 2015; Harding, 2013; ISMP, 2020; Marwitz et al., 2019; Trbovich et al., 2010). Overriding involves

almost all the soft-keys and some of the hard-keys when programming the smart pump thus eliminating the protections and safety features (Giuliano, 2018a; Marwitz et al., 2019; Trbovich et al., 2010; Wolf, 2016). The soft and hard keys are protections in the smart pump that question whether the right amount of drug, rate of drug infusion, and patients' weight are correct (ISMP, 2020; Marwitz et al., 2019; Pham et al., 2016). These keys are often bypassed for one of two reasons: either the nurse does not trust the information in the smart pump, or the nurse feels it takes too many steps to program the smart pump (Carayon et al., 2010; Giuliano, 2015; Giuliano, 2018b; Harding, 2013; ISMP, 2020). Overrides also occur because nurses feel overworked, believe overriding is quicker, or because of the nurses' lack of knowledge (Baron, 2020; Carayon et al., 2010; Giuliano, 2015; Harding, 2013; ISMP, 2020; Marwitz et al., 2019; Pham et al., 2016). Even with the pump integration system, the nurses can still override the pumps' soft and hard keys and manually enter data (Giuliano, 2018a; Giuliano, 2018b; Harding, 2013). Manual overrides are needed when a new drug is not in the formulary or to give a rapid fluid bolus, but these occurrences should be less than 10% of the time (Giuliano, 2015; Giuliano, 2018a; Giuliano, 2018b; Harding, 2013; ISMP, 2020).

Nurse education priorities should focus on correct utilization of the smart pump and integration system, the available features and why safety features should not be overridden (Carayon et al., 2010). The nurse may feel like cognitive workload is increased with the amount of information needed to utilize a smart pump (Baron, 2020; Carayon et al., 2010). This may lead the nurse to feel overloaded causing correct procedures to not be followed (Carayon et al., 2010; Harding, 2013; ISMP, 2020; Marwitz et al., 2019).

Simulation has been recommended as a source of education for the nurse to learn new skills and develop an understanding of safe practice (Lame & Dixon-Woods, 2018; Lewis et al., 2019). Some aspects of education to be incorporated into the scenarios include education on smart pumps, safety, and EMR charting (Lame & Dixon-Woods, 2018; Lewis et al., 2019). An identified gap is the lack of education of nurses about EMR charting and the culture of safety (Lewis et al., 2019; Mountain, Redd, O’Leary-Kelly, & Giles, 2015). A recommendation from Mountain et al. (2015) is SIM education should include the use of EMR charting in any education scenario. Charting in the EMR is one component of pump integration. Nurses need to have a good understanding of EMR charting to be effective in the use of pump integration (Mountain et al., 2015; Trbovich et al., 2010). A well-written scenario can incorporate safety issues, EMR charting, and learning a new skill into one scenario to create the realism seen on the floor by the nurse. With SIM education, nurses can see how their actions could ultimately lead to an unsafe environment for their patients (Lame & Dixon-Woods, 2018; Lewis et al., 2019; Mountain et al., 2015; Trbovich et al., 2010). An important feature of SIM education is debriefing. Debriefing occurs after the SIM and allows the participants to explore their feelings, actions, and discuss ways to improve on their delivery of care (Lame & Dixon-Woods, 2018; Lewis et al., 2019). Debriefing reinforces the newly learned skill (Lame & Dixon-Woods, 2018; Lewis et al., 2019)

Another identified gap is the slow adoption of pump integration by hospital systems (Carayon et al., 2010; Giuliano, 2015; Harding, 2013; ISMP, 2020; Vanderveen & Husch, 2015). The pump integration technology is expensive and requires hospitals to replace their current smart pumps (Vanderveen & Husch, 2015). The change to pump

integration also includes changes to the EMR to have communication occur between the two computer systems (Vanderveen & Husch, 2015). The increasingly complex equipment requires increased education of the nurse and may take a longer time for acceptance of the new equipment and procedures (Carayon et al., 2010; Giuliano, 2015; Giuliano, 2018a; Giuliano, 2018b; Harding, 2013; ISMP, 2020; Marwitz et al., 2019). To ensure safe use of pump integration and early identification of related issues, the recommendation is continuous quality improvement (CQI) be instituted (Harding, 2013; ISMP, 2020; Vanderveen & Husch, 2015; Wolf, 2016).

This quality improvement project seeks to change the nurse's perceptions and skills related to pump integration and the culture of safety. SIM education lends itself to the framework of Plan-Do-Study-Act (PDSA) utilized in quality improvement. The PDSA framework involves developing a plan of action, instituting the action, studying the outcome of the action, and then evaluating the action. Evaluation will determine whether the plan was successful or needs modification before being repeated. The SIM education and debriefing will provide evaluation feedback for the PDSA. A prospective chart review will identify whether change was sustained or does the PDSA cycle need to be adjusted and repeated (Hickey & Brosnan, 2017).

Methods

Design

An observational descriptive cohort design was used for this quality improvement project, with review of a prospective adherence report to evaluate the utilization of pump integration. A retrospective adherence report was compared to a ten-week prospective adherence report identifying the frequency of pump integration when

charting in the EMR. The PDSA framework was utilized for this project.

Setting

The quality improvement project occurred in a large metropolitan Midwestern not-for-profit Catholic medical health care system. There are approximately 11,500 health care employees across the system which includes seven acute care hospitals, a pediatric hospital, a rehabilitation network, and a free-standing simulation center. The nurses receiving the SIM education were from a designated unit in a 476-bed acute care hospital in the health care system. The designated unit was a 27-bed cardiac telemetry unit with 23 registered nurses.

Sample

A convenience sample of 18 nurses from the cardiac telemetry unit during October 2020 was utilized for this project. Inclusion criteria included all nurses hired to the designated unit. Exclusion criteria was any nurse not hired to the designated unit. The pump integration SIM education is a component of the designated units' mandatory yearly education.

Approval Processes

Approval was obtained from the simulation center director and the educator from the designated unit within the medical health care system. Additionally, approvals were received from the doctoral committee, University of Missouri-St. Louis (UMSL) Institutional Review Board (IRB), the medical health care systems IRB, and the UMSL graduate school. There were minimal risks associated with this study as it is a retrospective and prospective adherence report review. To minimize risks to confidentiality, all data was de-identified and stored on a password protected computer.

Only the educator of the unit and the DNP student had access. The benefits of the project include increased education and improved adherence rates related to the use of IV pump integration on the unit.

Data Collection and Analysis

The data included a nursing experience survey (see Appendix A). The survey identified the participants work experience and initial education on pump integration. A retrospective adherence report was obtained one month, August 2020, before the SIM education occurred. A prospective adherence report occurred ten to ten and a half weeks, post-SIM education in December 2020. The prospective adherence report included specific adherence rates for each nurse on the designated unit. The individual nursing adherence rate report identified: how often pump integration occurred, if pump integration was not utilized, frequency of manual overrides, and how many errors were made before pump integration was successful. The data was collected on an excel spreadsheet (see Appendix B) and analyzed via IBM SPSS Statistics Standard GradPack 27. The data analytics included descriptive statistics, T-tests and Anova. The data collected was coded and de-identified, via a random number assignment of each participant. Only the educator from the designated unit and the DNP student had access to the identifiers. A master list containing the names of the nurses with their corresponding unique identifier was kept on a password protected computer and destroyed immediately following data collection. This list was used to connect the survey data with the adherence report data.

Procedures

A team of key stakeholders was formed, including the educator from the designated unit, the simulation educator, and the DNP student who collected the data.

The group met in January 2020 to discuss and plan the SIM education. Due to a global pandemic the project was placed on hold. The key stakeholders remained in contact via text, email, and phone.

In October 2020 groups of nurses participated in a mandatory unit wide educational SIM experience designed to utilize pump integration with the EMR. Prior to the SIM the participant nurses completed a short survey (see Appendix A) regarding their educational and work experiences. The nurses then completed an educational SIM experience after a brief discussion of the objectives of the SIM and an orientation to the simulation rooms. The SIM education included a brief orientation, a standardized SIM scenario with two manikin patients, followed by a debriefing session. The SIM included two to four nurses from the designated unit performing assigned roles in a scenario which included various skills in the care of patients, including pump integration. The SIM education was provided in mandatory four-hour increments on four separate days in October 2020. Ten weeks after the SIM education a prospective adherence report was reviewed on the individual nurses from the designated unit.

Results

A total of 16 participants ($N=16$) met inclusion criteria and consented to participate in the study. A survey identified the number of years as an RN as 1-5 years 56.3% ($N=9$); 6-10 years 31.3% ($N=5$); and greater than 20 years 12.5% ($N=2$). Half of the nurses identified as having worked on the cardiac telemetry unit for 1-5 years 50%, ($N=8$). The other nurses were split with 31.3% ($N=5$) being on the unit more than 5 years and the other three nurses being on the unit for one year or less 18.8%, ($N=3$). The majority of the nurses were originally educated on pump integration during the summer

of 2019 (62.5%, $N=10$). The other six nurses were evenly split between being educated in September-October 2019 and January-March 2020. Half of the nurses were educated in hospital orientation, where the education times varied, while the rest of the nurses were educated in a designated class on pump integration.

Approximately ten to ten and a half weeks after their SIM education a report was generated from EPIC, which identified the nurse's interaction with the pump integration system. EPIC is the EMR charting system utilized by the hospital in this study. The report identified the compliance rate of the staff, which correlated to the adherence rate, and was analyzed via a one-tailed t -test and descriptive statistics. There was a statistically significant increase in compliance of pump integration from pre-education ($M=89.06\%$, $SD=12.25\%$) to ten-weeks post-education ($M=92.75\%$, $SD=7.10\%$), $t(15)=4.364$, $p < .005$ (one-tailed) (see Appendix D). Another aspect of the education was to decrease the frequency of manual overrides to less than 10%. A one-tailed t -test was run on the frequency of manual overrides which demonstrated a statistically significant decrease (Pre- $M=.69$, 4.18%; Post- $M=.50$, 2.1%), but based on Cohen's d (.19) there was a small effect size.

Another aspect of the SIM education was to increase the success rate of pump integration leading to a decrease in error rates. Successful integration versus number of errors was analyzed via a two-tailed t -test and descriptive statistics. The success rate had a statistically significant increase (Pre- $M=16.75$, $N=268$; Post- $M=23.38$, $N=374$) which correlated with the increased adherence rate. The mean increase in the success rate was 6.625 with a 95% confidence interval ranging from .348 to 12.902 and a large effect size according to Cohen's d (.59). The error rate did decrease, but because of the small size it

was not statistically significant (Pre- $M=2.69$, $N=43$; Post- $M=2.13$, $N=34$; $t(15) = -0.726$, $p > 0.05$). Lastly, a one-way Anova was conducted to explore the impact of years of nursing experience on success rates of IV pump integration related to a SIM education program (see Appendix F). The nurses were divided into three groups according to their years as an RN (Group 1: 1-5 years; Group 2: 6-10 years; Group 3: 20 years and above). There was no significant difference in successful pump integration, but during Post-hoc comparisons using the Tukey HSD test an interesting phenomenon was identified. The Post-hoc test indicated Group 2 was significantly lower than Group 1 and Group 3 success rates. The assumption was the nurses with the highest years of experience would have less knowledge of technology, but the Post-hoc test disproved this theory.

Discussion

The project had several unforeseen issues due to a global pandemic and a lower than anticipated number of participants. The lower participant numbers were related to illness, leaves, and no shows. The project was rescheduled to October 2020 due to a global shut down in March 2020. With the change in dates an updated adherence rate was retrieved on the EPIC data noting the unit's rate improved to 89%, above the SIM education projects projected 85%. The final adherence rate at the end of the project was 92.75% ($SD=7.1\%$) (see Appendix E) which was close to the adherence goal of 95% to 100% set by the chief pharmacist for the system. The new pre-SIM education adherence rate may be related to the unit changing from a cardiac telemetry unit to a Covid-19 unit to handle the influx of patients. Covid-19 patients are on isolation with an increase in the number of IV's and IVPB's, giving the nurses increased exposure to the use of pump integration. The increased exposure may have influenced how the nurses perceived the

use of pump integration, resulting in improved skills prior to attending the SIM class.

This exposure may have influenced the success rate of pump integration but did not have an impact on the error rate. An issue noted involved debriefing inconsistencies.

Debriefing is an integral part of SIM, which allows the discussion of actions occurring in the scenario. In debriefing participants identify their behaviors in the scenario, which facilitates learning and provides discussion on strategies to improve their skill. Using the PDSA framework, future SIM education requires the use of specific debriefing questions to provide consistency. The post data collection time occurred in December around the holidays. This time frame may have skewed the results, due to decreased staffing and an influx of Covid-19 patients in November. It is recommended the unit educator retrieve another adherence report from EPIC to see if the nurses retain their acquired knowledge.

Conclusion

The study provided evidence that SIM education does have a benefit in improving the knowledge and skills of nurses. The results reveal learning is done in simulation even if the nurse is not the one directly completing the skill, as demonstrated by the increased compliance rate to 92.75%. There were several factors which may have influenced the outcomes including debriefing and the pandemic which is not a common occurrence. A recommendation would be to repeat the SIM education using debriefing questions specifically addressing errors and manual overrides. Results from this project demonstrate and justify the continued use of SIM education to reinforce skill and knowledge acquisition. Simulation learning involves multiple levels of learning including audio, visual, and kinesthetic which together help to reinforce newly acquired knowledge.

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[effort-to-halve-medication-related-errors-in-5-years](https://www.who.int/en/news-room/detail/29-03-2017-who-launches-global-effort-to-halve-medication-related-errors-in-5-years)

Appendix A

Number: _____

Table 1

Nursing Experience Survey

<u>Questions</u>	<u>Answers</u>
Length of time working as a nurse.	<input type="checkbox"/> New Graduate <input type="checkbox"/> 1-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> 11-20 years <input type="checkbox"/> Greater than 20 years
Length of time working on current unit.	<input type="checkbox"/> Less than 6-months <input type="checkbox"/> Less than a year <input type="checkbox"/> 1-5 years <input type="checkbox"/> Greater than 5 years
When first educated on IV pump integration.	<input type="checkbox"/> Summer 2019 <input type="checkbox"/> Sept / Oct 2019 <input type="checkbox"/> Nov / Dec 2019 <input type="checkbox"/> Jan – Mar 2020
First educated on IV pump integration.	<input type="checkbox"/> In a 4-hour class <input type="checkbox"/> In a 2-hour class <input type="checkbox"/> In hospital orientation
Comments	

Note: Smart pump is a programmable IV infusion pump with a drug formulary. IV pump integration is a smart pump connected to the EPIC electronic record.

Appendix B

Table 2

Nurse Experience Survey and IV Pump Integration Data

Nurse	Years Worked		Initial Education on IV Pump Integration			IV Pump Integration Adherence Report			
	As Nurse	Current Unit	Date Educated	Skill Class length	Hospital Orientation	Successful	Tries	Not Used	Manually Entered
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Note. Appendix A Survey Data collected during registration for simulation education. The survey data includes years worked and initial education on IV pump integration. IV pump integration adherence report obtained six weeks after simulation education.

Appendix C

Informed Consent

I am asking you to participate in a quality improvement project. This form is designed to give you information about this project. I will describe this project to you and answer any of your questions.

Project Title: Increasing Adherence of Pump Integration with Electronic Medical Record Through Simulation (UMSL IRB # 1618414, SSM IRB # 20-03-1798)

Principal Investigator: Judith Ann Reeves, MSN, RN, CCRN
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What the study is about

The purpose of this quality improvement project is to identify whether simulation education will improve the compliance rates of the twenty-three staff members performing IV pump integration on the cardiac telemetry floor at DePaul Hospital. You will complete your unit education on IV pump integration in a simulation scenario. The scenario will be followed with a debriefing session. Debriefing is a time when you can discuss and review what occurred in the simulation, how you felt about it, and any concerns or issues you may have. Six weeks after the simulation a compliance report will be run from EPIC to see if the skills learned in simulation continue to be used in the same way initially taught. The items being specifically reviewed are: 1. was IV pump integration done; 2. how many tries did it take until successful IV pump integration; 3. was a manual overriding of the IV pump integration done; 4. was the use of the IV pump integration bypassed and manual charting of the medication done at a later time in EPIC.

What we will ask you to do

Before you to complete your simulation education on IV pump integration which you are already scheduled for as part of you unit education, you will be asked to fill out a short survey on previous nursing experience and what your initial education on IV pump integration included i.e.: type of class, length of class, and how long ago you took the class. The survey should only take about five minutes.

Six weeks after the simulation education a review of the use of IV pump integration will be conducted on the unit via the EPIC Electronic Medical Record. The review will be of the unit's overall compliance and of the participants compliance related to the use of IV pump integration.

Risks and discomforts

There may be minimal risks associated with this project such as boredom or fatigue while filling out the survey. The risk of security breach is discussed under privacy/confidentiality.

Benefits

The information collected may be of benefit to the unit's educator and/or the management team. This project may identify whether simulation education will improve the knowledge and skill of the participants in performing the skill of IV pump integration.

Alternatives

This research does not involve any experimental procedures, treatment, or therapy.

Privacy/Confidentiality

We will do everything we can to protect your privacy. As part of this effort, your identity will not be revealed in any publication that may result from this study. In rare instances, a researcher's study must undergo an audit or program evaluation by an oversight agency (such as the Office for Human Research Protection) that would lead to disclosure of your data as well as any other information collected by the researcher. When arriving for the simulation education, you will be given a random number to create a code for your records. The coded identification file and the survey's will be accessible only to Judi Reeves, DNP student (PI). Once the statistics have been calculated, the data will be destroyed. Until they are destroyed the computer records will be kept on a password protected computer and any surveys collected will be kept in a locked cabinet. Kelly Papagianis, Clinical Educator, DePaul Hospital and Judi Reeves, DNP student (PI) will have access to the raw data collected from EPIC six weeks after the education. Mrs. Papagianis will be the person collecting the data from EPIC. Once collected and given to the PI, she will no longer have access to the data. This data will be kept on a secure password protected computer.

Cost of participating

There will be no costs to participants.

Payment for participation

There is no payment for taking part in the study.

If you are injured by this research

In the event that any research-related activities result in an injury, treatment will be made available including first aid, emergency treatment, and follow-up care as needed. Cost for such care will be billed in the ordinary manner to you or your insurance company. No reimbursement, compensation, or free medical care is offered by SSM Health Care. If you think that you have suffered a research-related injury, contact Judith Reeves right away at 314-368-7450.

Taking part is voluntary

This Quality Improvement Project only includes the Nursing Experience Survey and collection of data in the IV Pump Integration Compliance Report which are both voluntary. You may refuse to participate in filling out the survey and refuse to have data collected individually on you when the IV pump integration compliance report is run on the cardiac telemetry unit. You may withdraw from the project at any time, with no penalty to you. There will be a unit compliance report reviewed, but it will not identify any individuals.

Withdrawal by investigator, physician, or sponsor

The investigators, physicians or sponsors may stop the project or take you out of the project at any time should they judge that it is in your best interest to do so, if you experience a project-related injury, if you need additional or different medication/treatment, or if you do not comply with the project plan. They may remove you from the project for various other administrative and medical reasons. They can do this without your consent.

If you have questions

The main researcher conducting this project is Judith Reeves. If you have questions, you may contact Judith Reeves at 314-368-7450 or her advisor Dr. Alicia Hutchings at 314-516-6075. If you have any questions or concerns regarding your rights as a subject in this project, you may contact the SSM St. Louis Institutional Review Board (IRB) for Human Participants at 314-989-2032.

If you have questions or concerns regarding your privacy and the use of your personal health information, you may contact the SSM CRP/Regulatory Coordinator at (314) 989-2824.

You will be given a copy of this form to keep for your records.

Statement of Consent

Your signature indicates that you have read and understand the above information, that you have discussed this study with the person obtaining consent, that you decided to participate based on the information provided, and that a copy of this form has been given to you.

Your Signature _____ Date _____

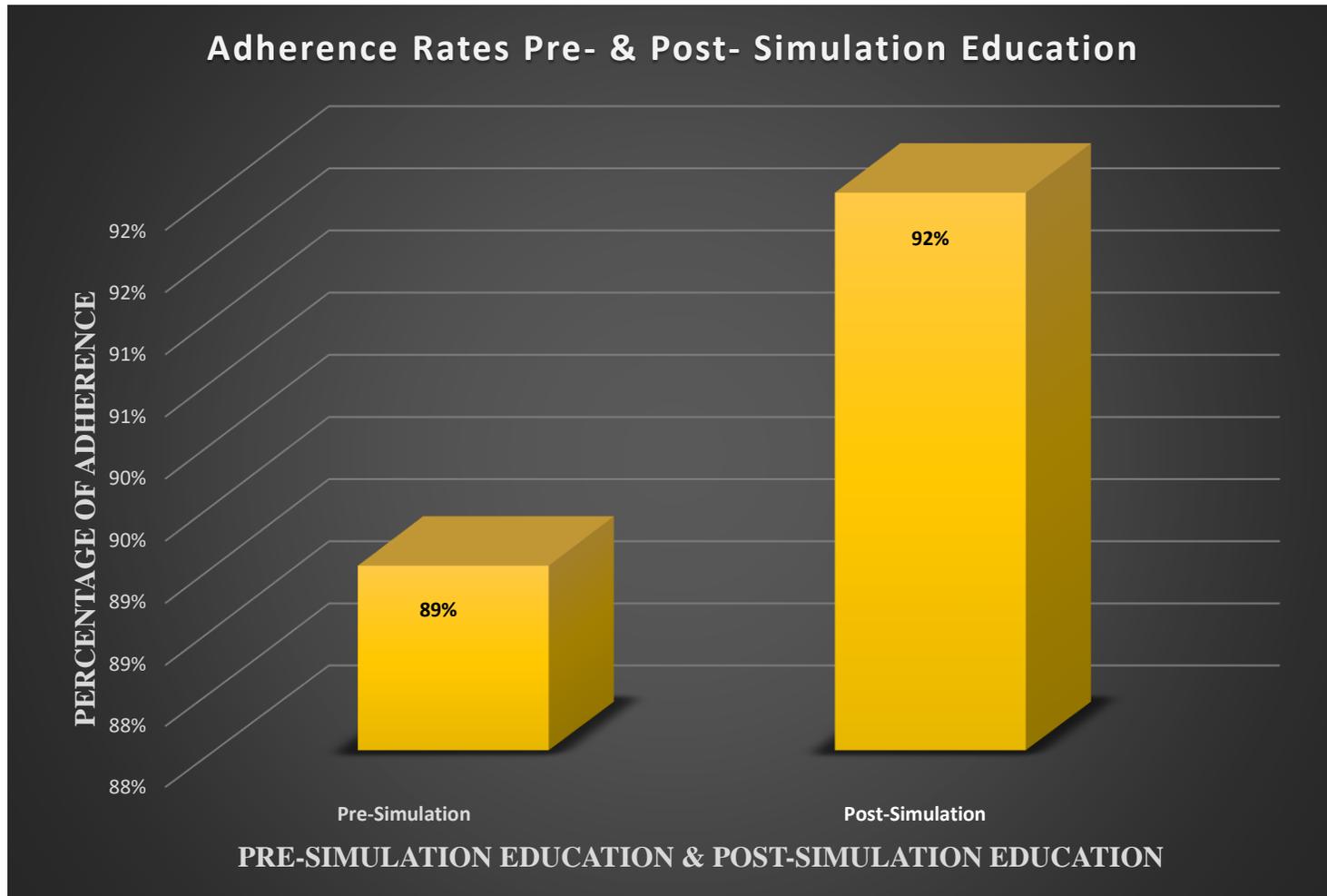
Your Name (printed) _____

Signature of person obtaining consent _____ Date _____

Printed name of person obtaining consent _____

Appendix D

Figure 1. Unit Adherence Rates



Appendix E

Figure 2. Individual Adherence Rates

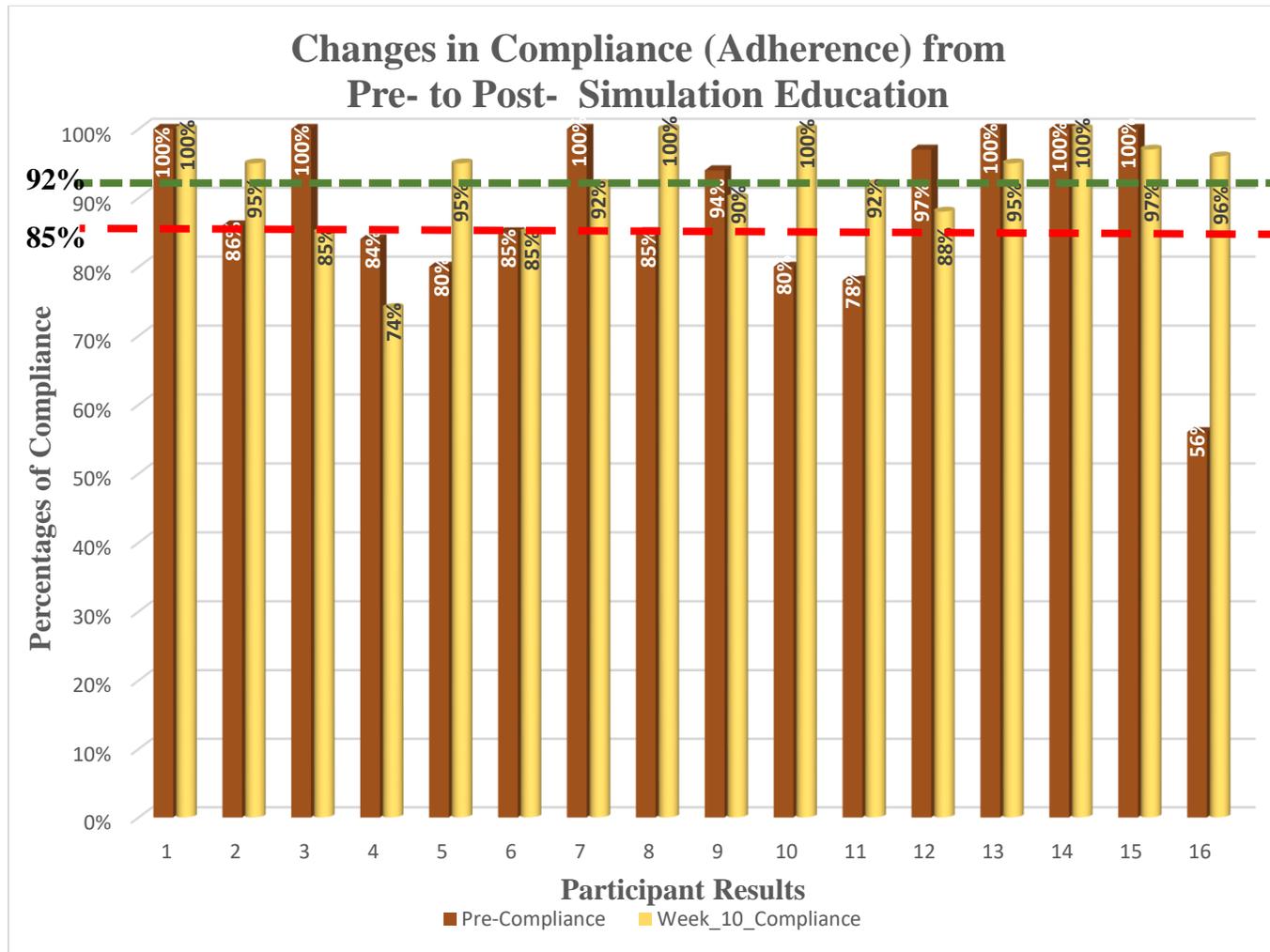


Figure 2. Percentages obtained from EPIC report on compliance in the use of IV Pump Integration. Red line is the original goal post-simulation education. Green line is the actual post-simulation education results.

Appendix F

Figure 3. Successful IV Pump Integration by Years an RN

