Improving Patient Safety and Decreasing Medication Errors by Improving Bar Code Medication Administration Compliance

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Abstract

A quality improvement initiative at a critical access hospital in rural Nevada is non-compliance with bar code medication administration (BCMA). BCMA has been shown to reduce medication errors in healthcare settings and should be done 100% of the time to reduce potential harm to patients. An educational program was implemented to inform how BCMA protects patients and prevents medication errors as part of a plan-do-study-act (PDSA) cycle. The program included pre-tests, post-tests, a survey, and an attestation of intent to comply with the policy. BCMA started improving when the flyers for the education program were posted. The post-education scanning rate reached 89% in March 2023, an improvement over the June 2022 rate of 67%. The current culture needs to be addressed by the facility to gain better compliance and address issues with equipment that does not work properly. It has been suggested to post scanning percentages monthly. The facility has started sending emails to staff with compliance issues. Compliance may be increased by rewarding those who comply and calling out those who lack compliance. Further research should be done on attitudes surrounding BCMA. Improving BCMA rates should be studied with Kotter's Change Model and PDSA to determine the most effective way to implement a practice change and a culture (attitude) change.

Keywords: Barcode Medication Administration, Medication Safety, Patient Safety, Medication Best Practices.

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Improving Patient Safety and Decreasing Medication Errors by Improving Bar Code Medication Administration Compliance

Introduction

A quality improvement initiative at a critical access hospital in rural Nevada is non-compliance with bar code medication scanning (BCMA). BCMA is a best practice with three national guidelines addressing it (Billstein-Leber et al., 2018; Institution for Safe Medication Practices [ISMP], 2022; Leapfrog Group, 2017). The American Society of Hospital Pharmacists (ASHP, 2018) has eleven areas where they have identified steps to increase medication safety in hospitals. The eighth area is medication administration (Billstein-Leber et al., 2018). ASHP reports that BCMA should be used to enhance medication safety (Billstein-Leber et al., 2018). The ISMP aims to identify best practices for medication safety and encourage the national adoption of these practices (ISMP, 2022). ISMP supports using BCMA in all hospital patient areas (Institute for Safe Medication Practices [ISMP], 2022). This includes the ED, outpatient surgery, and inpatient units (ISMP, 2022). The Leapfrog Group was established in 2000 as a national non-profit for quality and safety in healthcare (Leapfrog Group, 2017). The Leapfrog Group has a BCMA policy with four standards (Leapfrog Group, 2017). The first standard is BCMA implementation; the second is scanning patient armbands and medications at a minimum of 95% of the time (Leapfrog Group, 2017).

Medication errors kill up to 98,000 hospitalized patients yearly (Owens et al., 2020). Medication administration errors (MAEs) account for 30% of medication-related errors (Ho & Burger, 2020). Medication errors threaten patient safety and are thought to increase time in the hospital by 4.6 days (Shah et al., 2016). Medication errors happen to approximately 75% of hospitalized patients, causing harm to roughly ten percent, or 1.5 million patients annually (Küng

et al., 2021). An estimated one-third of these harmful errors may be preventable (Küng et al., 2021). A literature review done in Australia shows that not only does BCMA improve efficiency, but it can also reduce dispensing errors by up to 96%, as well as reduce documentation errors by up to 80.3% (Naidu & Alicia, 2019). A study published by the Mayo Clinic showed that medication errors decreased by 55.4% in events that would have caused patient harm when BCMA was implemented (Thompson et al., 2018).

Scanning of medications at the facility averages less than 75% for nursing and emergency department (ED) medication techs. These percentages represent the ED and the medical-surgical/telemetry unit (MedSurg/Tele). Currently, the reporting system cannot report the rate of patient armband scanning. It was initially thought that the scanning rates decreased during the COVID-19 epidemic because scanners were attached to the workstations-on-wheels (WOWs) and the infection control precaution of not taking WOWs into isolation rooms. When data were analyzed for the period before COVID-19, it was discovered that the rates had yet to reach the 95% benchmark since BCMA was implemented in February 2019. The lack of appropriate use of BCMA technology decreases patient safety by increasing the potential of a medication administration error (MAE). The health system has chosen BCMA as a priority quality improvement initiative.

Problem Statement

BCMA currently averages less than 75% of all staff who administer medications. By addressing staff barriers to BCMA, such as technical issues or lack of equipment, and educating staff on the importance of BCMA in patient safety and decreasing MAEs, scanning medications will reach the benchmark of 95% compliance.

Project Question

Will nurses and ED medication techs reach a BCMA compliance of 95% in five weeks after being educated and addressing barriers?

Search Methods

An extensive search utilizing the following databases: UpToDate, ECRI, Agency for Healthcare Research and Quality (AHRQ), NCQA, National Center for Complementary and Integrative Health (NCCIH), American Association of Nurse Practitioners (AANP), Centers for Disease Control and Prevention (CDC), and World Health Organization (WHO) were initially searched to look for a national guideline with no results. A Google search for "medication safety" returned national guidelines from the ISMP and the ASHP (Billstein-Leber et al., 2018; ISMP, 2022). A second search for "increasing bar code medication administration" returned a third national guideline (Leapfrog Group, 2017).

The facility provided a copy of the policy on BCMA, located in Appendix A. The policy addresses medication bar code scanning from receipt into the pharmacy through administering to a patient. This policy outlines not only every step which requires bar code scanning but also instructions on how to perform bar code scanning when using the electronic medical record (EMR) (Southwest Nevada Rural Hospital, 2019).

Criteria were determined to be increasing compliance with bar code medication administration by nurses by addressing barriers and education. Inclusion criteria were medication safety using BCMA, implementing BCMA in acute care facilities, and increasing compliance with BCMA in acute care facilities. Exclusion criteria were outpatient-only settings and facilities where automated dispensing devices (ADDs) and computerized provider order entry (CPOE)

were added to existing BCMA systems. The initial search was from CINAHL Plus, PubMed Central, EBSCO host, and Consumer Health Journal provided through the Jay Sexter library at Touro University Nevada. Search terms were “bar code medication administration” AND “nurses” from 2018 to 2022, peer-reviewed, and available online. This returned 53 results. Of these results, 24 were determined as not meeting the criteria from the title, four were duplicates, one had a more recent similar study by the same author, and one was not in English. One 2016 study was added as supporting evidence because it is a systematic review referenced in one of the studies included. The second search was “bar code medication administration” AND compliance OR education. This search returned six results. Two were duplicates, two did not meet the criteria, and the last two were not peer-reviewed.

A Google Scholar search using the terms “bar code medication administration” AND “nurses” AND “compliance” AND “patient safety” returned 101 titles. Four were duplicates, and 86 were determined not to meet the criteria by title. A second search using the terms “bar code medication administration” AND “compliance” OR “education” from 2018 to 2022 returned 476 results. The term “nurses” was added, bringing the results to 325. “Improving compliance bar code medication administration” AND “nurses” had no results. A final search using the terms “bar code medication administration” AND “improving compliance” OR “education” returned six results. None of the six results met the criteria. The 11 results from the initial Google Scholar search were then searched through the Jay Sexter library to determine that they were peer-reviewed, leaving 35 studies from the two searches.

Abstracts were then used to eliminate 14 additional studies. Two other studies were eliminated because only the abstract could be obtained. After reading the articles, two more

studies were eliminated because they studied the effect of ADDs added to an existing BCMA system. The result was 20 studies and guidelines that met the criteria.

Review of Study Methods

The resulting literature reviews included national guidelines, quantitative and qualitative studies, cohort comparisons, quasi-experimental studies, prospective studies, systematic reviews, literature reviews, descriptive research, case studies, reports of implementations, and narrative reviews. The emerging themes are relevant to the DNP project because studies show the advantages of BCMA for increasing patient safety by decreasing medication errors, barriers discovered in the implementation of BCMA, or how BCMA compliance levels were raised to the standard of The Leapfrog Group.

Review Synthesis

The most prevalent theme was that BCMA reduces medication errors (Billstein-Leber et al., 2018; ISMP, 2022; Küng et al., 2021; Leapfrog Group, 2017; MacDowell et al., 2021; Macias et al., 2018; Owens et al., 2020; Shah et al., 2016; Strudwick et al., 2018; Thompson et al., 2018). Barriers to implementation, both psychological and physical or technology related, were another theme (Barakat & Franklin, 2020; Lunt & Mathieson, 2020; Mulac et al., 2021; Shah et al., 2016; van der Veen et al., 2020). Methods for increasing compliance with BCMA were the last identified themes (Baiden, 2018; Bird, 2020; Ho & Burger, 2020; Küng et al., 2021; Macias et al., 2018; Naidu & Alicia, 2019; Owens et al., 2020; Perez Arias, 2019; Strudwick et al., 2018; Thompson et al., 2018; Van Ornum, 2018).

Impact of the MAEs

Seventy-five percent of hospitalized patients will experience a medication error, and 30% of these errors are MAEs (Ho & Burger, 2020). Of the hospitalized patients that experience a

medication error, 10% (1.5 million) will be harmed by the error, while a third of these errors may be preventable (Küng et al., 2021). Approximately 98,000 of these 1.5 million will die annually (Owens et al., 2020). A medication error that causes harm will increase the number of days the patient stays in the hospital by an average of 4.6 days (Shah et al., 2016). Workarounds when using BCMA potentially expose patients to the errors BCMA was meant to eliminate (van der Veen et al., 2020).

Reduction of MAEs with the Implementation of BCMA

According to Shah et al., implementing BCMA has significantly impacted wrong patient, wrong dose, wrong route, wrong medication, and medication omission errors (Shah et al., 2016). The effect of wrong-time medication errors is not as significant (Baiden, 2018; Shah et al., 2016). In a systematic review of BCMA systems implemented where an ADD and CPOE system was already in place, BCMA improves the rate of charting medication administered (Shah et al., 2016). Implementation of BCMA also increased compliance with patient identification and was found to be a double check of the five rights of medication administration (Shah et al., 2016). The literature review by Baiden supported the decrease in MAEs but showed an extensive range of results (Baiden, 2018).

In addition to the national guidelines by The Leapfrog Group, ASHP, and ISMP, there is sufficient evidence to support the use of BCMA in reducing MAEs (Baiden, 2018; Barakat & Franklin, 2020; Billstein-Leber et al., 2018; 2018; Bird, 2020; ISMP, 2022; Küng et al., 2021; Leapfrog Group, 2017; MacDowell et al., 2021; Macias et al., 2018; Naidu & Alicia, 2019; Owens et al., 2020; Shah et al., 2016; Strudwick et al., 2018; Thompson et al., 2018). A cohort comparison with a group with BCMA implementation and a control group supports the decrease in MAE (Macias et al., 2018). The control group had increased medication errors from 18% to

39%, while the intervention group had decreased medication errors from 20% to 10%, with a confidence interval (CI) of 95% (Macias et al., 2018). Macias et al. (2018) performed their study on an oncology ward. It showed a decrease in administering the medications in the wrong order and other medication error decreases (Macias et al., 2018). Another study showed a reduction in MAE from 2.96% to 0.76% (P <0.01) and an increase in nurse satisfaction with the medication administration process from 2.6 to 2.29 (P <0.01) (Owens et al., 2020). Küng et al. (2021) showed a risk reduction in MAE by 54.9%. The total risk reduction was insignificant when adjusted for the nurses' experience (Küng et al., 2021). Still, the odds ratio (OR) of the wrong medication administration decreased to 0.38 (P < 0.01), while the wrong dose administration decreased to an OR of 0.12 (P=0.004) (Küng et al., 2021). Post-implementation errors eliminated were wrong patient and wrong route (Küng et al., 2021). An expert opinion paper by MacDowell supported the use of BCMA as a high-tech method of reducing MAE, while Bird stated that a literature review supported the implementation of BCMA in their facility (Bird, 2020; MacDowell et al., 2021).

Physical Barriers to the Use of BCMA

Physical barriers to using BCMA include technology issues and inadequate tools or equipment (Baiden, 2018; Mulac et al., 2021; Perez Arias, 2019; Shah et al., 2016; van der Veen et al., 2020). Most technical problems were bar codes that would not scan or inconsistent wireless connectivity (Baiden, 2018; Mulac et al., 2021). The ASHP states that technology must work to prevent workarounds, as well as a process to alert the pharmacy when medications do not scan (Billstein-Leber et al., 2018). Technology issues were why many nurses deviated from BCMA policy and were the most significant barrier to compliance (Macias et al., 2018; Mulac et al., 2021; Perez Arias, 2019; Shah et al., 2016). Developing an education plan for strategies to

address physical barriers helps improve compliance (Macias et al., 2018; Mulac et al., 2021; Perez Arias, 2019; Shah et al., 2016).

Psychological Barriers to the Use of BCMA

One of the psychological barriers to implementing BCMA was the assumption that BCMA increases medication administration time (Barakat & Franklin, 2020; Küng et al., 2021; Mulac et al., 2021; Perez Arias, 2019; 2019; 2019; van der Veen et al., 2020). Some nurses believed that BCMA increased MAEs (Barakat & Franklin, 2020). One barrier was the impression that there was a lack of evidence that BCMA decreased MAEs, and some believed that it increased errors (Shah et al., 2016). Nurse involvement is essential for the success of BCMA (Strudwick et al., 2018). Owens et al. (2020) found that nurse satisfaction increased after implementing BCMA. Developing an education plan that addresses psychological barriers helps increase compliance (Barakat & Franklin, 2020; Perez Arias, 2019).

Increasing Compliance for BCMA

Nurse input and involvement are essential for implementation and continued compliance with BCMA, as well as nurse training and patient education (Strudwick et al., 2018). BCMA should be an ongoing process rather than a one-time rollout (Shah et al., 2016). Nurse and nursing leader input into the reporting process, publicly posting compliance reports and emails to staff below the benchmark increased compliance in a facility (Van Ornum, 2018). One facility used Kotter's change theory, performance dashboards, and plan-do-study-act (PDSA) cycles to implement change and sustain engagement (Ho & Burger, 2020). Another facility started with Kotter's model for the pilot study but switched to Lewin's model for sustainment when implementing BCMA (Bird, 2020). One facility educated staff on the importance of BCMA, toured low compliance units, and identified barriers (Perez Arias, 2019). Barriers were

addressed, and targeted education for individuals below the benchmark was used to increase BCMA percentages (Perez Arias, 2019).

Addressing Gaps and Controversies

Baiden (2018) found several areas identified as gaps in research regarding BCMA. One gap was a need for robust qual (Baiden, 2018) qualitative research. A second gap identified was a need for more theoretical frameworks used for research. Baiden (2018) also felt there needed to be more research to determine how organizational frameworks and external regulations impacted the implementation of BCMA. Gaps in evidence were identified as studies using qualitative evidence and theoretical frameworks, as well as how organization frameworks or external regulations affected the implementation and use of BCMA (Baiden, 2018). Barakat & Franklin (2020) felt there was a lack of studies addressing perceptions of increased workflow and that these studies merited further investigation.

Conclusion

Of the 1.5 million hospitalized patients that will experience a harmful medication error, it is estimated that 98,000 will die annually from the error (Owens et al., 2020). BCMA protects patients from many MAEs (Billstein-Leber et al., 2018; ISMP, 2022; Küng et al., 2021; Leapfrog Group, 2017; MacDowell et al., 2021; Macias et al., 2018; Owens et al., 2020; Shah et al., 2016; Strudwick et al., 2018). The most significant impact of BCMA was in reducing medication errors: wrong dose, wrong route, wrong medications, and medication omission (Shah et al., 2016).

Addressing physical and psychological barriers is essential to successfully implement BCMA (Bird, 2020; Naidu & Alicia, 2019; Thompson et al., 2018). Addressing physical and psychological barriers may improve compliance with BCMA (Ho & Burger, 2020). Anticipating

and addressing workarounds will aid implementation and increase compliance (MacDowell et al., 2021; van der Veen et al., 2020; Van Ornum, 2018). When implementing a plan to improve compliance with BCMA having a theoretical framework and implementing PDSA cycles is helpful (Bird, 2020; Ho & Burger, 2020). Staff who administer medications have increased compliance after education about the many patient safety issues surrounding non-compliance and leadership support (Ho & Burger, 2020; Perez Arias, 2019; Strudwick et al., 2018; Van Ornum, 2018).

Project Aims

The project aims to provide safe patient care by improving BCMA compliance. Additional aims include increasing knowledge of the patient safety aspect of BCMA, decreasing the potential for MAEs, and reducing the number of actual MAEs by becoming compliant with BCMA. Through education, the project will increase BCMA compliance to at least 95%, the minimum benchmark (Leapfrog Group, 2017). This will improve patient safety by decreasing the incidence of possible and actual medication errors. With increased knowledge of the BCMA advantages and the patient safety aspect of reducing medication errors, staff administering medication should become compliant.

Project Objectives

1. Improve staff compliance with national standards for medication scanning rates to 95% within the five-week implementation frame.
2. Administer an education program for the multidisciplinary team to train staff on BCMA with post-test knowledge scores of 100%.
3. Decrease administration-related medication errors by 80% within the five-week implementation frame.

Implementation Framework

The plan, do, study, act (PDSA) framework is appropriate for this project as it is a quality improvement (QI) initiative. A sample PDSA is found in Appendix B. The PDSA was initially developed in the 1920s by Walter Shewhart, who used the terminology specification, production, and inspection as a model for improving processes for manufacturing (Millard, 2022). Shewhart compared his manufacturing process to research, stating that the terms hypothesizing, experimenting, and testing the hypothesis align with the manufacturing terms (Millard, 2022). Initially, the sequences were linear, but the Shewhart Cycle was born when he decided they should be circular instead (Millard, 2022). Edward Demings modified it as a process for quality control in engineering in the 1950s (Millard, 2022). His modification, known as the Deming Wheel, was to design the product with testing as necessary, make the product with testing as required, sell the product, and test the product with market research and while in service (Millard, 2022). Japanese executives modified Demings Wheel into the plan, do, check, and act (PDCA) (Millard, 2022). Demings changed the check to study, as he felt it to be a better way to describe the process (Millard, 2022). It allows for rapid cycles with minor adjustments until you have an effective technique (Taylor et al., 2013). Although PDSA was initially intended for engineering (and is credited for the meteoric rise in the Japanese auto industry), it is easily adapted to healthcare (Lenane, 2013; Millard, 2022; Taylor et al., 2013).

Major Framework Tenets

Plan

The Team

Everyone affected by the change should have a representative on the team (Millard, 2022). The project leader's job is to keep everyone on track during brainstorming sessions and

accountable for the parts of the intervention they have volunteered or been assigned to do (Lean Enterprise Institute, Inc., n.d.). Departments that should be considered to have a representative on the team include, but are not limited to, administration, affected staff, managers/supervisors, facility management, purchasing, and central supply.

Asking the Questions

Once the team is formed and the planning commences. The process that needs improvement will be identified (Millard, 2022). Three essential questions to guide the improvement project are "What are we trying to accomplish?", "How will we know if the change is an improvement?" and "What changes can we make that will result in the improvement?" (NHS UK, 2021, p. 2). For the team to be effective, they must understand the problem (Millard, 2022). One method of identifying the root cause is to ask "why" multiple times until you have the most fundamental reason (Millard, 2022). In most instances, asking "why" five times will bring you to the root cause (Millard, 2022). Then the team must develop the PICOT question or hypothesis (Taylor et al., 2013). The team develops the goals or outcomes after formatting the PICOT question (Taylor et al., 2013).

Brainstorming

During this part of the planning process, solutions are brainstormed. Many teams use a tool for problem-solving called an A3 (Millard, 2022). An example of the A3 problem-solving tool is in Appendix C (Lean Enterprise Institute, Inc., n.d.). During this part of the planning, the leader should ensure that all voices are heard. An idea brought up by staff may not be possible from a purchasing standpoint, so all team members must be able to contribute. The leader is responsible for ensuring the team stays on track and that no incivility occurs.

Putting the Plan Together

When the brainstorming is finished, a rough plan idea should become evident (Christoff, 2018). The team will now refer to the goals and make sure that the interventions planned will (or should) meet the goals (Bollegala et al., 2016). The goals must be measurable, relevant, attainable, and timely (Bollegala et al., 2016). When the team is satisfied that the plan is complete, the unit where the intervention will be piloted is decided (Taylor et al., 2013). Necessary equipment or supplies should be purchased. Any forms to be used should be developed. The decision is made on how the data is to be obtained to determine the effectiveness of the intervention (Taylor et al., 2013)

Do

When the planning phase is completed and the hypothesis developed, the process is tested, typically on one or several smaller units in the facility (Taylor et al., 2013). This provides a trial run of the process (Millard, 2022). Data is gathered and sorted but still needs analysis (Millard, 2022). Data may be put into a spreadsheet or a statistics tool for review during the study portion of the cycle (Millard, 2022). Documentation of implementation steps is recorded, and limitations are identified (Millard, 2022). This cycle phase is repeated as often as necessary to make the intervention as perfect as possible (Millard, 2022).

Study

This is the phase when the data will be analyzed (Millard, 2022). This will occur after the intervention has occurred for a predetermined time (Millard, 2022). This cycle should be short enough for frequent adjustments (Millard, 2022). It is necessary to ensure that the sample size is sufficient for statistical analysis. The team will meet to analyze data and consider if the objectives have been met entirely or partially (Millard, 2022). The act phase will be implemented

if the objectives are partially or entirely met (Millard, 2022). If the first cycle is successful, additional cycles may be run with more participants or units (Millard, 2022).

If the objectives were only partially met, the team would discuss and decide where the process went awry and determine changes that needed to be tested before implementing the intervention on a facility-wide basis (Millard, 2022). They also decide if any changes might improve the process (Millard, 2022). Essentially, the cycle would go to the next step, but instead of ”act,” it would be “adjust” (Millard, 2022).

Act or Adjust

This phase is when the final intervention is implemented, or adjustments are made before rerunning the cycle (Millard, 2022). The team has determined that the intervention was effective and is ready to be implemented facility-wide or in the units that the process is meant to improve. It is not a stopping point for the process (Millard, 2022). It is intended as a place from which to build (Millard, 2022). Future improvements might be made to make the process as perfect as possible (Millard, 2022). To sustain the change, the new process must still be analyzed regularly (Millard, 2022).

Application to DNP Project

Plan

In this project, the team members will include the risk manager, the chief nursing officer, the MedSurg/Tele unit supervisor, the education nurse, and the project lead. The project focuses on planning an educational program to reinforce and comply with BCMA policy. The education nurse is included because she will be responsible for continuing the program after the project is implemented.

The team will determine the objectives, then the PICOT question will be formulated, the data extracted from the EMR, and the plan for the components to be included in the education program will be developed. The team will determine the items to be included in the educational program. The pre-test, post-test, questionnaire, and attestation will be created. The team will also choose the statistical tool that will be used to analyze the quantitative data. To maximize attendance, the team will develop posters or flyers to hang in staff restrooms and lounges advertising the education program dates.

Do

As the facility is a small, critical-access hospital, education will be provided to all staff that administer medication and can attend during the one-week rollout of the project. A pre-test will be administered; the poster will be presented; a time for questions and answers will be included, then the post-test will be conducted. The final part of the education program will be an attestation of the intent to comply with the policy and a survey of the strong and weak points of the presentation. It is important to note that employees may be missed due to scheduling and the short implementation timeframe. The education program will be scheduled for multiple dates during shift change, both mornings and evenings. It will also be presented at staff meetings if any are planned during implementation. Documentation of implementation steps will be recorded, and limitations will be identified. The pre-test, post-test, and survey will be kept for analysis during the study period. The attestation will go into the employee files as a reminder of the agreement to comply with the policy if needed.

Study

This will occur after the educational program has been given during the one-week timeframe. Pre-test and post-test results will be entered into a spreadsheet for statistical analysis.

The number of employees attending the education needs to be sufficient for statistical analysis (Millard, 2022). The data for BCMA compliance will be extracted from the EMR during weeks two to five to compare scanning percentages from before the intervention and after. The questionnaire will be used to analyze suggested improvements to the process. The team will meet to analyze data and consider any necessary changes to make the intervention more effective.

Act or Adjust

This phase is when the final intervention is put into place. The team will have determined whether the intervention was effective or not. If the intervention was ineffective, the survey results would be used to strengthen (adjust) the education program. Results from the post-test will also reveal any information that may be missing or not evident in the education.

If the intervention is successful, the education department will be given the poster presentation in PowerPoint format, pre-test, post-test, and attestation to implement in the new employee orientation process. The data will be pulled from the EMR monthly to verify continued compliance. If the benchmarks still need to be met, the unit manager will send email reminders to staff. If in-person counseling is needed, staff will be reminded that they signed a letter intending to comply with the policy.

Population of Interest

The direct population of interest is nurse apprentices on in ED or MS/Tele, nurses in the ED, medication techs in the ED, and nurses on the medical/surgical unit. These are the employees that administer medications. Between the two units, there are approximately 58 nurses, nurse apprentices, and medication techs. Staff in the ED are a combination of registered nurses, nurse apprentices, and medication techs. Nurses on the medical/surgical floor are registered nurses, licensed practical nurses, and nurse apprentices. The education nurse and risk

manager will assist in overseeing the education and examining the data regularly after the intervention to guarantee sustainment. Nurse apprentices are nursing students who have completed the first semester of school. They can give medications under the supervision of a licensed RN (Nevada Department of Health and Human Services [DHHS] & Nevada Board of Nursing [NSBN], 2022).

Staffing has been an issue since COVID-19. Most staff live locally and have been licensed for less than two years. A handful of nurses were previously travelers who are now per-diem and have more experience than the local nurses. There are three nurse apprentices in the ED and three in the MedSurg/Tele unit. Employees who do not administer medications such as support staff, physician assistants, nurse practitioners, and doctors will not be included. Patients presenting to the ED after trauma, respiratory arrest, cardiac arrest, or any other true emergency will not be counted in the scanning percentages. Patients on the MedSurg/Tele unit in isolation are excluded as no computers or scanners currently can be taken into isolation rooms. Patients presenting for day surgery are excluded from scanning percentages. The hospital does not perform inpatient surgery. Staff that work in the ED or inpatient units for less than 12 hours per week may be excluded from the education if they are not working during the implementation timeframe.

The indirect population of interest is patients in the facility that receive medications in the ED or the inpatient unit. The care they receive will be safer due to BCMA. Improving practice will reduce potential and actual MAEs (Ho & Burger, 2020). Reaching the benchmark of 95% compliance in BCMA will protect not only the patients being served but the licenses of the staff administering medications.

Setting

The setting is a critical access hospital in southwest Nevada. There are 25 beds in the inpatient unit and 11 beds in the ED. The inpatient unit beds are either medical or telemetry, depending on the admitting orders. The unit has a telemetry box for every bed. On rare occasions, a patient will be admitted from the day surgery unit, but most admissions come from the ED. Patients requiring specialized medical care are transferred to a larger hospital by fire department ambulance or helicopter.

The facility is part of a more extensive hospital system but does not have access to the same resources and technology as the larger hospitals. The facility's electronic health record (EHR) is Healthland. It can be set up with a navigation list or cards for navigation through the various sections. BCMA was added to the system in 2019. The electronic medication administration record (EMAR) has a separate navigation tab or link from assessments, notes, labs, and other navigation areas. The BCMA portion of the EMAR is considered cumbersome by some staff. The medication list is populated when the EMAR link is clicked in the patient record. After scanning the patient's armband, each medication is scanned. After each medication, the administer button must be clicked before the following medication can be scanned. Clicking the button after each scan in the EMAR does not add much to the administration time. Still, it could be viewed as cumbersome due to the number of clicks.

The city is the 12th largest in Nevada, with a population of 44,738 in 2020 (U.S. Census Bureau, n.d.). Of these residents, 5,652 are veterans (U.S. Census Bureau, n.d.). The percentage of the population over 65 years of age is 32.4% (U.S. Census Bureau, n.d.). Those who have graduated high school or obtained an associate degree make up 86% of the (U.S. Census Bureau, n.d.). A bachelor's degree or higher is held by approximately 12.7% of the residents of Pahrump

(U.S. Census Bureau, n.d.). The population's median age is 54.5 years (World Population Review, 2022). Retirees make up 31.2% of the residents (Meehan, 2019).

Stakeholders

The two upper-level administrators involved in the project are the chief nursing officer (CNO) and risk manager. Both are RNs and hold DNP degrees. The CNO manages the inpatient unit and oversees nursing operations in the facility. The risk manager oversees the nurses and operations in the ED. The quality improvement project was presented to the team leader at the initial meeting with the CNO and risk manager. The CNO and risk manager are heavily invested in the project as the health system has prioritized improvement, and they answer to the health system. The quality improvement project was their suggestion. They have offered suggestions as various places to research implementation, improvement, and guidelines. They jointly oversee the education/infection control nurse, who will sustain the improvement by adding it to new employee orientation.

The MedSurg/Tele interim supervisor will be involved since she is directly responsible for compliance within the unit. The education/infection control nurse will continue the education sessions during new employee orientation after the project implementation and assist with setting up the education program. In addition, the supervisor from the information technology department will be included to help with computer hardware and software issues that may present barriers to compliance with BCMA.

Included are the clinical supervisors from the ED and inpatient unit. Depending on the census, they sometimes have a patient load. Staff that administer medications are the stakeholders directly affected by the quality improvement project. Although patients will not be directly involved in the project, they will benefit from the added safety resulting from

compliance with BCMA. The facility does not require an affiliation agreement with the university. The site has granted permission to conduct the project. The site agreement can be found in Appendix D.

Plan for Implementation

The implementation will take place from the first week of March 2023 to the first week of April 2023. The education program will be presented at times arranged to reach the most staff. After completing the education program, data collection will happen for the following four weeks. A summary of changes in behavior, as analyzed through BCMA compliance reports and medication error reports, will be analyzed and put in writing each week following the educational presentation.

Pre-Implementation

The risk manager made a PowerPoint presentation available as a place to start; see Appendix E. The project leader updated it for the education seminar (Appendix F) and created a poster presentation from the PowerPoint. A test blueprint (Appendix G), test questions with correct answers and rationale (Appendix H), a pre-test (Appendix I), and a post-test (Appendix J) have been created. A survey (Appendix K) and attestation of the intention to comply with the policy (Appendix L) have been created. The site does not require an affiliation agreement for the project (Appendix M). Test questions were sent to four sources for content validity index (CVI); see Appendix N. A sign-in sheet has been created for management at the facility to track attendance (Appendix P). Pre-tests and post-tests will be printed and numbered so the pairs remain intact for each staff member taking the tests.

Implementation Week One

Education will be provided during the morning and evening huddles in each unit. The dates scheduled are March 1, 2023, March 3, 2023, and March 6, 2023. The scheduled times are 7:00 am and 7:00 pm when the huddle occurs. This will allow the presentation to be given to both dayshift and night-shift staff simultaneously. The pre-test will be administered before the poster presentation. After the presentation, the post-test, attestation, and survey will be completed. A summary of the education provided will be written. Keywords from the open-ended questions on the survey will be determined for statistical analysis and entered in the codebook, along with the result of the Likert scale questions. The survey results will be analyzed with descriptive statistics. Pre-test and post-test results will be entered into the codebook. Statistical analysis will be done using a paired t-test. Attestations and sign-in sheets will be provided to the risk manager. A summary of the survey results will be written.

Implementation Weeks Two through Four

The risk manager will provide the percentage of BCMA scanning compliance and medication error rates pre-implementation, which will be entered in the codebook in week two. The risk manager will obtain percentages of each week's post-implementation BCMA scanning compliance and medication errors. These numbers will be entered in the codebook. A summary of the results of each week will be written.

Implementation Week Five

The risk manager will provide percentages of the fourth-week post-implementation BCMA compliance and medication errors. These numbers will be entered into the codebook. Statistical analysis will be done by running paired t-tests for BCMA compliance, chi-squared tests for MAEs, and descriptive analysis for survey results. A summary of the results of the fifth

week will be written. The codebook will be put into Appendix R. The SPSS results will be provided in Appendix S. All educational materials will be provided on a flash drive to the education nurse. The education nurse will add these materials to the new employee orientation materials. In addition, the PowerPoint, pre-test, post-test, and attestation will be added to the new employee orientation to sustain compliance.

Interventions

Education Program

The intervention is a poster presentation developed from a PowerPoint with a pre-test, post-test, survey, and attestation. The education program will be administered on-site for three days during huddles at the shift change during the first week of March 2023. The PowerPoint presentation provided by the facility did not fit the project's aim to increase compliance. It will be included as a handout during the education seminar as a reminder of the procedure for BCMA. A PowerPoint presentation was created specifically for improved compliance. This PowerPoint was used to create a poster for use during huddles. A preliminary list of test questions with correct answers and rationale has been developed and will be submitted for the content validity index (CVI) Appendix N. The post-test is the same as the pre-test, with the order of the questions altered. A survey will be used to improve the education program if needed. An attestation of intent to comply will be included in the program paperwork.

Project Planning Team

The project planning team will include the risk manager, the education nurse, the interim MedSurg/Tele supervisor, and the project leader. The risk manager will be responsible for approving the PowerPoint and tools used. The education nurse will collect the surveys after they have been coded, collect the attestations, and implement the education as part of new employee

orientation. The risk manager, education nurse, and MedSurg/Tele supervisor will approve the program dates. Finally, the project leader will develop the tools, conduct the program, post the flyers (Appendix O), and analyze the results.

Resources

Tests, flyers, surveys, attestations, and handouts will be printed at the facility. Tests will be numbered by hand by the project leader. The facility will not need to provide compensation for the employees attending the program as it will be held during morning and evening huddles at change of shift. The sign-in sheets currently used at the facility for education will be utilized for the program (Appendix P).

Timeline

The scheduled dates for the educational program are March 1, March 3, and March 6, 2023, at 7:00 am and 7:00 pm. The project leader has developed a flyer advertising the dates and times (Appendix Q). The educational PowerPoint and poster presentation will continue to be developed until approximately January 15, 2023. The posters regarding the program will be posted in the facility roughly the third week of January. The pre-test, post-tests, and survey data will be entered in the codebook as the programs are completed. Data will be obtained for MAEs and BCMA compliance from March 7 through April 7, 2023. Then, paired t-tests will be done on the pre-test and post-test results and the pre-intervention and post-intervention scanning rates. A chi-squared will be used to determine MAEs since the data will not be able to be matched with staff. See Appendix Q for a detailed timeline.

Tools

PowerPoint and Poster Presentation

A PowerPoint presentation was created specifically for improved compliance by the team leader. This presentation is original work and requires no permission. A poster for the education program was created from the PowerPoint. This presentation will start with objectives and then continue to an overview of a nurse in Tennessee who made a medication error that resulted in the death of a patient. It was in the news frequently as the nurse lost her license and was also convicted of negligent homicide and gross negligence of an impaired adult (Kelman, 2022). A few slides of the presentation explain positions from the defense and prosecution. The presentation continues with statistics on the patient safety aspects of BCMA and the harm inflicted every year from medication errors. Troubleshooting scanning issues are addressed. National guidelines and evidence of best practices are highlighted. Finally, the ED is addressed, reminding the audience that not everyone who walks through the doors is an emergency, as well as what constitutes a true emergency where BCMA might not be possible. The team leader will develop the PowerPoint presentation. From the PowerPoint, a poster presentation will be created. The risk manager will approve the presentation before implementation.

Test Blueprint and Test

The team leader developed the test blueprint, pre-test, and post-test. The pre-test and post-test have the same questions in a different order. Two questions are related to troubleshooting, six are related to patient safety, and two are related to licensing protection. The tests are ten questions long. The tests will be numbered to keep pre-test results paired with post-test results. Ten minutes will be allotted to administer each test. The test questions are the

original material of the team leader and require no permission. The team leader sent the questions and the test blueprint to the project team for CVI.

Survey, Attestation, and Statistical Analysis

The survey uses a Likert five-point scale for eight questions with two "fill in the answer" questions. The survey will be used to improve the program if necessary. The fill-in questions will be examined and sorted into themes for analysis. The survey is the original work of the team leader and requires no permission. The last tool for the educational program is the attestation of intent to comply with the policy. It is a simple statement of understanding and agreement to abide by the BCMA policy printed on facility letterhead. The team leader created the attestation as an original work, and no permission is required. IBM SPSS software will be used to analyze the results of the increase in knowledge following the educational program and analyze the BCMA and MAE pre-intervention and post-intervention numbers. The team leader purchased the IBM SPSS software, and no permission is required to use it.

Plan for Data Collection

Pre-tests, Post-tests, and Survey

The pre-tests and post-tests will be kept confidential as they will be numbered with no names required. The pre-tests, post-tests, and surveys will be administered on paper. The numbering is used to keep pairs together and to maintain confidentiality. Data will be entered into the codebook daily after the education program. Paired t-tests will be used to analyze the data. The survey data will have the free text answers analyzed and categorized. The survey uses a five-point Likert scale to determine staff attitudes about the education program and potential areas for improvement. Pre-tests, post-tests, and surveys will be turned over to the education

nurse after they have been entered into the codebook. The education nurse will double-check the data entered in the codebook for accuracy.

BCMA scanning reports will be downloaded to an Excel spreadsheet by the team leader for analysis. BCMA scanning reports from the four weeks immediately prior to the education program (February 2023) will be used for comparison to the post-education reports. BCMA scanning will be downloaded from the EHR weekly by the team leader for four weeks post-education to verify compliance. The team leader will clean the data to exclude cardiac arrest, respiratory arrest, trauma, and isolation patients. The interim supervisor of the MedSurg/Tele unit will provide medication error percentages or reports for the same timeframe as the BCMA reports for analysis.

Attestations and Sign-in Sheets

The attestation and sign-in sheets will be administered on paper and given to the education nurse right after the presentation or the next day if the presentation is during the evening shift change. If the paperwork is held until the following business day, the team leader will keep attestations and sign-in sheets on the team leader's person or in a locked office drawer until they are turned over to the education nurse to maintain confidentiality. The success of the intervention will be determined by BCMA scanning percentages reaching the compliance benchmark of 95%.

Ethics/Human Subjects Protection

Keeping participant identities confidential by not including names on the pre-test, post-test, or survey is an important ethical consideration. Staff will be given the program during huddles, so no active recruitment is necessary. The program's benefits are increased knowledge of the safety benefits of BCMA when administering medication. No risks have been identified to

the participants. No additional compensation is necessary as the education will be administered during normal working hours. This education program has been determined to be a quality improvement project by the project team at Touro University Nevada. The facility does not require IRB approval. The risk manager will administer oversight of the project by approving all materials before their use. The team leader completed CITI training and had the project team determine that no IRB oversight was needed (Appendix T).

Plan for Data Analysis

The number of participants will be compared to the number of staff on the MedSurg/Tele and ED units to determine if the sample size is significant. A confidence level of 95% (CI of 0.05) will be used. IBM SPSS software will be used to generate statistical data. Data from pre-tests, post-tests, and surveys will be entered into the codebook. Data will be analyzed using paired t-tests, descriptive statistics, and chi-squared tests.

T-tests are used when the assumptions are that there is normal distribution and interval scaling of the data (Pallant, 2020). The data provided for scanning is percentages. These will be displayed in a graph to show trends from before and after the education program. The paired samples t-test will be used for the pre-test and post-test statistical analysis. Paired sample t-tests are used when comparing identical groups (Pallant, 2020).

Chi-squared tests will be run on pre-implementation and post-implementation medication errors. Chi-squared tests are used when the variables are categorical, and the sample is random. The assumptions are that the data is numerical instead of percentages and that there is only one value for each sample (Pallant, 2020) The number of medication errors is anticipated to be too small to use t-tests.

Descriptive statistics will be used for the survey. Descriptive statistics are used to see ordinal data (the type of data created with a Likert scale) in a numerical format (Pallant, 2020) Descriptive data measures the frequency, central tendency, variation, and position of data; open-ended questions on the survey will be categorized to determine any adjustments needed for the education program. Continued compliance with BCMA will be monitored weekly for four weeks, with results given to the team leader to add to statistical tests. Continued monitoring will be done monthly to verify the sustainment of BCMA compliance.

Analysis of Results

The first objective aligned with the national guidelines for BCMA with scanning rates at a minimum of 95% (Billstein-Leber et al., 2018; ISMP, 2022; Leapfrog Group, 2017). The risk manager provided scanning percentages for July 2022 to December 2022 in whole numbers. The team leader calculated percentages to two decimal places from January 2023 through March 2023 (April 1 to April 3 were included). Program objective 1 was to improve staff compliance with national standards for medication scanning rates to 95% within the five-week implementation frame. Although the objective of 95% was not reached, BCMA scanning percentages are markedly improved from July 2022, when the education program planning started. In July, scanning percentages for the ED were 64% and MedSurg/Tele 70%, resulting in a combined 67%. In January 2023, when flyers for the education program were posted, ED scanning increased to 86% and MedSurg/Tele to 94.3% for a 90.2% combined compliance rate. Percentages rose for ED in February 2023 to 86.8%, while MedSurg/Tele dropped to 93.4%. The combined total for February dropped to 90%. In March, the ED dropped again to 84.3% while the MedSurg/Tele unit rose to 93%, for a combined total that decreased to 89%. BCMA scanning percentages for ED and MedSurg/Tele are shown in Figure 1 and hospital-wide in Figure 2. The

only modification to the original plan was the team leader cleaned and presented the scanning data as the risk manager had retired. Factors affecting BCMA compliance may be explained by a combination of WOWs and scanners that did not work and increased census increasing the need for additional WOWs that were not available. Technology problems are a barrier to compliance with BCMA (Bird, 2020; Mulac et al., 2021; Shah et al., 2016; Strudwick et al., 2018). As the facility monitors BCMA compliance and addresses individual staff behaviors, compliance should continue to improve (Van Ornum, 2018). The conclusion reached is that although BCMA compliance was improved, the objective was not met.

Figure 1

BCMA by Department July 2022 to March 2023

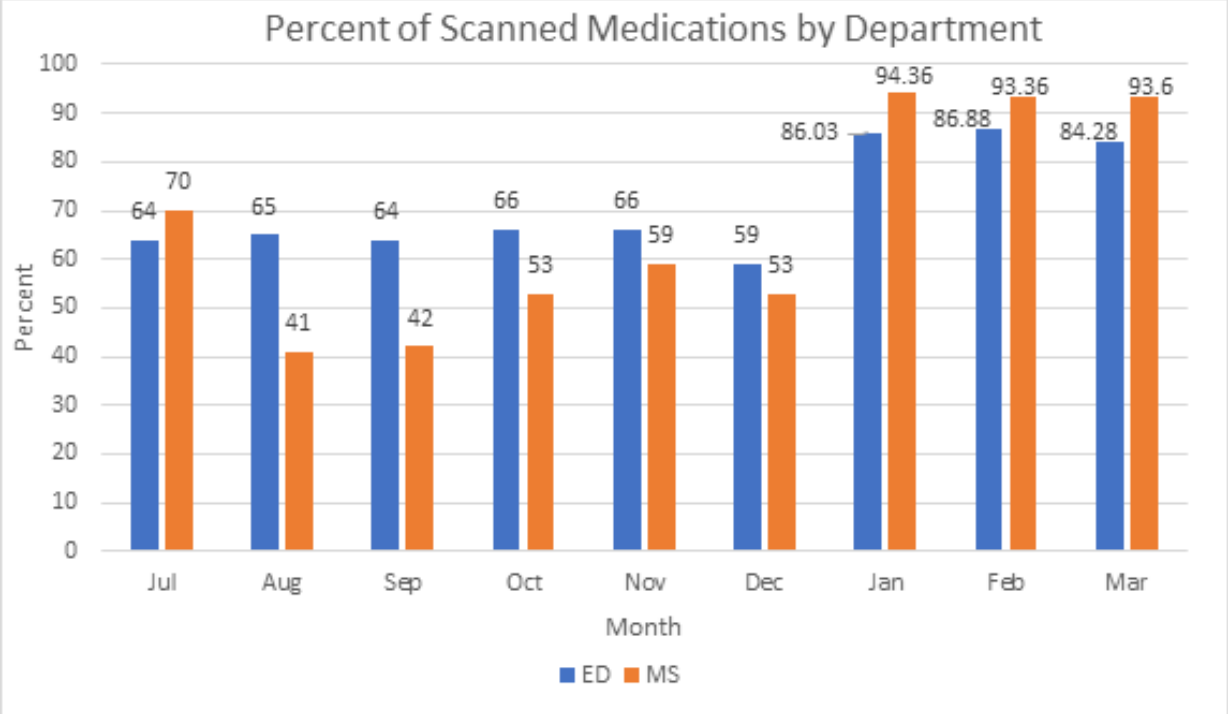
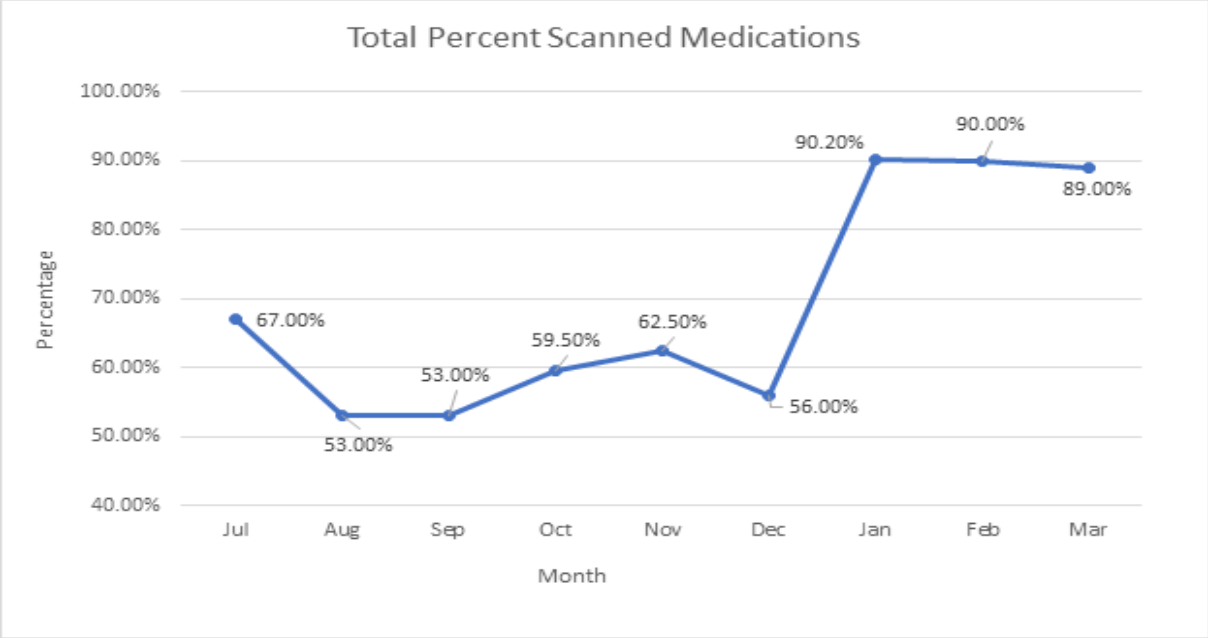


Figure 2

Combined BCMA Percentages ED and MedSurg/Tele July 2022 to March 2023

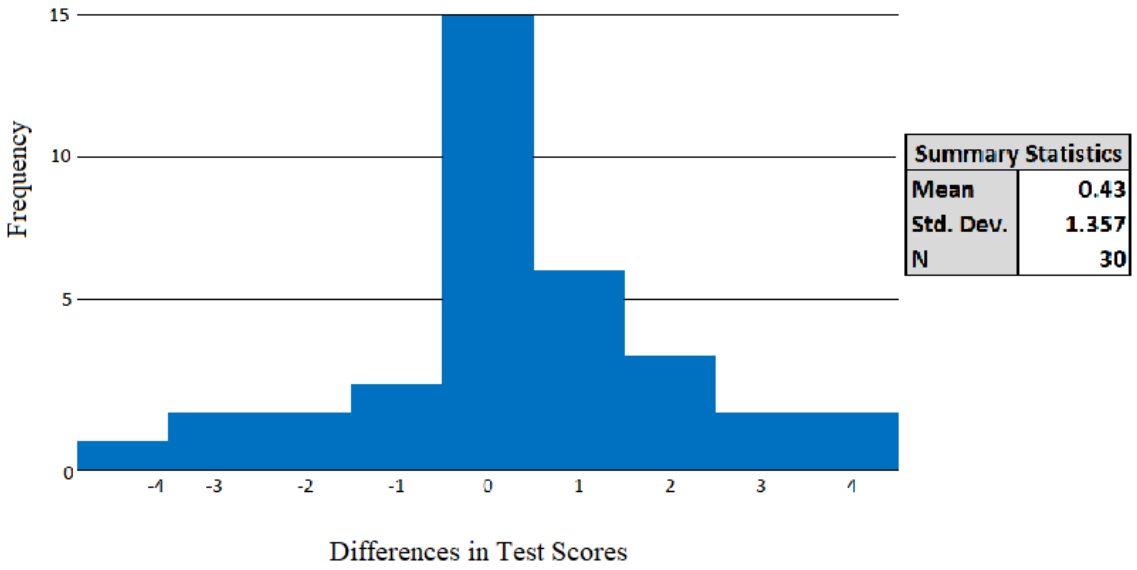


The second objective was to conduct an education program for staff administering medications in the ED and MedSurg/Tele units. These staff are comprised of RNs, LPNs, and EMTs. The education program has a pre-test, poster presentation, question and answer period, post-test, and survey. Program objective 2 was to administer an education program for the multidisciplinary team to train staff on BCMA with post-test knowledge scores of 100%. Staff education can increase compliance with BCMA (Naidu & Alicia, 2019; Perez Arias, 2019; Shah et al., 2016; Strudwick et al., 2018). Four assumptions must be addressed when using a paired sample t-test (Pallant, 2020). The first assumption is that data is distributed normally (Pallant, 2020, pp. 213–220). A histogram was used to determine if the data was distributed normally (Figure 3). The bell shape indicates normal distribution (Pallant, 2020, pp. 213–220). The second assumption is that the dependent variable is continuous (Pallant, 2020, pp. 213–220). This

assumption was met as the data is presented in the difference between the score on the pre-test and the post-test. The third assumption is that the observations are independent of one another (Pallant, 2020, pp. 213–220). The tests were numbered to keep them in pairs. The pre-test was given before the education, and the post-test was given after, meeting this assumption. The last assumption is that the dependent variable should not contain any outliers (Pallant, 2020, pp. 213–220). The distribution of differences in test scores ranged from negative three to positive four, relatively equal with no outliers.

Figure 3

Histogram of Differences Between Pre-test and Post-Test



The pre-test and post-test statistics used were paired sample t-tests. These were performed using SPSS statistics. The null hypothesis is defined as no significant linear correlation between the pre-test and the post-test scores (*Null Hypothesis Ho: p = 0*) (Sylvia &

Terhaar, 2018, pp. 16–20). The alternate hypothesis is that there is a significant linear correlation (*Alternative Hypothesis Ha: $p \neq 0$*) (Sylvia & Terhaar, 2018, pp. 16–20). The means results from the pre-test (M = 8.77, SD = 1.104) and the post-test (M = 9.17, SD = 1.234) indicate that there was a slight improvement in the score on the post-test (Table 1). The correlation between the pre-test and the post-test has a correlation value of .333 (Table 2). This positive correlation signifies that a larger number in the pre-test will generally provide a larger number in the post-test. The Sig. shown in Table 2 is the *p*-value. Since $p > 0.05$, we conclude that the null hypothesis is accepted, and there is no statistical difference in the pre-test and post-test scores. This is further supported by the paired differences in Table 3, $t = (-1.618)\ -3.1$, $p = 0.117$. The probability value (*p*) is greater than 0.05, indicating no significant difference in the pre-test and post-test scores. Cohen's d tests for statistical analysis of the effect size. Since a Cohen's d of 0.02 is considered a small effect, the Cohen's d in Table 4 (d = -.295) is less than 0.2, so the effect size is small. From these statistical tests, the conclusion can be made that the samples are not statistically significantly different, and the sample size has very little effect on the outcome. The first modification to the education plan included a change from a PowerPoint presentation after the shift change in the education room to a poster presentation during the morning and evening huddle on the ED and MedSurg/Tele units. The second modification was that the program was presented an hour before the shift change. Twice the program could not be presented due to interference with patient care, and once because the nurses working had already attended the program. The post-test scores were expected to be 100% correct, but this expectation was not reached. Pre-test and post-test results when the program is given during new employee orientation and yearly reorientation should be tracked to determine if any adjustments to the program are needed.

Table 1

Paired Sample Statistics

		Mean	N	Std Deviation	Std. Error Mean
Pair 1	Pre-test	8.77	30	1.104	.202
	Post-test	9.17	30	1.234	.225

Table 2

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre-test & Post-test	30	.333	.072

Table 3

Paired Differences

					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pre-test-Post-test	-.400	1.354	.247	-.906	.106	-1.618	29	.117

Table 4

Paired Samples Effect Size

					95% Confidence Interval	
			Standardizer [a]	Point Estimate	Lower	Upper
Pair 1	Pre-test -	Cohen's d	1.354	-.295	.-659	.073
	Post-test	Hedges' correction	1.372	-.291	-.650	.072

Note. a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference, Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

When analyzing the tests in greater detail, 13 out of 30 scored 100% on the post-test, while eight out of the 13 answered all the questions correctly both times. Four participants had lower test scores on the post-test than on the pre-test. The questions that had a choice of "all of the above" or select all that apply were analyzed to check for validity. Three of the four questions had an improved number of correct answers on the post-test, while one had the same number on both tests. Fifteen participants (50%) had no change in scores between the two tests. The conclusion is there are no significant differences in pre-test and post-test scores.

When analyzing individual questions, question nine on the pre-test (question 6 on the post-test) was the only question with fewer correct answers on the post-test. This question reflected knowledge of the traditional five rights of medication administration. Question four on the pre-test (question five on the post-test) had no change in the number of correct answers, where 27 of 30 participants answered correctly. This question asked how BCMA reduces potential medication errors. One of the three incorrect answers was from the same participant on both tests, while the other two incorrect answers did not have a common participant. Question seven of the pre-test (post-test two) also had no change in the number of correct answers, with 29 correct. The incorrect answer on each test was not from the same participant. This question asked for a true statement about medication administration errors. The last question with no difference in correct responses was question eight (post-test question ten), with 27 correct responses. The participants who answered incorrectly on the post-test were not the same participants that answered incorrectly on the pre-test. This question asked for multiple true statements about bypassing BCMA. The conclusion is that all test questions are reliable, as there were no questions with large numbers of incorrect answers on both the pre-test and post-test.

Individual questions are analyzed in Table 5. The *p*-values are greater than 0.05 on nine out of ten questions, indicating no statistical significance in the differences. Pre-test question two (post-test question three) has a *p*-value of 0.043, indicating a statistical significance in the difference. This sample concluded that only one question had a significant difference in the outcome after the education program, which shows that this question addressed a new item to the learners.

Table 5

Test Question Paired Sample Statistics Compilation

Question #					
Pre-test	Post-test	Pre-test	Post-test	*t*	*p*
1	4	M = .83, SD = .379	M = .87, SD = .346	-.571	.573
2	3	M = .83, SD = .379	M = .97, SD = .183	-2.112	.043
3	7	M = .93, SD = .254	M = .97, SD = .183	-.571	.573
4	5	M = .90, SD = .305	M = .90, SD = .305	.000	1.000
5	1	M = .63, SD = .490	M = .70, SD = .466	-.701	.489
6	8	M = .90, SD = .305	M =1.00, SD = .000	-1.795	.083
7	2	M = .97, SD = .183	M = .97, SD = .183	.000	1.000
8	10	M = .90, SD = .305	M = .90, SD = .305	.000	1.000
9	6	M =1.00, SD = .000	M = .97, SD = .183	1.000	.326
10	9	M = .97, SD = .346	M = .93, SD = .254	-1.439	.161

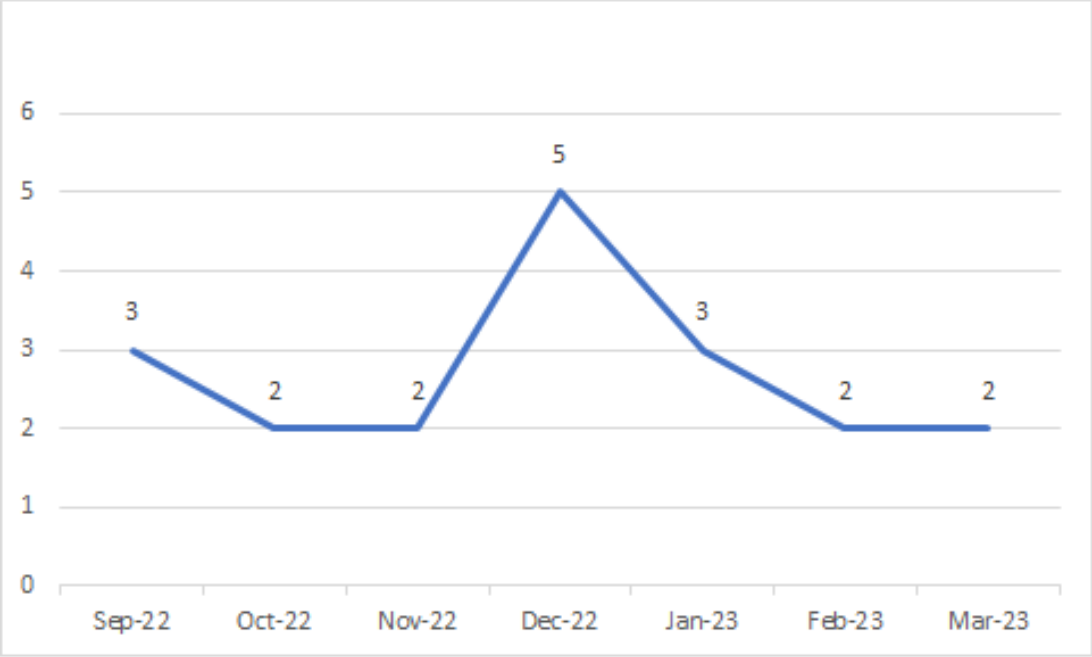
Note. These values are a compilation of Table 6 and Table 7 (Appendix U)

Program objective 3 was to decrease administration-related medication errors by 80% within the five-week implementation frame. It was anticipated that a chi-squared test would be used to analyze the data with a CI of 0.05. Per a verbal report from the safety officer, there were no MAEs from February 1 to April 3, 2023 (personal communication, K. McComas, April 4, 2023). Medication errors are often unreported due to fear (Hammoudi et al., 2017). This must be taken into consideration when analyzing a decrease in MAEs. BCMA has been shown to reduce

MAEs (Küng et al., 2021; Leapfrog Group, 2017; MacDowell et al., 2021; Owens et al., 2020; Shah et al., 2016; Strudwick et al., 2018). The DON was interviewed regarding medication errors (personal communication, C. Franklin, May 8, 2023). It was determined that although there were no medications given to patients in error, there were medications given to patients that were not documented. This was determined by comparing reports from the medication dispensing machine to the medication administration records. Information was available from September 2022 forward. The potential for error was concerning, as 14 of the 19 medications were opiates, and three were benzodiazepines. If the medication were given twice the potential for patient harm would be high. A chi-square statistical analysis was run on the data from the undocumented medications. Three assumptions must be met with this statistical analysis. Data must be random, variables must be independent, and the count in each cell should be five or greater. The data for medication errors violate the number of instances being at least five for every month except December 2022 (Figure 4). Medication errors were predicted to decrease by 80% during the post-implementation four-week period. The objective was not achieved, as the medication errors were the same for February and March. There were no additional costs for this objective, as costs were covered in objectives one and two. Potential opportunity losses would be medications administered twice causing harm to a patient.

Figure 4

Medication Errors



The survey administered after the test had eight questions ranked on a Likert scale and two open-ended questions. Cronbach's alpha was used to determine the reliability of the eight ranked questions (Pallant, 2020, pp. 102–106). The Cronbach alpha coefficient was .981, concluding that the questions have an internal consistency at a high level (Table 8). Values above .8 are preferred when testing for reliability (Pallant, 2020, pp. 102–106). The data were further analyzed to determine if there was any significant change in the Cronbach alpha coefficient if any questions were excluded (Table 9). Eliminating any of questions one through six would decrease the coefficient from .007 to .974. If question seven were excluded, the coefficient would decrease by .005 to .976. If question eight were excluded, the coefficient would increase by .018 to .999.

Table 6

Survey Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.981	.975	25

Table 7

Survey Item Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1	32.28	28.627	.996	.974
Q2	32.28	28.627	.996	.974
Q3	32.28	28.627	.996	.974
Q4	32.28	28.627	.996	.974
Q5	32.28	28.627	.996	.974
Q6	32.28	28.627	. 996	.974
Q7	32.32	28.810	.968	.976
Q8	32.16	36.557	.333	.999

After reliability was established, the survey results were analyzed using descriptive statistics appropriate for a Likert scale (Pallant, 2020, pp. 52–64). Most respondents strongly agreed or agreed that the individual aspects of the program were effective. In contrast, all of the respondents strongly agreed or agreed that the overall program was excellent or good (Table 10). Frequencies of the individual answers are found in Table 11. Individual answer statics are in Table 12. Table 11 and Table 12 are found in Appendix V.

Table 8

Survey Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q1	25	1	5	.460	.866
Q2	25	1	5	.460	.866
Q3	25	1	5	.460	.866
Q4	25	1	5	.460	.866
Q5	25	1	5	.460	.866
Q6	25	1	5	.460	.866
Q7	25	1	5	.456	.870
Q8	25	4	5	.472	.458
Valid N (listwise)	25				

When examining test answers individually, one respondent chose “strongly disagree” for questions one through seven while choosing “strongly agree” for question eight. Questions one through seven were questions about the effectiveness of individual aspects of the education program (the stated objectives were met, the information presented was relevant to practice, the presenter encouraged group involvement, the presenter was knowledgeable about the subject, the presenter was engaging, the presenter was prepared, and the handouts enhanced learning. In contrast, question eight was an overall rating of the program. These answers should have been closely aligned rather than on opposite ends of this scale. This analysis concludes that the respondent either answered questions one through seven as strongly disagree when they meant strongly agree, or that the answer to question eight should have been poor rather than excellent.

Question nine asked for ideas to improve the program. There were seven responses; three responded nothing, two responded not during shift change, and one each for a video and more time. Question ten was asked what subjects the education department should present in the

future. There were four responses: efficacy rates of BCMA, case studies on medication errors, chest tubes, and Zoll and baby monitors. Table 13 shows the results of fill-in questions.

Table 9

Fill-in Question Results

	No Answer	Free Text Answer			
Question 9	18	Nothing (3)	Not during shift change	Video	More time
Question 10	21	Efficacy rates of BCMA	Case studies on medication errors	Chest tubes	Zoll and baby monitors

Strengths and Weaknesses

Strengths

The abundance of evidence that BCMA reduces MAEs was one strength of the project. Evidence included three national guidelines for using BCMA (Billstein-Leber et al., 2018; ISMP, 2022; Leapfrog Group, 2017). Other evidence for implementing BCMA included systematic reviews, cohort comparisons, and quantitative and qualitative analyses (Baiden, 2018; Barakat & Franklin, 2020; Bird, 2020; Shah et al., 2016).

The upper-level management of the facility (Chief Nursing Officer, Risk Manager, and Director of Nursing) supported the project, as did the House Shift Supervisors. The facility already had the technology and tools in place that were needed to improve the BCMA scanning rates. Content experts reviewed the test questions for validity, and a test blueprint was used, ensuring the questions were relevant to the material.

Weaknesses

One weakness was the smaller than desired number of employees educated. The program was initially planned as a mandatory education program after the morning and evening shift change on three days. Due to overtime costs, this was changed to morning and evening huddles on three days. Both the MedSurg/Tele interim supervisor and the ED clinical supervisor asked that it not be done during huddles, so it was changed to one hour before the end of the shift, both mornings and evenings. The program could not interfere with patient care, which caused some employees not to participate. The total number of staff administering medication to be included was 58. In the timeframe allowed, only 30 were able to attend the education program.

Another weakness of the project was the delivery of the education program. The program was originally intended to be in a classroom setting. The final setting was on each unit an hour before the shift change. This was a weakness since the noise on the unit was distracting, and patient care needs interrupted the program. On two occasions, patient care needs were too demanding to give the program. On one occasion, the staff of the ED had already received the program, a loss of potential employees to be educated. The program was originally designed as a PowerPoint presentation with 30 to 45 minutes allocated, but it ended up being 15 to 20 minutes, including the pre-test and post-test. These factors led to an environment that was not optimal for testing or learning.

The small number of medications not documented caused a weakness in statistical analysis. Medication errors are often unreported for fear of discipline or job loss (Hammoudi et al., 2017). The current EMR does not produce user-friendly reports, which can cause errors to be overlooked. In addition, the Director of Nursing is new to the position and is working hard to

catch up on reporting. When analyzing the BCMA fall-outs, clinical supervisors (team leaders or charge nurses) had some of the worst scanning percentages.

Technology was also a weakness. Several computers were replaced during the project planning, but high census and additional computers and scanners that were not working properly caused a barrier to effective BCMA. When the tools are not working properly, nurses employ workarounds to administer the medications (Billstein-Leber et al., 2018).

Summary and Interpretation of Results

Objective One

Providing education increased BCMA compliance overall, but the benchmark of 95% compliance was not reached. Adding the program to future staff meetings, new employee orientation, and yearly re-orientation will continue to improve compliance. The project positively impacted compliance, but further follow-up is needed to attain the goal and keep staff compliant (Van Ornum, 2018). Costs were minimal, as no overtime was involved, and staff that were given the education were already working. Approximately 50% of the staff received the education (30 of 58) program. The strategic trade-off for not having the staff attend outside of work hours was cost savings versus the inability to educate as many staff as expected. No staff meetings were scheduled during implementation, so that no additional staff could be reached. Opportunity costs are defined as “the loss of potential gain from one alternative when another alternative is chosen” (U.S. Department of Veterans Affairs, 2021, para. 1). It is estimated that 40-50% of rising healthcare costs annually are due to technology (Clemens, 2017). The opportunity costs are the costs of the technology versus the increased patient safety from that technology. When the WOWs and scanners are not being used, or are broken and unavailable, there is no benefit to the

cost of the technology. This is a physical barrier to BCMA (Bird, 2020; Mulac et al., 2021; Shah et al., 2016; Strudwick et al., 2018).

Objective Two

There was no significant increase in the scores from the pre-test to the post-test. The answers to questions were covered in the poster presentation and handouts. Feeling rushed due to the timing of the education (while on shift during patient care times) may have impacted post-test scores. The only cost associated with this objective was the printing of materials. The strategic trade-off was that if the education had been given away from the units, post-test scores might have been improved due to a perception of more time for test taking and an environment conducive to learning. The post-test answers are slightly better than the pre-test scores since the data leans toward the right on the bell curve. A conclusion could be made that many of the staff know what they should be doing, but do not comply. This may be due to psychological or physical barriers (Barakat & Franklin, 2020; Bird, 2020; Lunt & Mathieson, 2020; MacDowell et al., 2021; Mulac et al., 2021; Perez Arias, 2019; Shah et al., 2016; van der Veen et al., 2020). There has been a significant investment in hardware and technology for BCMA. Having multiple WOWs and scanners not functional while there was an increased demand is an opportunity loss.

Objective Three

There were no MAEs in March or February. There are potential costs to MAEs in the form of harm to a patient, including death. The errors of undocumented medications, consisting mostly of opiates and benzodiazepines, could have devastating consequences if the medications were administered again due to non-documentation. Medication errors can cause extended hospital stays and harm (Shah et al., 2016). No costs were associated with this objective, as no additional technology or supplies were needed. The opportunity costs are a loss in value from the

cost of the technology. Studies show that BCMA reduces MAEs, and the results of objective three align with those studies (Küng et al., 2021; Leapfrog Group, 2017; MacDowell et al., 2021; Owens et al., 2020; Shah et al., 2016; Strudwick et al., 2018).

It is important to note that the medication errors listed in objective three belong to the category of unscanned medications. The greatest number of medications administered and not scanned (or documented) was five in December, which would not alter the percentages in a significant way. The practice of administering medications without documentation is an opportunity for a quality improvement project.

Limitations

Bias

The small sample size could potentially lead to bias. According to Simmons (2018), sampling errors significantly impact results. Not only can sampling errors lead to bias, undercoverage, or large variability, they can cause harm to the business conducting the study or the population affected by the study (Simmons, 2018). An additional day was added for the delivery of the education program to reach more staff.

Design

The original plan was to present the education program in the training room, which is away from patient care units, after shift change in the morning and evening. The original design was a pre-test, followed by a PowerPoint presentation, a post-test, and a survey and attestation of intent to comply with the policy at the end. The facility's administration changed the location from the training room to during the staff huddle. It was changed a second time to before the end of the shift. The change in timing led to a change in delivery, the intended delivery was a PowerPoint presentation, the actual delivery was a poster presentation. This led to limitations in

the delivery of the program, as noise in the units and patient care needs led to interruptions and a less-than-desirable learning environment. Several changes were made to delivery to reach as many staff as possible, including adding an additional day and changing the times the educational programs were delivered.

Data Collection

Data collection was limited in the ability to track medication that was pulled from the Pyxis but not documented. This is caused by the Pyxis and the EHR not having interconnectivity. Either personnel in the pharmacy or the DON must go through the data manually to confirm all medications pulled were given. The EHR has limited reporting capability, the BCMA report must be downloaded, and administrations marked as "manual" must be verified by hand. A spreadsheet for medications not scanned was downloaded weekly. On the spreadsheet, each medication that was not scanned was looked up to verify if there was a reason for exclusion. The timelines for pre-implementation BCMA audits and medication errors were expanded. The original timeline was February 1st through the 28th and March 7th through April 3rd for both the BCMA and MAE. The BCMA comparison was expanded to include July 2022 through January 2023. The MAE comparison was expanded to include September 2022 through January 2023.

Data Analysis

Data analysis was limited by several factors. There was no access to a statistician. The data gathered for BCMA could not be analyzed using SPSS software, as it could only be presented in a graph format due to the data being in percentages. MAEs were also unable to be analyzed by the SPSS software, due to the small number of errors identified. The sample size was not large enough to be considered significant. The paired samples t-test used to analyze the

pre-test questions with the post-test questions did not show any statistical significance in the results of the two test comparisons.

Conclusion

The project aimed to increase BCMA compliance at a critical access hospital in Southwestern Nevada. The units involved were the ED and the MedSurg/Tele units. The objectives were to increase BCMA compliance, reduce MAEs, and to have all staff who attended the educational program score 100% on a post-test. One PDSA cycle was run on both units that included a pre-test, a poster presentation, post-test, a survey, and an attestation of agreement to comply with the BCMA policy. Thirty out of 58 staff were able to attend the program. The program was given over one week and the results were studied by cleaning data in report pulled from the EHR and cleaned to remove patients in isolation rooms and patients needing immediate stabilization in the ED over the next four weeks.

There was significant improvement in BCMA percentages from the time the flyers were posted compared to the six months previous, however the percentages dropped in the four weeks post implementation. The paired t-test showed no significant difference in pre-test scores compared to post test scores; this led to conclusion that the learners knew what they were supposed to be doing with BCMA, but were not compliant. A chi-squared test showed reliably that most of the participants found the education useful.

Strengths were identified as support from administration at the facility and the abundance of evidence for BCMA protecting patients. Weaknesses were identified as the setting in which the education was performed and the small sample size. To minimize limitations the timeframe for comparison of both BCMA and MAEs was expanded.

The administration of the facility found the results promising in meeting compliance with national guidelines for BCMA. The facility intends to use the education program for all new employees and annually in re-orientation, which guarantees sustainability. Implications for practice suggest that the employees that are still chronically low receive the education again, as well as employees who did not receive the education in the week allotted for the program. A change in nursing practice cannot be accomplished in one week. Follow-up needs to be done consistently and in a timeframe that makes counseling relevant. The addition of a DON to the facility should help to ensure that follow-up will be done.

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Appendix A

Policy

Policy Title:	Bar Code Scanning	14.075
Date of Origin:	2/20/19	MM05.01.07-13
Revision Date:		CMS 4588.635;
Location:	Critical Access Hospital in Nevada	582.23; 582.25
Department:	Pharmacy	
Owner:	Director of Pharmacy	

Purpose: To define the process and procedure of using Barcode / Scanning technology for medication administration

Policy: This policy applies to all staff administering medications, and defines the process and procedure of using Barcode / Scanning technology

Procedure:

1. Pharmacy receipt of product
    a. Barcode string will be confirmed on receipt of product from suppliers. The String must be confirmed with all systems the scan barcodes (ie Hospital information system and automated dispensing cabinets)
    b. The unit of use barcode string will be scanned
        i. Items that positive scan on all systems may be placed in general stock
        ii. Items that do not scan properly will be quarantined.
            1. A qualified pharmacist will update formulary data base and enter barcode string into IT systems as needed.
            2. The product will be scanned to confirm barcode string is linked

2. Pharmacy dispense of product.
    a. Product will be loaded/ refilled into automated dispensing machines by use of bar code string scanning
        i. Product that does not positive scan will be returned to pharmacy with written copy of error message and will be quarantined.
            1. A qualified pharmacist will update formulary data base and enter barcode string into IT systems as needed.
            2. The product will be scanned to confirm barcode string is linked

3. Medication administration
    a. Health care professional will obtain medications through automated dispensing cabinet (refer to automated dispensing cabinet policy). Remove medications for one patient at a time and administer to that patient prior to removing medications for next patient.
    b. In the electronic chart, select patient and then e-Mar
        i. Click BCMA tab in upper right hand corner

Appendix A, continued

14.075 Bar Code Medication Administration

ii. Scan Patient ID Band
    1. If the scan does not match, verify you are in the correct chart.
    2. If the patient wristband does not scan correctly, have a new band created. The goal is to scan 100 % of all patient and medications. Managers will have a report of all exceptions
    3. ID Band must be on the patient

iii. Once the patient is scanned correctly, the scan medication window will open
    1. Scan the product in the package. If all information is correct (Name, strength, dosage, quantity, route and time) all green checks will appear. Pharmacy compounded IV products will have a pharmacy generated label with an order specific barcode
    2. If all items are not correct, there will be a red stop circle.
        a. Sliding scale will require you to click ok then complete sliding scale window
        b. Multiple dose items (2 tabs) will require you to scan the second tablet
        c. Partial dose item (1/2 tab) will require you to click ok then waste tablet (If you break the tablet). The pharmacy will provide unit of use partial tablets whenever possible. Scan the barcode on patient medication bag
    3. Click administer to document medication administration.

iv. If the barcode will not scan, confirm the medication is correct, and rescan. Product and packaging that does not scan must be returned to the pharmacy with a notation of patient name and error message if applicable

4. Monitoring
    a. Mangers will monitor compliance with BCMA process

Reference:

MM.05.01.07 The critical access hospital safely prepares medications.
MM.05.01.09 Medications are labeled.
MM.05.01.11 The critical access hospital safely dispenses medications.
MM.05.01.13 The critical access hospital safely obtains medications when the pharmacy is closed.

Appendix B

PDSA Sample

QI ESSENTIALS TOOLKIT: PDSA Worksheet

Instructions

Plan: Plan the test, including a plan for collecting data.

- State the question you want to answer and make a prediction about what you think will happen.
- Develop a plan to test the change. (Who? What? When? Where?)
- Identify what data you will need to collect.

Do: Run the test on a small scale.

- Carry out the test.
- Document problems and unexpected observations.
- Collect and begin to analyze the data.

Study: Analyze the results and compare them to your predictions.

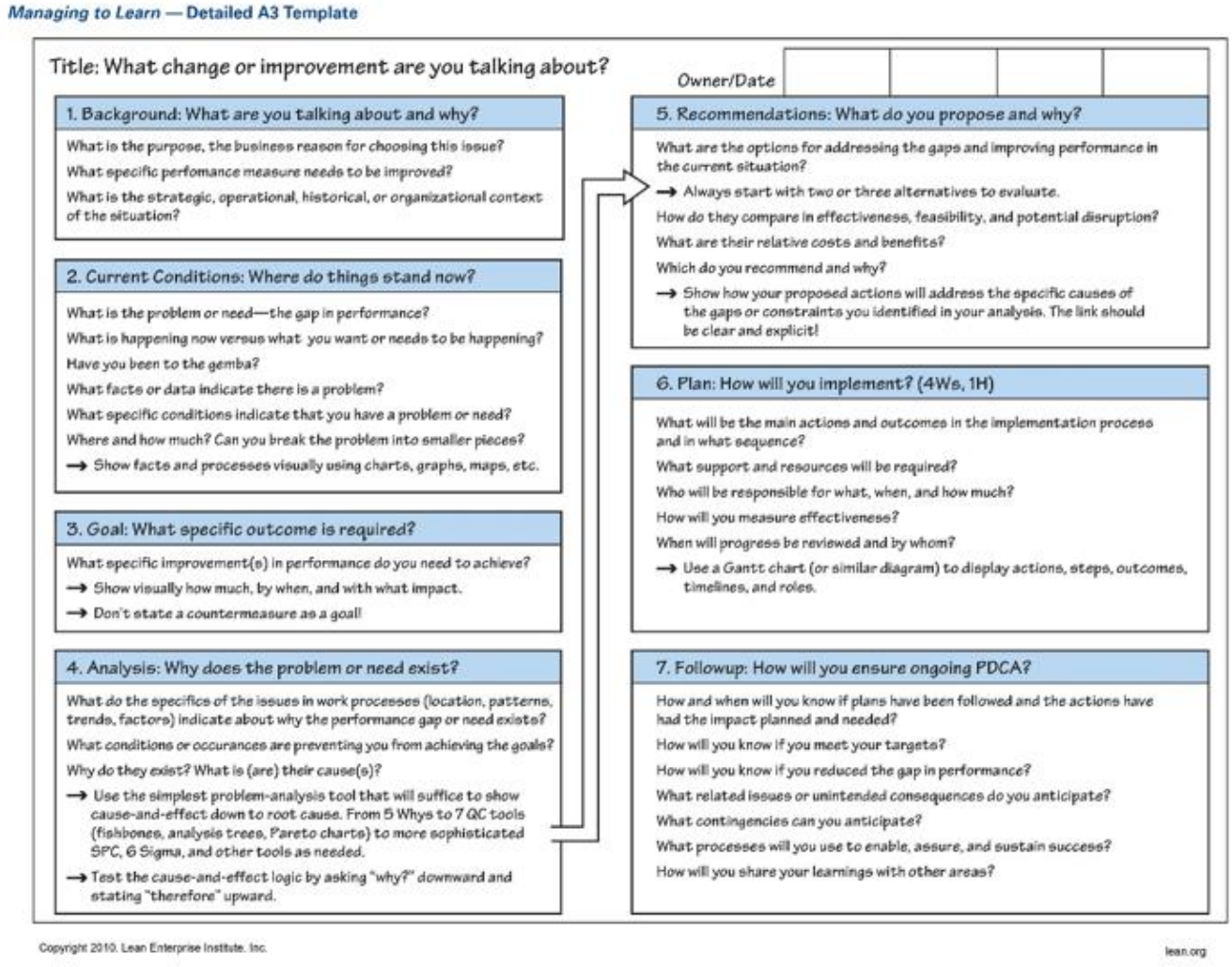
- Complete, as a team, if possible, your analysis of the data.
- Compare the data to your prediction.
- Summarize and reflect on what you learned.

Act: Based on what you learned from the test, make a plan for your next step.

- Adapt (make modifications and run another test), adopt (test the change on a larger scale), or abandon (don't do another test on this change idea).
- Prepare a plan for the next PDSA.

Appendix C

A3 Example



Appendix D

PM and Site Contract Agreement

The Project/Practicum Mentor (PM)

Purpose

Each student will identify an individual that has practice expertise in nursing leadership. The PM needs adequate content understanding in the area related to the DNP project/practicum and agrees to mentor the student throughout the program and provide guidance with development and implementation of the DNP project/practicum experience, under the supervision of the course instructor and academic mentor.

Qualifications

The PM must:

- Hold a doctoral degree (for example, PhD, EdD, or DNP) from a regionally accredited University and have adequate knowledge and/or expertise related to the DNP scholarly project. (The exception to this rule: DNP 756 the PM may hold a Master's degree).
- In addition, the PM must have expertise within the realms of nursing leadership that is documented in a CV or resume. This document should be provided to the student who will submit it for review by the project/practicum course instructor.
- The PM must have a current unencumbered RN license in the state where the DNP project/practicum will occur. Compact license is acceptable provided both the student and the PM are authorized to practice in the state where the project/practicum will take place.
- The PM may not be the student's supervisor.
- The PM must possess adequate technology skills to read and respond to emails, and to communicate with you in a timely fashion.

Responsibilities of the PM

The PM agrees to:

- Supervise practicum hours completed for the DNP project/practicum. This requires validation of practicum logs through providing signatures once per course module.
- Support the student throughout the program or sessions they agree to participate. It is preferred that the PM commit to working with the student throughout the program.
- Help the student gain access to practicum experience at the practice site where applicable.
- Troubleshoot issues that arise during the planning, implementation, and evaluation of the DNP project/practicum.
- Provide encouragement and support during the project/practicum phase of the student's education.
- Share expertise regarding the project/practicum topic(s).
- Meet in person or virtually with the student and the project/practicum instructor as needed throughout the students' academic career at TUN.
- Mentor the student towards successful completion of the identified DNP scholarly project and/or practicum experiences, under the supervision of the Project Instructor and/or course lead.
- Coach, support, and mentor the student towards success as necessary, including obtaining necessary site approvals in the identified project/practicum setting.

Responsibilities of the Student

The student agrees to:

- Utilize the time of the PM effectively and efficiently through effective communication and respect.

Appendix D, continued

- Meet in person or virtually, with the Project Team at least as needed throughout the students' academic career at TUN.
- Make consistent progress towards completion of the DNP Scholarly project/practicum and to keep the PM and Project Team updated on their progress through submission of appropriate weekly Practicum logs and communication with all parties on an as needed basis.
- Complete all project/practicum course assignments in a timely manner.
- Reach out to the PM with questions and for support as needed.

Responsibilities of the Project/Practicum Instructor

The Project/Practicum Instructor agrees to:

- Always maintain open communication with the PM and Student.
- Schedule virtual meetings with the PM and Student at least once per session and as needed at other times.
- Review the weekly progress reports made by the student and identify and communicate issues that the committee must address.
- Support the student and the PM through availability and responsiveness to identified issues.
-

The overall DNP Project/Practicum experience is monitored and approved by the Project/Practicum Mentor and DNP Project/Practicum instructor to meet the rigor and clinical requirements of said experience.

I agree to abide by the respective responsibilities stated above, both implicit and inferred.

Carol Rayfield — 7.27.2022
Signature of PM — Date

Carol Rayfield — 7.27.2022
Printed Name of PM — Date

Desert View Hospital
Project/practicum Site Name

360 South Lola Lane, Pahrump, NV 89048
Project/practicum Site Address

775-751-7599
Project/practicum Site Phone Number

Carol.Rayfield@uhsinc.com
Project/practicum Site Contact Person & Email Address

Dorothy Callander — July 27, 2022
Signature of Student — Date

Dorothy Callander
Printed Name of Student

Addressing barriers to increase barcode scanning compliance
Title of DNP Scholarly Project/practicum

Appendix D, continued

PM and Site Contract Agreement

The Project/Practicum Mentor (PM)

Purpose

Each student will identify an individual that has practice expertise in nursing leadership. The PM needs adequate content understanding in the area related to the DNP project/practicum and agrees to mentor the student throughout the program and provide guidance with development and implementation of the DNP project/practicum experience, under the supervision of the course instructor and academic mentor.

Qualifications

The PM must:

- Hold a doctoral degree (for example, PhD, EdD, or DNP) from a regionally accredited University and have adequate knowledge and/or expertise related to the DNP scholarly project. (The exception to this rule: DNP 756 the PM may hold a Master's degree).
- In addition, the PM must have expertise within the realms of nursing leadership that is documented in a CV or resume. This document should be provided to the student who will submit it for review by the project/practicum course instructor.
- The PM must have a current unencumbered RN license in the state where the DNP project/practicum will occur. Compact license is acceptable provided both the student and the PM are authorized to practice in the state where the project/practicum will take place.
- The PM may not be the student's supervisor.
- The PM must possess adequate technology skills to read and respond to emails, and to communicate with you in a timely fashion.

Responsibilities of the PM

The PM agrees to:

- Supervise practicum hours completed for the DNP project/practicum. This requires validation of practicum logs through providing signatures once per course module.
- Support the student throughout the program or sessions they agree to participate. It is preferred that the PM commit to working with the student throughout the program.
- Help the student gain access to practicum experience at the practice site where applicable.
- Troubleshoot issues that arise during the planning, implementation, and evaluation of the DNP project/practicum.
- Provide encouragement and support during the project/practicum phase of the student's education.
- Share expertise regarding the project/practicum topic(s).
- Meet in person or virtually with the student and the project/practicum instructor as needed throughout the students' academic career at TUN.
- Mentor the student towards successful completion of the identified DNP scholarly project and/or practicum experiences, under the supervision of the Project Instructor and/or course lead.
- Coach, support, and mentor the student towards success as necessary, including obtaining necessary site approvals in the identified project/practicum setting.

Responsibilities of the Student

The student agrees to:

- Utilize the time of the PM effectively and efficiently through effective communication and respect.

Appendix D, continued

- Meet in person or virtually, with the Project Team at least as needed throughout the students' academic career at TUN.
- Make consistent progress towards completion of the DNP Scholarly project/practicum and to keep the PM and Project Team updated on their progress through submission of appropriate weekly Practicum logs and communication with all parties on an as needed basis.
- Complete all project/practicum course assignments in a timely manner.
- Reach out to the PM with questions and for support as needed.

Responsibilities of the Project/Practicum Instructor

The Project/Practicum Instructor agrees to:

- Always maintain open communication with the PM and Student.
- Schedule virtual meetings with the PM and Student at least once per session and as needed at other times.
- Review the weekly progress reports made by the student and identify and communicate issues that the committee must address.
- Support the student and the PM through availability and responsiveness to identified issues.
-

The overall DNP Project/Practicum experience is monitored and approved by the Project/Practicum Mentor and DNP Project/Practicum Instructor to meet the rigor and clinical requirements of said experience.

I agree to abide by the respective responsibilities stated above, both implicit and inferred.

Cynthia Lewis DNP, RN 01/30/23

Signature of PM — Date

Cynthia Lewis

Printed Name of PM — Date

Desert View Hospital

Project/practicum Site Name

360 Lola Lane Pahrump NV 89048

Project/practicum Site Address

775-751-7500

Project/practicum Site Phone Number

Cynthia Lewis revcjlewis@gmail.com

Project/practicum Site Contact Person & Email Address

Dorothy Callander 1/26/2023

Signature of Student — Date

Dorothy Callander

Printed Name of Student

Improving Patient Safety and Decreasing Medication Errors by Improving Bar Code Medication Administration Compliance

Title of DNP Scholarly Project/practicum

Appendix E

BCMA PowerPoint from Facility

Bar Code Medication Administration

2022

BCMA

- BCMA –Bar code medication administration (BCMA) is a bar code system designed by Glenna Sue Kennick to prevent medication errors in healthcare settings and to improve the quality and safety of medication administration. The overall goals of BCMA are to improve accuracy, prevent errors, and generate online records of medication administration
- Health Care Professionals who administer medications will utilize BCMA. The goal is 100% compliance

Equipment

- WOWs
- Scanners that are attached to WOW or computer work station
- Patient ID Barcode (on patient ID band)
- Medication specific Barcodes
  - Each medication Barcode is unique to the medication, dose, formulation
  - Common IVPBs and infusions will have a medication specific barcode
  - Patient specific medications (ex Banana Bag) will utilize a order specific barcode on patient specific label

Samples of Barcodes

Process

- BCMA occurs in Healthland through the eMAR module

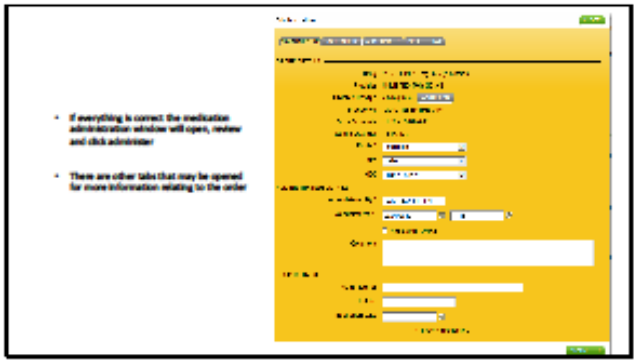
Entering patient ID Barcode

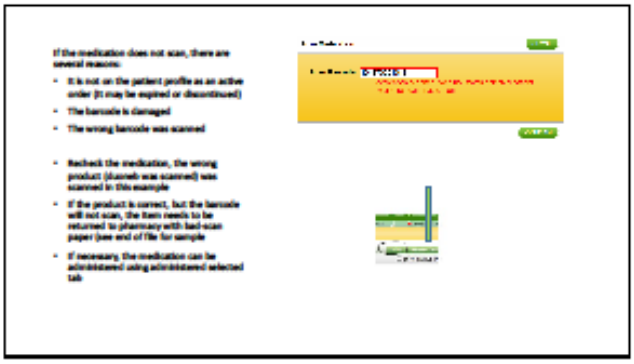
- When you click on BCMA button, the BCMA window will pop-up in the middle of screen
- Scan the barcode on patient ID band, if it does not recognize, recheck patient, rescan. If barcode is damaged or incorrect, have a new ID Band generated and applied to patient
- If the barcode is recognized, click confirm if necessary (we are working to initialize all scanners to go directly to next screen when correct/recognized barcode is entered

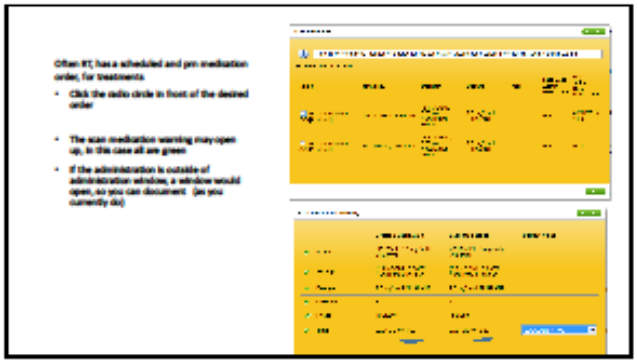
Scanning the medication

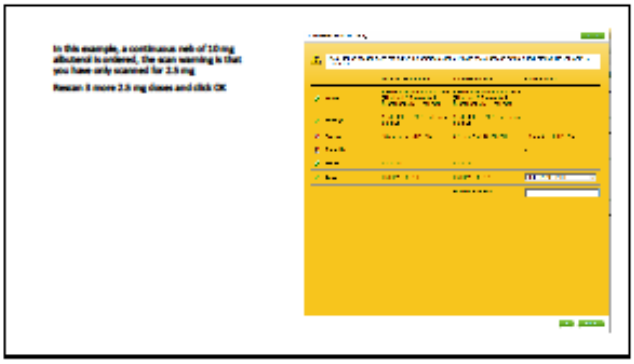
- The scan medication window will open
- Scan the barcode

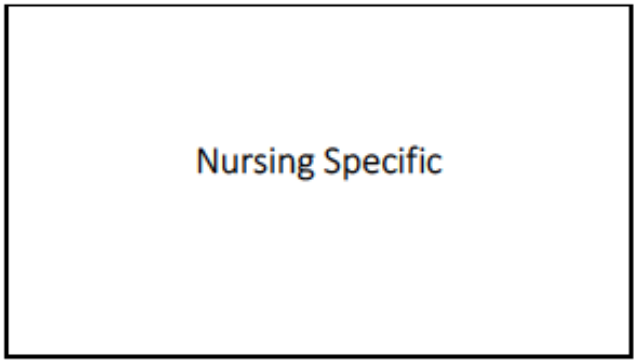
Appendix E, continued

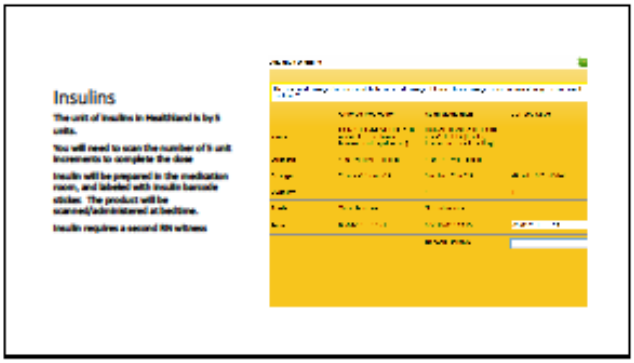


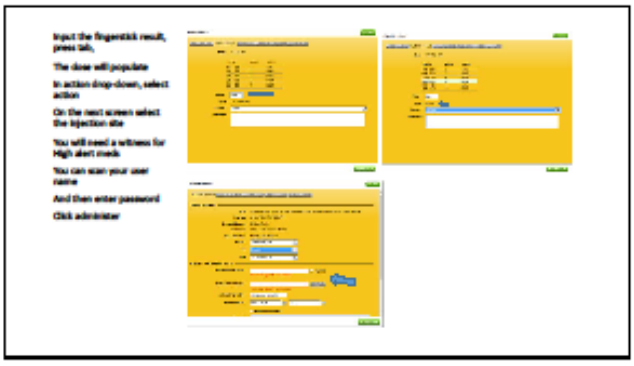












Appendix E, continued

IVPB (antibiotics)

Injections

Infusions

Partial tablets

ENT/ topicals

Isolation

If a WOW is taken into an Isolation Room, it must be terminally cleaned per current practice

Preventing infections can be exhausting...

Battling a outbreak is much worse

Appendix E, continued

Bad Scan Report

Complete the report

Return defective barcode to pharmacy

Submit a CCE for a medication which will not scan

Stop the process if the medication will not scan; patient safety is paramount

Thank you

Please check with pharmacy for any questions /issues

Also stop by to get your personal barcode(s) so you can:

- Access PYXIS
- Witness in MedStand
- Log on to the glucose monitors

Appendix F

PowerPoint for Poster and Education Program

Appendix F, continued

BCMA

- BCMA -Bar code medication administration (BCMA) is a bar code system designed by Glenna Sue Kennick to prevent medication errors in healthcare settings and to improve the quality and safety of medication administration. The overall goals of BCMA are to improve accuracy, prevent errors, and generate online records of medication administration
- Hospital policy states BCMA will be used to administer medications. The goal is 100% compliance

Medication Errors

- Kill up to 98,000 hospitalized patients yearly
- Medication administration errors are 30% of all medication-related errors
- Happen to approximately 75% of hospitalized patients. Harm roughly 1.5 million patients annually. One-third of these are preventable
- Errors decreased by 55.4% in events that would have caused patient harm when BCMA was implemented

Advantages of BCMA

- BCMA significantly decreases wrong patient, wrong dose, wrong route, wrong medication, and medication omission errors (Shah et al., 2016)
- BCMA added to dispensing machines and computerized physician order entry correctly charts administered medication (Shah et al., 2016)
- BCMA increases compliance with patient identification and double-checks the five rights (Shah et al., 2016)
- Three federal guidelines support BCMA (Hillstein-Lobue et al., 2018, Institute for Safe Medication Practices [ISMP], 2022, Laugling Group, 2017)

Troubleshooting

- The patient's armband won't scan
  - Get a new armband. The unit clerk can assist.
    - It is **NEVER** acceptable to scan a label.
- The medication won't scan
  - Call or go to the pharmacy to resolve the issue

YOUR Job is to Keep Your Patient SAFE

- BCMA improves patient safety
- BCMA is an evidence-based best practice

Emergency Department Considerations

- Scanning the patient's armband and medications at the bedside is expected and required in the ED.
- Not everyone who walks through the doors is an emergency.
- These are emergencies where BCMA may not be possible:
  - Trauma
  - Cardiac Arrest
  - Respiratory Arrest

Protect your Patients

Protect your License

Thank You!

Appendix F, continued

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Appendix G

Test Blueprint

Test Construction Activity

Dorothy Callander

Touro University

DNPV 763 DNP Practicum II

January 11, 2023

Appendix G, continued

Test Construction

Purpose

Learning Objectives:

At the end of this presentation, the learner should be able to:

- State why BCMA helps protect your patient
- State how BCMA helps protect your license
- State how to troubleshoot BCMA issues

Population

Nurses at a critical access hospital in Southwest Nevada.

Length of the Test

10 Questions.

Difficulty and Discrimination Levels of Test Items

Low to moderate difficulty question will be used. Criterion based grading is used to assess that course objectives have been met (Oermann & Gaberson, 2019, Chapter 17).

Scoring Procedures to be Used

The tests will be numbered to pair pre-test and post test results. The pre-test and post-test have the same questions in a different order. The tests will be used to generate a statistical analysis of both the pre-test and the post-test.

Item Format

Multiple choice.

Appendix G, continued

Test Blueprint

Content	Level of Cognitive Skill				
	K	C	AP	AN	Total
Troubleshooting 1, 3				2	2
Patient Safety 2, 4, 6, 7, 9, 10	3	1	1	1	6
License Protection 5, 8		1	1		2
Total					10

Questions

1. Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?
    a. Call or go to the pharmacy to have the problem resolved.
    b. Administer the medication by manually entering it into the EMR.
    c. Do not administer the medication.
    d. Administer the medication manually and alert the pharmacy.

Answer: A Analysis-Troubleshooting

Rationale: The pharmacy should always be alerted when a medication will not scan to resolve medication scanning issues before administering medications. The only time administering medication without scanning is acceptable is in the event of a trauma, cardiac arrest, or respiratory arrest. The patient should have their scheduled medications unless there is a contraindication (C. Rayfield, personal communication, November 28, 2022).

2. How does BCMA prevent wrong medication errors?
    a. BCMA will alert if a medication is not on the EMar.
    b. BCMA will alert if a daily maximum dose is about to be exceeded.
    c. BCMA will alert if a PRN medication is being administered too soon.
    d. All of the above.

Answer: D Knowledge - Patient Safety

Rationale: Bar coded medication, when scanned, will alert if the medication is not on the EMar, if the daily maximum dose is about to be exceeded, and if a PRN medication is being administered too soon (Shah, et al., 2016).

3. You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?
    a. Scan a label from the chart.
    b. Manually enter the patient ID.

Appendix G, continued

c. Obtain a new armband.
d. Manually enter the patient ID and get an armband later.

Answer: C Analysis-Troubleshooting

Rationale: Scanning a label from the chart is never acceptable. If this were a trauma, cardiac or respiratory arrest This is not an emergency, so B is not correct. C is correct, you would obtain a new armband or ask the unit clerk to get one for you. You should ensure the patient has an armband and properly identify the patient before giving medication, so D is incorrect (C. Rayfield, personal communication, November 28, 2022).

4. How does BCMA reduce potential medication errors?
    a. By double checking the rights of medication administration.
    b. By checking the medication rights for the nurse and removing the human element.
    c. By making sure the nurse does not administer expired drugs.
    d. It does not reduce potential medication errors.

Answer: A Comprehension – Patient Safety

Rationale: BCMA verifies the five rights of medication administration (Shah, et al., 2016). The nurse should always perform medication checks. Not all EHR systems check for expired medications. BCMA can reduce up to 30% of medication administration errors.

5. A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?
    a. It was an emergency, and there was no time.
    b. The patient is not wearing a wristband.
    c. It takes too long and causes more medication errors.
    d. All of the above.

Answer: D Application – License Protection

Rationale: It was an emergency, the patient is not wearing a wristband, and it is too time consuming and causes medication errors are all excuses used to avoid BCMA (C. Rayfield, personal communication, November 28, 2022).

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6. You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?
    a. I do not need to scan; everything is an emergency in the emergency department.
    b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest.

Appendix G, continued

c. If there is no available WOW.
d. If the patient's name is not known.

Answer: B Application – Patient Safety

Rationale: Patients that require immediate stabilization are the only true emergencies in the ED. In the event of a trauma, cardiac arrest, or respiratory arrest patient stabilization is the top priority, so BCMA may be bypassed until the patient is stable. If there is no WOW available obtain one as soon as possible, if the patients' name is not known they will have been registered as a John or Jane Doe (C. Rayfield, personal communication, November 28, 2022).

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7. Which statement is true regarding medication administration errors?
   a. They rarely happen.
   b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time.
   c. They happen, but rarely cause harm.
   d. They cannot be avoided, we are human.

Answer: B Knowledge – Patient Safety

Rationale: Medication errors kill up to 98,000 patients annually, so A, C, and D are incorrect (Owens et al., 2020). BCMA is a tool to provide an extra check of the five rights to protect patients.

8. What is true about bypassing BCMA?
   a. It violates the BCMA policy.
   b. It is acceptable to bypass BCMA if you are in a hurry.
   c. The chance of a harmful medication error increases.
   d. None of the above.
   e. Both A & C.

Answer: E Comprehension – License Protection

Rationale: Bypassing BCMA violates the BCMA policy and increases the chances of harmful medication errors (MacDowell et al., 2021). BCMA cannot prevent all medication errors. A and C are incorrect individually since they both apply. D is incorrect since two statements are true.

9. What are the five rights of medication administration?
   a. Route, time, drug, patient, dose.
   b. Drug, shift, route, patient, dose.
   c. Patient, dose, route, room, purpose.
   d. Time, patient, drug, dose, doctor.

Answer: A Knowledge – Patient Safety

Appendix G, continued

Rationale: The five rights are the right patient, drug (medication), dose, route, and time. Medication administration does not depend on shift, room, or doctor (Federico, n.d.).

10. Why should you always use BCMA?
    a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error.
    b. BCMA can decrease medication administration errors by 96% while improving efficiency.
    c. All of the above.
    d. None of the above.

Answer: C Comprehension – Patient Safety

Rationale: C is correct since both A and B are true statements about using BCMA (Shah, et al., 2016).

Appendix G, continued

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Appendix H

Test Answer Keys

Pre-Test

Test # _____

Please circle the correct response

1. Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?
   a. Call or go to the pharmacy to have the problem resolved.
   b. Administer the medication by manually entering it into the EMR.
   c. Do not administer the medication.
   d. Administer the medication manually and alert the pharmacy.

2. How does BCMA prevent wrong medication errors?
   a. BCMA will alert if a medication is not on the EMar.
   b. BCMA will alert if a daily maximum dose is about to be exceeded.
   c. BCMA will alert if a PRN medication is being administered too soon.
   d. All of the above.

3. You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?
   a. Scan a label from the chart.
   b. Manually enter the patient ID.
   c. Obtain a new armband.
   d. Manually enter the patient ID and get an armband later.

4. How does BCMA reduce potential medication errors?
   a. By double checking the rights of medication administration.
   b. By checking the medication rights for the nurse and removing the human element.
   c. By making sure the nurse does not administer expired drugs.
   d. It does not reduce potential medication errors.

5. A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?
   a. It was an emergency, and there was no time.
   b. The patient is not wearing a wristband.
   c. It takes too long and causes more medication errors.
   d. All of the above.

6. You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?
   a. I do not need to scan; everything is an emergency in the emergency department.
   b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest.
   c. If there is no available WOW.
   d. If the patient's name is not known.

Appendix H, continued

Test # _____

7. Which statement is true regarding medication administration errors?
    a. They rarely happen.
    b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time.
    c. They happen, but rarely cause harm.
    d. They cannot be avoided, we are human.

8. What is true about bypassing BCMA?
    a. It violates the BCMA policy.
    b. It is acceptable to bypass BCMA if you are in a hurry.
    c. The chance of a harmful medication error increases.
    d. None of the above.
    e. Both A & C.

9. What are the five rights of medication administration?
    a. Route, time, drug, patient, dose.
    b. Drug, shift, route, patient, dose.
    c. Patient, dose, route, room, purpose.
    d. Time, patient, drug, dose, doctor.

10. Why should you always use BCMA?
    a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error.
    b. BCMA can decrease medication administration errors by 96% while improving efficiency.
    c. All of the above.
    d. None of the above.

Appendix H, continued

Post-Test

Test # _____

Please circle the correct response

1. A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?
   a. The patient is not wearing a wristband.
   b. It was an emergency, and there was no time.
   c. It takes too long and causes more medication errors.
   d. All of the above.

2. Which statement is true regarding medication administration errors?
   a. They rarely happen.
   b. They happen, but rarely cause harm.
   c. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time.
   d. They cannot be avoided, we are human.

3. How does BCMA prevent wrong medication errors?
   a. BCMA will alert if a medication is not on the EMar.
   b. BCMA will alert if a daily maximum dose is about to be exceeded.
   c. BCMA will alert if a PRN medication is being administered too soon.
   d. All of the above.

4. Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?
   a. Call or go to the pharmacy to have the problem resolved.
   b. Administer the medication by manually entering it into the EMR.
   c. Do not administer the medication.
   d. Administer the medication manually and alert the pharmacy.

5. How does BCMA reduce potential medication errors?
   a. By checking the medication rights for the nurse and removing the human element.
   b. By making sure the nurse does not administer expired drugs.
   c. It does not reduce potential medication errors.
   d. By double checking the rights of medication administration.

6. What are the five rights of medication administration?
   a. Drug, shift, route, patient, dose.
   b. Patient, dose, route, room, purpose.
   c. Route, time, drug, patient, dose.
   d. Time, patient, drug, dose, doctor.

Appendix H, continued

Test # _____

7. You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?
   a. Obtain a new armband.
   b. Scan a label from the chart.
   c. Manually enter the patient ID.
   d. Manually enter the patient ID and get an armband later.

8. You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?
   a. I do not need to scan; everything is an emergency in the emergency department.
   b. If there is no available WOW.
   c. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest.
   d. If the patient's name is not known.

9. Why should you always use BCMA?
   a. BCMA can decrease medication administration errors by 96% while improving efficiency.
   b. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error.
   c. All of the above.
   d. None of the above.

10. What is true about bypassing BCMA?
    a. It violates the BCMA policy.
    b. It is acceptable to bypass BCMA if you are in a hurry.
    c. The chance of a harmful medication error increases.
    d. None of the above.
    e. Both A & C.

Appendix I

Pre-Test

Test # _____

Please circle the correct response

1. Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?
    a. Call or go to the pharmacy to have the problem resolved.
    b. Administer the medication by manually entering it into the EMR.
    c. Do not administer the medication.
    d. Administer the medication manually and alert the pharmacy.

2. How does BCMA prevent wrong medication errors?
    a. BCMA will alert if a medication is not on the EMar.
    b. BCMA will alert if a daily maximum dose is about to be exceeded.
    c. BCMA will alert if a PRN medication is being administered too soon.
    d. All of the above.

3. You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?
    a. Scan a label from the chart.
    b. Manually enter the patient ID.
    c. Obtain a new armband.
    d. Manually enter the patient ID and get an armband later.

4. How does BCMA reduce potential medication errors?
    a. By double checking the rights of medication administration.
    b. By checking the medication rights for the nurse and removing the human element.
    c. By making sure the nurse does not administer expired drugs.
    d. It does not reduce potential medication errors.

5. A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?
    a. It was an emergency, and there was no time.
    b. The patient is not wearing a wristband.
    c. It takes too long and causes more medication errors.
    d. All of the above.

6. You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?
    a. I do not need to scan; everything is an emergency in the emergency department.
    b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest.
    c. If there is no available WOW.
    d. If the patient's name is not known.

Appendix I, continued

Test # _____

7. Which statement is true regarding medication administration errors?
    a. They rarely happen.
    b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time.
    c. They happen, but rarely cause harm.
    d. They cannot be avoided, we are human.

8. What is true about bypassing BCMA?
    a. It violates the BCMA policy.
    b. It is acceptable to bypass BCMA if you are in a hurry.
    c. The chance of a harmful medication error increases.
    d. None of the above.
    e. Both A & C.

9. What are the five rights of medication administration?
    a. Route, time, drug, patient, dose.
    b. Drug, shift, route, patient, dose.
    c. Patient, dose, route, room, purpose.
    d. Time, patient, drug, dose, doctor.

10. Why should you always use BCMA?
    a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error.
    b. BCMA can decrease medication administration errors by 96% while improving efficiency.
    c. All of the above.
    d. None of the above.

Appendix J

Post-Test

Test # _____

Please circle the correct response

1. A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?
    a. The patient is not wearing a wristband.
    b. It was an emergency, and there was no time.
    c. It takes too long and causes more medication errors.
    d. All of the above.

2. Which statement is true regarding medication administration errors?
    a. They rarely happen.
    b. They happen, but rarely cause harm.
    c. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time.
    d. They cannot be avoided, we are human.

3. How does BCMA prevent wrong medication errors?
    a. BCMA will alert if a medication is not on the EMar.
    b. BCMA will alert if a daily maximum dose is about to be exceeded
    c. BCMA will alert if a PRN medication is being administered too soon.
    d. All of the above.

4. Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?
    a. Call or go to the pharmacy to have the problem resolved.
    b. Administer the medication by manually entering it into the EMR.
    c. Do not administer the medication.
    d. Administer the medication manually and alert the pharmacy.

5. How does BCMA reduce potential medication errors?
    a. By checking the medication rights for the nurse and removing the human element.
    b. By making sure the nurse does not administer expired drugs.
    c. It does not reduce potential medication errors
    d. By double checking the rights of medication administration

6. What are the five rights of medication administration?
    a. Drug, shift, route, patient, dose
    b. Patient, dose, route, room, purpose.
    c. Route, time, drug, patient, dose
    d. Time, patient, drug, dose, doctor

Appendix J, continued

Test # _____

7. You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?
    a. Obtain a new armband.
    b. Scan a label from the chart.
    c. Manually enter the patient ID.
    d. Manually enter the patient ID and get an armband later.

8. You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?
    a. I do not need to scan; everything is an emergency in the emergency department.
    b. If there is no available WOW.
    c. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest.
    d. If the patient's name is not known.

9. Why should you always use BCMA?
    a. BCMA can decrease medication administration errors by 96% while improving efficiency.
    b. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error.
    c. All of the above.
    d. None of the above.

10. What is true about bypassing BCMA?
    a. It violates the BCMA policy.
    b. It is acceptable to bypass BCMA if you are in a hurry.
    c. The chance of a harmful medication error increases.
    d. None of the above
    e. Both A & C.

Appendix K

Survey

Please mark your responses. Your answers will help to improve the program.					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. The stated objectievs were met.	1	2	3	4	5
2. The information presented was relevant to your practice.	1	2	3	4	5
3. The presenter encouraged group involvement	1	2	3	4	5
4. The presenter was knowledgeable about the subject	1	2	3	4	5
5. the presenter was engaging.	1	2	3	4	5
6. The presenter was prepared.	1	2	3	4	5
7. The handouts and PowerPoint enhanced learning.	1	2	3	4	5
	Very Poor	Poor	Neutral	Good	Excellent
8. Overall rating of the program.	1	2	3	4	5
9. What changes do you think would make the program more effective or engaging?					
10. I would be interested in learning more about:					

Appendix L

Attestation

Southwest Nevada
Rural Hospital

ATTESTATION

I have received education regarding compliance with bar code medication administration. I agree to abide by the company policy regarding bar code medication administration.

_____
Printed Name

_____
Signature

_____
Date

Appendix M

Affiliation Statement

Affiliation Agreement Statement:

Touro University Nevada does not require affiliation agreements for DNP Practicum Experiences. However, the project/practicum site may require an affiliation agreement with Touro. Please delegate this form to an appropriate project/practice site representative for completion.
Please fill in the blanks below and check the appropriate box:

The TUN DNP student: Dorothy Callander is authorized to complete practicum hours at the above listed project site.

_____ An affiliation agreement is required for completion of this practicum experience.

X An affiliation agreement is not required for completion of this practicum experience.

*If an affiliation agreement is required, please insert the name and contact information of the person who will coordinate the agreement:

Name of representative: Carol Rayfield

Contact Information and preferred contact method: (775)-751-7599 360 S. Lola Lane Pahrump NV 89048

Authorized Project Site Representative Signature: Carol Rayfield

Student Signature: Dorothy Callander

Appendix M, continued

Affiliation Agreement Statement:

Touro University Nevada does not require affiliation agreements for DNP Practicum Experiences. However, the project/practicum site may require an affiliation agreement with Touro. Please delegate this form to an appropriate project/practice site representative for completion.
Please fill in the blanks below and check the appropriate box:

The **TUN DNP student:** Dorothy Callander is authorized to complete practicum hours at the above listed project site.

____ An affiliation agreement is required for completion of this practicum experience.

X An affiliation agreement is not required for completion of this practicum experience.

*If an affiliation agreement is required, please insert the name and contact information of the person who will coordinate the agreement:

Name of representative: _____

Contact Information and preferred contact method: _____

Authorized Project Site Representative Signature: Cynthia Dennis Desert View Hospital

Student Signature: Dorothy Callander

Appendix N

Content Validity Index

Content Validity Index Table

Item	Expert 1	Expert 2	Expert 3	Expert 4	Mean	CVR	Proportion of Agreement
1	4	4	3	4	3.75	2.00	1
2	4	4	4	4	4.00	2.00	1
3	4	4	4	3	3.75	2.00	1
4	4	4	4	4	4.00	2.00	1
5	4	4	2	4	3.50	0.67	0.67
6	4	4	3	3	3.50	2.00	1
7	4	4	4	4	4.00	2.00	1
8	4	3	4	4	3.75	2.00	1
9	4	2	4	4	3.50	0.67	0.67
10	4	4	3	4	3.75	2.00	1

Appendix N, continued

Expert Rating Form – SP, DNP

Expert Rating Form

Rating instructions: For each item, please indicate the following:

Please rate each item's relevance to the overall construct of bar code medication administration by placing a number in the box to the right of each item.

1 = Not relevant at all

2 = Slightly relevant

3 = Moderately relevant

4 = Highly relevant

Your honest feedback is appreciated and will be used to enhance the quality of the test.

Item	Relevance Rating
Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case? a. Call or go to the pharmacy to have the problem resolved. b. Administer the medication by manually entering it into the EMR. c. Do not administer the medication. d. Administer the medication manually and alert the pharmacy.	4
How does BCMA prevent wrong medication errors? a. BCMA will alert if a medication is not on the EMar. b. BCMA will alert if a daily maximum dose is about to be exceeded. c. BCMA will alert if a PRN medication is being administered too soon. d. All of the above.	4
You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case? a. Scan a label from the chart. b. Manually enter the patient ID. c. Obtain a new armband. d. Manually enter the patient ID and get an armband later.	4
How does BCMA reduce potential medication errors? a. By double checking the rights of medication administration. b. By doing it for the nurse and removing the human element. c. By making sure the nurse does not administer expired drugs. d. It does not reduce potential medication errors.	4

Appendix N, continued

A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the excuses the nurse might give for not using BCMA? a. It was an emergency, and there was no time. b. The patient is not wearing a wristband. c. It takes too long and causes more medication errors. d. All of the above.	4
You are working in the emergency department. Are there any exceptions that allow you to bypass scanning? a. I do not need to scan; everything is an emergency in the emergency department. b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest. c. If there is no available WOW. d. If the patient's name is not known.	4
Which statement is true regarding medication administration errors? a. They rarely happen. b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time. c. They happen, but rarely cause harm. d. They cannot be avoided, we are human.	4
What is true about bypassing BCMA? a. It violates the BCMA policy. b. BCMA will prevent all medication errors. c. The chance of a harmful medication error increases. d. None of the above. e. Both A & C.	4
What are the five rights of medication administration? a. Route, time, drug, patient, dose. b. Drug, shift, route, patient, dose. c. Patient, dose, route, room, purpose. d. Time, patient, drug, dose, doctor.	4
Why should you always use BCMA? a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error. b. BCMA can decrease medication administration errors by 96% while improving efficiency. c. Both A & B. d. Neither A & B.	4

Appendix N, continued

Expert Rating Form – JA, DNP

Expert Rating Form

Rating instructions: For each item, please indicate the following:

Please rate each item's relevance to the overall construct of bar code medication administration by placing a number in the box to the right of each item.

1 = Not relevant at all

2 = Slightly relevant

3 = Moderately relevant

4 = Highly relevant

Your honest feedback is appreciated and will be used to enhance the quality of the test.

Item	Relevance Rating
Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case? a. Call or go to the pharmacy to have the problem resolved. b. Administer the medication by manually entering it into the EMR. c. Do not administer the medication. d. Administer the medication manually and alert the pharmacy.	4
How does BCMA prevent wrong medication errors? a. BCMA will alert if a medication is not on the EMar. b. BCMA will alert if a daily maximum dose is about to be exceeded. c. BCMA will alert if a PRN medication is being administered too soon. d. All of the above.	4
You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case? a. Scan a label from the chart. b. Manually enter the patient ID. c. Obtain a new armband. d. Manually enter the patient ID and get an armband later.	4
How does BCMA reduce potential medication errors? a. By double checking the rights of medication administration. b. By doing it for the nurse and removing the human element. c. By making sure the nurse does not administer expired drugs. d. It does not reduce potential medication errors.	4 For response B I would clarify what you mean by "doing it" for the nurse

Appendix N, continued

FACULTY DEVELOPMENT 2

A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the excuses the nurse might give for not using BCMA? a. It was an emergency, and there was no time. b. The patient is not wearing a wristband. c. It takes too long and causes more medication errors. d. All of the above.	4–change excuses to reasons? Makes it less accusatory
You are working in the emergency department. Are there any exceptions that allow you to bypass scanning? a. I do not need to scan; everything is an emergency in the emergency department. b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest. c. If there is no available WOW. d. If the patient's name is not known.	4
Which statement is true regarding medication administration errors? a. They rarely happen. b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time. c. They happen, but rarely cause harm. d. They cannot be avoided, we are human.	4
What is true about bypassing BCMA? a. It violates the BCMA policy. b. BCMA will prevent all medication errors. c. The chance of a harmful medication error increases. d. None of the above. e. Both A & C.	3 Letter B doesn't relate to bypassing which is the stem of the question.
What are the five rights of medication administration? a. Route, time, drug, patient, dose. b. Drug, shift, route, patient, dose. c. Patient, dose, route, room, purpose. d. Time, patient, drug, dose, doctor.	2
Why should you always use BCMA? a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error. b. BCMA can decrease medication administration errors by 96% while improving efficiency. c. Both A & B. d. Neither A & B.	4–you could change to "all of the above" and "none of the above" for clarity

Appendix N, continued

Expert Rating Form – CR, DNP

Expert Rating Form

Rating instructions: For each item, please indicate the following:

Please rate each item's relevance to the overall construct of bar code medication administration by placing a number in the box to the right of each item.

1 = Not relevant at all

2 = Slightly relevant

3 = Moderately relevant

4 = Highly relevant

Your honest feedback is appreciated and will be used to enhance the quality of the test.

Item	Relevance Rating
Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case? a. Call or go to the pharmacy to have the problem resolved. b. Administer the medication by manually entering it into the EMR. c. Do not administer the medication. d. Administer the medication manually and alert the pharmacy.	3
How does BCMA prevent wrong medication errors? a. BCMA will alert if a medication is not on the EMar. b. BCMA will alert if a daily maximum dose is about to be exceeded. c. BCMA will alert if a PRN medication is being administered too soon. d. All of the above.	4
You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case? a. Scan a label from the chart. b. Manually enter the patient ID. c. Obtain a new armband. d. Manually enter the patient ID and get an armband later.	4
How does BCMA reduce potential medication errors? a. By double checking the rights of medication administration. b. By doing it for the nurse and removing the human element. c. By making sure the nurse does not administer expired drugs. d. It does not reduce potential medication errors.	4

Appendix N, continued

A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the excuses the nurse might give for not using BCMA? a. It was an emergency, and there was no time. b. The patient is not wearing a wristband. c. It takes too long and causes more medication errors. d. All of the above.	2
You are working in the emergency department. Are there any exceptions that allow you to bypass scanning? a. I do not need to scan; everything is an emergency in the emergency department. b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest. c. If there is no available WOW. d. If the patient's name is not known.	3
Which statement is true regarding medication administration errors? a. They rarely happen. b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time. c. They happen, but rarely cause harm. d. They cannot be avoided, we are human.	4
What is true about bypassing BCMA? a. It violates the BCMA policy. b. BCMA will prevent all medication errors. c. The chance of a harmful medication error increases. d. None of the above. e. Both A & C.	4
What are the five rights of medication administration? a. Route, time, drug, patient, dose. b. Drug, shift, route, patient, dose. c. Patient, dose, route, room, purpose. d. Time, patient, drug, dose, doctor.	4
Why should you always use BCMA? a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error. b. BCMA can decrease medication administration errors by 96% while improving efficiency. c. Both A & B. d. Neither A & B.	3

Appendix N, continued

Expert Rating Form – SC, DNP

Expert Rating Form

Rating instructions: For each item, please indicate the following:

Please rate each item's relevance to the overall construct of bar code medication administration by placing a number in the box to the right of each item.

1 = Not relevant at all

2 = Slightly relevant

3 = Moderately relevant

4 = Highly relevant

Your honest feedback is appreciated and will be used to enhance the quality of the test.

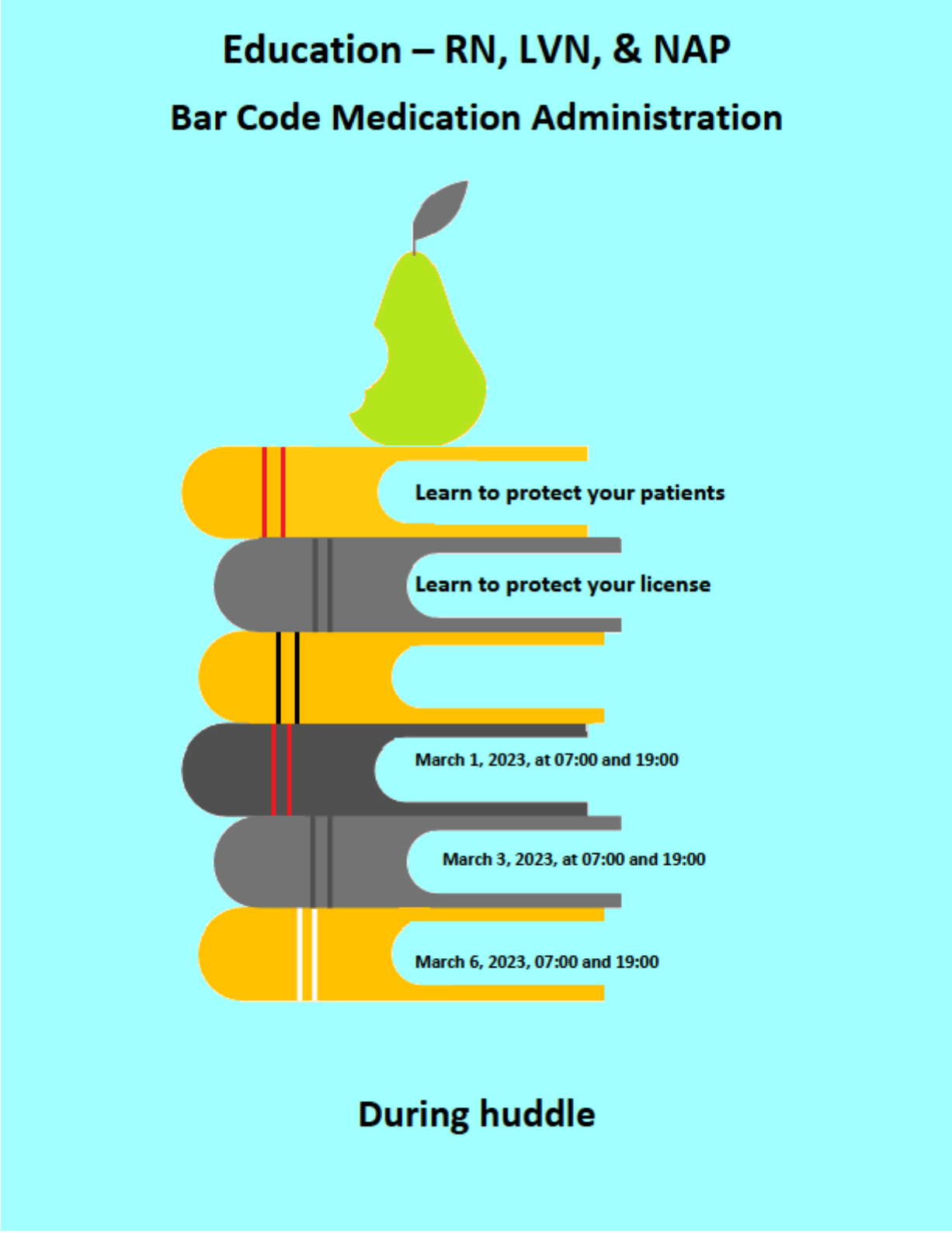
Item	Relevance Rating
Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case? a. Call or go to the pharmacy to have the problem resolved. b. Administer the medication by manually entering it into the EMR. c. Do not administer the medication. d. Administer the medication manually and alert the pharmacy.	4
How does BCMA prevent wrong medication errors? a. BCMA will alert if a medication is not on the EMar. b. BCMA will alert if a daily maximum dose is about to be exceeded. c. BCMA will alert if a PRN medication is being administered too soon. d. All of the above.	4
You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case? a. Scan a label from the chart. b. Manually enter the patient ID. c. Obtain a new armband. d. Manually enter the patient ID and get an armband later.	3
How does BCMA reduce potential medication errors? a. By double checking the rights of medication administration. b. By doing it for the nurse and removing the human element. c. By making sure the nurse does not administer expired drugs. d. It does not reduce potential medication errors.	4

Appendix N, continued

A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the excuses the nurse might give for not using BCMA? a. It was an emergency, and there was no time. b. The patient is not wearing a wristband. c. It takes too long and causes more medication errors. d. All of the above.	4
You are working in the emergency department. Are there any exceptions that allow you to bypass scanning? a. I do not need to scan; everything is an emergency in the emergency department. b. If the patient is in cardiac arrest or requires immediate stabilization, such as a trauma or respiratory arrest. c. If there is no available WOW. d. If the patient's name is not known.	3
Which statement is true regarding medication administration errors? a. They rarely happen. b. Every precaution should be taken to prevent medication errors, including checking the five rights and scanning patients and medications every time. c. They happen, but rarely cause harm. d. They cannot be avoided, we are human.	4
What is true about bypassing BCMA? a. It violates the BCMA policy. b. BCMA will prevent all medication errors. c. The chance of a harmful medication error increases. d. None of the above. e. Both A & C.	4
What are the five rights of medication administration? a. Route, time, drug, patient, dose. b. Drug, shift, route, patient, dose. c. Patient, dose, route, room, purpose. d. Time, patient, drug, dose, doctor.	4
Why should you always use BCMA? a. Medication administration accounts for 30% of all medication errors and inpatients have a 75% chance of being exposed to a medication error. b. BCMA can decrease medication administration errors by 96% while improving efficiency. c. Both A & B. d. Neither A & B.	4

Appendix O

Flyer



Appendix P

Sign-in Sheet

Southwest Nevada Critical Access Hospital

PROGRAM PARTICIPATION RECORD

Title of Course Bar Code Medication Administration
Name of Presenter Dorothy Callander
Name of Coordinator _____
Date _____ Time _____ Location DVH Basement Training Room
Type of Presentation: Pre-Test, PowerPoint & Lecture, Post-Test

☒ In-service ☐ CE Program - Contact Hours _____ ☐ Other_____

	Last Name, First Name (Print)	Signature
1		
2		
3		
4		
5		
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Rev. 02/2020

Appendix Q

Timeline

Project Implementation Timeline

Introduction	
Project Site	**Critical Access Hospital in Southwest Nevada**
Project Mentor	**Dr. Carol Rayfield**
Project Purpose	**Improving patient safety and decreasing medication errors by improving bar code medication administration compliance**
Project Question	**Will nurses reach a BCMA compliance of 95% in five weeks after being educated and addressing barriers?**
Project Timeline	
Prior to Project 12/21/2022-1/15/2023	• Develop PowerPoint, pre-test, post-test, survey, flyer, and attestation. • CVI of tools
Week 1 2/27/2023-3/5/2023	• **Education – 3/1/2023, 3/3/2023, and 3/6/2023 at 07:00 and 19:00** • **Write a summary of education for the project paper**
Week 2 3/6/2023-3/12/2023	• **Determine keywords from open-ended survey questions, and enter survey results in the codebook** • **Enter pre-test and post-test scores in the codebook** • **Run statistical tests on pre-test, post-test, and surveys.** • **Write results in project paper, put codebooks and SPSS reports in Appendices** • **Gather first-week post-education BCMA percentages and enter them in the codebook** • **Write a summary of the first week's data for the project paper**
Week 3 3/13/2023-3/19/2023	• **Gather second-week post-education BCMA percentages and enter them in the codebook** • **Write a summary of the second week's data for the project paper**
Week 4 3/20/2023-3/26/2023	• **Gather third-week post-education BCMA percentages and enter them in the codebook** • **Write a summary of the third week's data for the project paper**
Week 5 3/27/2023-4/2/2023	• **Gather fourth-week post-education BCMA percentages and enter them in the codebook** • **Write a summary of the fourth week's data for the project paper** • **Add results to Appendices**

Appendix R

Codebooks

Pre- and post-test codebook variables

Variable Name	Variable Description	Data Source	Data Format	Measurement Type
Short Title	**Question**	**Data Type**	**Variable 0**	**Variable 1**
ID#				
Pre1	Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?	Nominal	Incorrect	Correct
Pre2	How does BCMA prevent wrong medication errors?	Nominal	Incorrect	Correct
Pre3	You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?	Nominal	Incorrect	Correct
Pre4	How does BCMA reduce potential medication errors?	Nominal	Incorrect	Correct
Pre5	A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?	Nominal	Incorrect	Correct
Pre6	You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?	Nominal	Incorrect	Correct
Pre7	Which statement is true regarding medication administration errors?	Nominal	Incorrect	Correct
Pre8	What is true about bypassing BCMA?	Nominal	Incorrect	Correct
Pre9	What are the five rights of medication administration?	Nominal	Incorrect	Correct
Pre10	Why should you always use BCMA?	Nominal	Incorrect	Correct
TotCorrPre	Total Correct Pre-Test			
AvgPre	Average score of pretests	Numeric3.2		
Post1	A patient came in in severe respiratory distress. After the patient was stabilized, the nurse did not use BCMA for this patient during the rest of their shift. What are some of the reasons the nurse might give for not using BCMA?	Nominal	Incorrect	Correct
Post2	Which statement is true regarding medication administration errors?	Nominal	Incorrect	Correct
Post3	How does BCMA prevent wrong medication errors?	Nominal	Incorrect	Correct
Post4	Your patient's medication is due at 09:00, and the medication will not scan. What is the best action to take in this case?	Nominal	Incorrect	Correct
Post5	How does BCMA reduce potential medication errors?	Nominal	Incorrect	Correct
Post6	What are the five rights of medication administration?	Nominal	Incorrect	Correct
Post7	You are administering a PRN order for Tylenol in the emergency department, and the patient does not have an armband on. What is the best action to take in this case?	Nominal	Incorrect	Correct
Post8	You are working in the emergency department. Are there any exceptions that allow you to bypass scanning?	Nominal	Incorrect	Correct
Post9	Why should you always use BCMA?	Nominal	Incorrect	Correct
Post10	What is true about bypassing BCMA?	Nominal	Incorrect	Correct

Appendix R, continued

Pre- and post-test codebook data

Education Pre & Post Tests		
ID#	Total Pre Correct	Total Post Correct
1	10	10
2	8	8
3	9	9
4	9	10
5	9	10
6	10	10
7	10	10
8	7	7
9	8	10
10	8	9
11	10	8
12	9	9
13	9	9
14	10	10
15	9	9
16	8	10
17	9	6
18	9	9
19	7	6
20	8	7
21	10	10
22	10	10
23	9	10
24	9	10
25	10	10
26	10	10
27	8	9
28	6	10
29	7	10
30	8	10

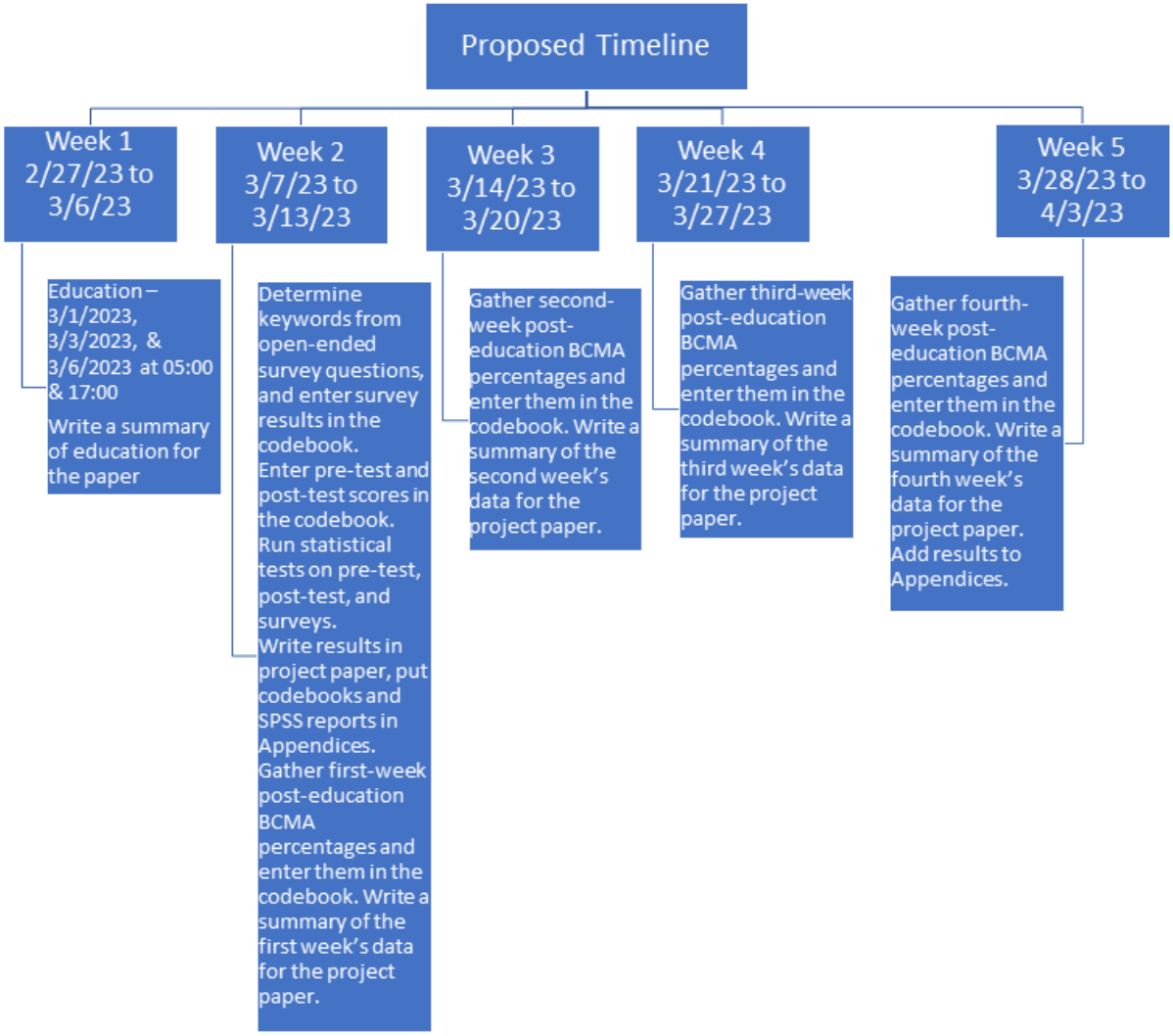
Appendix R, continued

Pre- and post-test individual questions codebook data

ID #	Answer Pre1	Answer Post4	Answer Pre2	Answer Post3	Answer Pre3	Answer Post7	Answer Pre4	Answer Post5	Answer Pre5	Answer Post1	Answer Pre6	Answer Post8	Answer Pre7	Answer Post2	Answer Pre8	Answer Post10	Answer Pre9	Answer Post6	Answer Pre10	Answer Post9
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	1	1	1	1	1
3	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1
4	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0
9	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
10	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
11	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1
17	0	0	1	1	1	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
19	1	1	0	1	1	1	1	0	0	0	1	1	1	1	1	0	1	0	0	1
20	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1
28	0	1	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
29	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1
30	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Appendix S

Project Timelines



Appendix S, continued

Appendix T

DNP Project Team Determination

Touro University Nevada

DNP 763–Project II

DNP Project Team Determination: Quality Improvement Project or Research

All DNP Projects, regardless of methodology, must uphold the highest standards of ethical practice including confidentiality and privacy as described in the ANA Code of Ethics. Accordingly, basic principles of ethics, confidentiality, and privacy must be addressed and maintained in each phase of the DNP Project implementation. Methods for maintaining such should be described in full detail within body of the DNP Project Paper.

If the determination is made that the DNP Project is a "Quality Improvement Project," then the project should be referred to as such in all future communications–both written and verbally. Quality Improvement projects should not be referred to as research or research projects and are not subject to any form of IRB review. Additionally, the student should not make any claims in writing or verbally of IRB exemption status, acceptance, or review in such projects.

Sections A and B should be completed and submitted by the student. **Section C** should be completed by the faculty.

SECTION A

Student Name: Dorothy Callander

DNP Project Title: Improving patient safety and decreasing medication errors by improving bar code medication administration compliance

DNP Project Instructor: Dr. Samantha Peckham

DNP Project Mentor: Dr. Carol Rayfield

Quality Improvement or Research Worksheet

Rachel Nosowsky, Esq.

ITEM	Issue and Guidance	Rating
1	Are participants randomized into different intervention groups to enhance confidence in differences that might be obscured by nonrandom selection? Randomization done to achieve equitable allocation of a scarce resource need not be considered and would not result in a "yes" here.	____ YES _X___ NO
2	Does the project seek to test issues that are beyond current science and experience, such as new treatments (i.e., is there much controversy about whether the intervention will be beneficial to actual patients – or is it designed simply to move existing evidence into practice?). If the project is performed to implement existing knowledge to improve care – rather than to develop new knowledge – answer "no".	____ YES _X___ NO

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Appendix T, continued

Touro University Nevada

DNP 763–Project II

3	Are there any potential conflicts of interest (financial or otherwise) among any researchers involved in the project? If so, please attach a description of such in an attachment to this form.	____YES __X__NO
4	Is the protocol fixed with a fixed goal, methodology, population, and time period? If frequent adjustments are made in the intervention, the measurement, and even the goal over time as experience accumulates, the answer is more likely "no."	__X__YES ____NO
5	Will data collection occur in stages with an effort to remove potential bias? If so, is there any potential for data skewing from this process?	__X__YES ____NO
6	Is the project funded by an outside organization with a commercial interest in the use of the results? If the answer to this question is "Yes" please also answer question 6a and 6b. If the project is funded by third-party payors through clinical reimbursement incentives, or through internal clinical/operations funds vs. research funds, the answer to this question is more likely to be "no."	____YES __X__NO
6a	Is the sponsor a manufacturer with an interest in the outcome of the project relevant to its products?	____YES _X___NO
6b	Is it a non-profit foundation that typically funds research, or internal research accounts?	____YES __X__NO

Adapted from Hastings Center, "The Ethics of Using Quality Improvement Methods to Improve Health Care Quality and Safety" (June 2006) If the weight of the answers tends toward "yes" overall, the project should be considered "research" and approved by an IRB prior to implementation. If the weight of the answers tends toward "no," the project is not "research" and is not subject to IRB oversight unless local institutional policies differ. Answering "yes" to sequence #1 or #2 – even if all other answers are "no" – typically will result in a finding that the project constitutes research. It is important to consult with your local IRB if you are unsure how they would handle a particular case, as the analysis of the above issues cannot always be entirely objective and IRB policies and approaches vary significantly.

Obtained from: Quality Improvement or Research Worksheet

SECTION B

All projects, including student QI or EBP projects, are required to be registered with the Department of Research at TUN. Please register your project via this Qualtrics survey. Provide your information as the PI for your project.

_X__ Yes, I registered my project with the Department of Research at TUN via the link above

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Appendix T, continued

Touro University Nevada

DNP 763–Project II

___ No, I did not register my project with the Department of Research at TUN. Please provide rationale.

SECTION C

Project Classification Decision:

The project instructor will select one of the three classifications listed below.

___X__ This DNP Project is a quality improvement project. Do not submit to IRB for review.

_____ This DNP Project contains research methodology, and an IRB application should be submitted to the TUN IRB committee for exemption determination and/or full IRB review.

_____ This DNP Project is not clearly delineated as quality improvement or research of discovery. Additional consultation will be obtained from the IRB committee by the project team. The advice of the IRB committee regarding the need for review will be noted in writing and the student will be informed of such (Please attach any pertinent documentation from IRB review as an Appendix to this document.)

By signing below, the project instructor indicates that they agree with the above selection.

Printed Name of Project Instructor: Dr. Samantha Peckham

Electronic Signature of Project Instructor: Samantha Peckham DNP, APRN, AGACNP-BC, FNP-BC, FNP-C, ACUE

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Appendix U

Test Question Tables

Table 10

Paired Sample Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Answer Pre-test 1	.83	30	.379	.069
	Answer Post-test 4	.87	30	.346	.063
Pair 2	Answer Pre-test 2	.83	.30	.379	.069
	Answer Post-test 3	.97	30	.183	.033
Pair 3	Answer Pre-test 3	.93	30	.254	.046
	Answer Post-test 7	.97	30	.183	.033
Pair 4	Answer Pre-test 4	.90	30	.305	.056
	Answer Post-test 5	.90	30	.305	.056
Pair 5	Answer Pre-test 5	.63	30	.490	.089
	Answer Post-test 1	.70	30	.466	.085
Pair 6	Answer Pre-test 6	.90	30	.305	.056
	Answer Post-test 8	1.00	30	.000	.000
Pair 7	Answer Pre-test 7	.97	30	.183	.033
	Answer Post-test 2	.97	30	.183	.033
Pair 8	Answer Pre-test 8	.90	30	.305	.056
	Answer Post-test 10	.90	30	.305	.056
Pair 9	Answer Pre-test 9	1.00	30	.000	.000
	Answer Post-test 6	.97	30	.183	.033
Pair 10	Answer Pre-test 10	.87	30	.346	.063
	Answer Post-test 9	.93	30	.254	.046

Table 7

Paired Differences Pre-test to Post-test

					95% Confidence Interval of the Difference				
	Answer	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pre-1 Post-4	-.033	.320	.059	-.153	.086	-.571	29	.573
Pair 2	Pre-2 Post-3	-.133	.346	.063	-.262	-.004	-2.112	29	.043
Pair 3	Pre-3 post-7	-.033	.320	.058	-.153	.086	-.571	29	.573
Pair 4	Pre-4 Post-5	.000	.371	.068	-.139	.139	.000	29	1.000
Pair 5	Pre-5 Post-1	-.067	.521	.095	-.261	.128	-.701	29	.489
Pair 6	Pre-6 Post-8	-.100	.305	.056	-.214	.014	-1.795	29	.083
Pair 7	Pre-7 Post-2	.000	.263	.048	-.098	.098	.000	29	1.000
Pair 8	Pre-8 Post-10	.000	.455	.083	-.170	.170	.000	29	1.000
Pair 9	Pre-9 Post-6	.033	.183	.033	-.035	.102	1.000	29	.326
Pair 10	Pre-10 Post-9	-.067	.254	.046	-.161	.028	-1.439	29	.161

Appendix V

Survey Result Statistics

Table 11

Frequencies

		Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
N	Valid	25	25	25	25	25	25	25	25
	Missing	0	0	0	0	0	0	0	0
Median		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mode		5	5	5	5	5	5	5	5

Table 12

Frequency Table

			Frequency	Percent	Valid Percent	Cumulative Percent
Question 1	Valid	1	1	4.0	4.0	4.0
		4	6	24.0	24.0	28.0
		5	18	72.0	72.0	100.0
		Total	25	100.0	100.0	
Question 2	Valid	1	1	4.0	4.0	4.0
		4	6	24.0	24.0	28.0
		5	18	72.0	72.0	100.0
		Total	25	100.0	100.0	
Question 3	Valid	1	1	4.0	4.0	4.0
		4	6	24.0	24.0	28.0
		5	18	72.0	72.0	100.0
		Total	25	100.0	100.0	
Question 4	Valid	1	1	4.0	4.0	4.0
		4	6	24.0	24.0	28.0
		5	18	72.0	72.0	100.0
		Total	25	100.0	100.0	
Question 5	Valid	1	1	4.0	4.0	4.0
		4	6	24.0	24.0	28.0
		5	18	72.0	72.0	100.0
		Total	25	100.0	100.0	
Question 6	Valid	1	1	4.0	4.0	4.0
		4	6	24.0	24.0	28.0
		5	18	72.0	72.0	100.0
		Total	25	100.0	100.0	
Question 7	Valid	1	1	4.0	4.0	4.0
		4	7	28.0	28.0	32.0
		5	17	68.0	68.0	100.0
		Total	25	100.0	100.0	
Question 8	Valid	4	7	28.0	4.0	28.0
		5	18	72.0	24.0	100.0