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Strategies for Improving Documentation of Medication Overrides

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Strategies for Improving Documentation of Medication Overrides

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Abstract

Title: Strategies for Improving the Documentation of Medication Overrides

Purpose: Medication Override is the removal of medication from an Automatic Dispensing System (ADS) without a verified order. The aim of this project was to educate nurses on how to link override medications to orders to reduce administration errors.

Methods: Plan Do Study Act (PDSA) technique was used to guide a pilot study conducted in two Intensive Care Units (ICUs). Interventions included hands-on training, discussions during daily staff sessions which occur at the beginning of every shift (huddles), and the distribution of copies of a step-by-step instruction ("quick guide"). Daily Medication Override Reconciliation (DMOR) rates were gathered on the piloted units for three months and captured on an Excel spreadsheet. The spreadsheet was used to organize the data by weeks and by groups of narcotic and non-narcotic medications.

Results: There was no statistically significant difference in the pre-and the post-intervention rates of linked medications. Discrepancies between ordered and dispensed routes prevented nurses from reconciling overrides. Hospital policy prohibits the placement of verbal order mode for overridden medications unless during surgical operations; therefore, overrides remain unlinked and often undocumented.

Conclusion: Education did not significantly increase the reconciliation rates of medication overrides in the two units. Future improvement projects should examine the use of nursing protocol and electronic reminders for the safe management and documentation of medication overrides.

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Strategies for Improving the Documentation of Medication Overrides

Introduction

Medication override is the process of removal of medication from an Automatic

Dispensing System (ADS) without a verified order. Medication overrides are indicated in

emergency situations where a delay in care may result in an adverse patient outcome (Pockras &

Smith, 2013). The retrieved medication must be linked to a physician order to prevent

administration error (Early, Riha, Martin, Lowden & Harvey, 2011). Safety during medication

administration is essential because Medication Errors (MEs) rank highest in the categories of

medical errors with huge financial impact on health systems (Smeulers, Onderwater, Van

Zwieten & Vermeulen, 2014). Death from MEs was estimated at 2.34 per 100 hospital

admission, and a prolonged hospital length of stay of approximately 4.6 days at a total cost of

$5857 per occurrence (Early et. al., 2011). The project setting is a public urban academic

healthcare institution where the current rate of linking overrides to orders is below 50%.

According to the Joint Commission (JC) Standard MM 4.10, all prescribed medications must be

reviewed for appropriateness (Pockras & Smith, 2013). Medication overrides must be linked at

100% for institutions to comply with the JC guidelines. An unlinked override may lead to a

second or an unintended administration following a pharmacist's verification that displays a

status of "due".

Problem Statement and Project Purpose

Normal medication administration process begins with the physician placing an order in

the Electronic Medical Record (EMR) system. The order placement causes the medication to

appear on the Electronic Medication Administration Record (eMAR). An additional step occurs

with the pharmacist verifying the dose, duration, any contraindication, allergy or interaction with

other therapies to ensure patient safety. Following the pharmacist 's completion of the safety

checks, the medication is loaded into the Automatic Dispensing System (ADS) under the

patient's profile.

During an override, the nurse removes a drug from the ADS without a physician's order

thus bypassing system safety checks (Pockras & Smith, 2013). In some institutions, the EMR

systems are configured to allow nurses in procedural departments and in the Intensive Care Units

(ICUs) to perform medication overrides. Patients in such care areas are critically unstable and

may require urgent drug interventions (D.Vigliotti, personal communication, September 25,

2015).

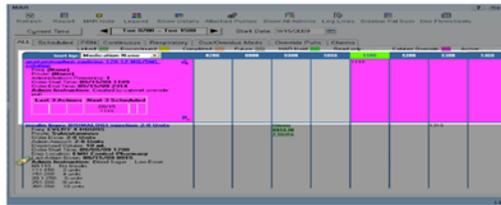At the project site, medication override can occur in one of two ways:

When an order exists before dispensing, but the order has not yet been verified
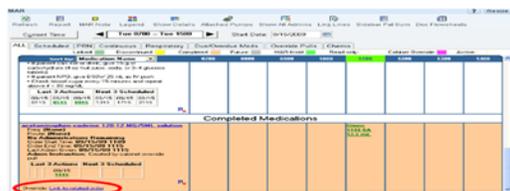
or

When no order was placed before the medication was dispensed

Figure 1.1. Display of Medication Overrides in the eMAR

Display of Medication Overrides in the eMAR

Override generated when nurse retrieves medication without an order, or when order has not been verified by the Pharmacist

Medication status shows "Given" when documented, but a "Link to related order" link appears at the bottom to enable nurse to link medication to the override
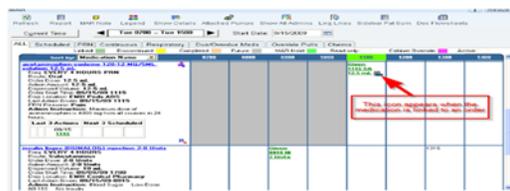
Link icon appears when nurse links it to the override, and the override line disappears from the list

When an order exist that has not been verified before dispensing, the lavender-colored line appears on the eMAR which indicates that the nurse retrieved the medicine from the ADS. The nurse receives a prompt to link the override to the existing order when the eMAR is opened. There is a link in the lower left-hand corner of the screen titled "Link to related order". Linking the override to the order completes the loop and the color changes to salmon with a status of "completed".

When no order exists before dispensing, the nurse receives the same prompt to "Link to related order" when the eMAR opens and after a physician has entered a medication order that matches the retrieved medication. If the order is not connected and the pharmacist verifies the medicine, it will be loaded on the patient's profiled medications in the ADS. The medicine will

be available for dispensing a second time even though the nurse removed and administered the

medication at an earlier time. A status of "due" will appear on a time column on the medication

line which the nurse or another nurse may interpret as a task that needs to be completed. A

second administration may constitute an overdose if the treatment plan is to give one dose of the

medication. The administration of the first dose was intended to treat the patient; however, the

existence of the second dose on the eMAR poses a danger to the patient during hospitalization.

Associating an override to an order changes the administration status to "given" in the eMAR.

The status indicates that no further administration action is required.

The purpose of the project was to increase nursing knowledge on how to correctly

document an override to minimize injury to the patient. The Project Investigator (PI) sought to

educate nurses on how to document overrides to reduce risk of injuries from administration

errors, and to prevent appearance of nurses practicing outside of scope (Pockras & Smith, 2013).

Specific aims of the project was to increase patients' safety in the ICU when nurses override

medications, and to enable the organization to realize the quality and the financial benefits of

medication administration technology. The automatic generation of a lavender-colored line in the

eMAR is a crucial benefit of medication administration technology because it prevents a

potential error that may occur if the nurse attempts to transcribe the overridden medication. The

advantage becomes ineffective if the nurse omits to reconcile the override to an order.

Clinical Question: Among staff nurses in the ICU, can education increase the rate of linking

medication overrides to orders by 25% or more?

Review of Literature

Search Strategy and Results

Literature searches were conducted in the CINAHL, and PubMed databases; additional searches occurred in Google Scholar, reference lists, governmental agencies, and professional organization websites such as Journal of American Medical Informatics Association (JAMIA) and American Nursing Informatics Association (ANIA). The search terms included Medication Overrides, Workarounds, Medication Administration, EMR, eMAR, Bar Code Medication Administration (BCMA), Pyxis, and EPIC. Phrases such as 'Education and Medication Error', 'Education, and Medication administration', 'Educating the nurse and Medication Administration', and 'Nursing and Education Error Prevention' were included in the search.

The searches produced very few studies on the topic of medication overrides; however, multiple studies exist on Medication Administration (MA) technology. The process of medication override includes eMAR and BCMA; thus, the inclusions of the articles in the literature review. The search for literature also included studies on nurses' perception of the use of technology during MA because of the relevance of adaption to change (Gooder, 2011). Searches were restricted to articles published from 2005 to 2016 because responses to the Institute of Medicine (IOM) reports regarding safety during MA occurred after the beginning of this millennium (Gooder, 2011).

The literature search resulted in 189 studies with 25 chosen for further analysis following a thorough review of the titles, abstract and potential duplication of contents. Eleven of the studies were selected from reference lists for further evaluation. In all, a total of 36 articles were reviewed, and 12 were critically appraised for validity, reliability, and applicability of findings (Melnyk, 2003). The 12 selected articles consist of 1 systematic review of randomized and non-randomized study trials (Level I), 3 randomized and non-randomized trial articles (Level II), 2 systematic reviews of a single observational study (Level III), 4 single

observational/correlational studies (Level IV), 1 single descriptive/qualitative/physiologic study

(VI), and 1 opinions of authority/expert committees (VII). A comprehensive appraisal and

analysis of the articles were completed using GRADE assessment tool.

Review and Synthesis of the Literature

A review of the literature identified findings that could be summarized in three categories

Educational intervention promotes adoption of MA technology (Pockras & Smith, 2013;

Early, Riha, Martin, Lowden & Harvey, 2011; Poon, Keohane, Yoon, Ditmore, Bane, Levtzion-

Korach, et al., 2010; Krautscheid, Orton, Chorpenning, & Ryerson 2011; Keane, K. 2014).

MA Technology reduces error and it increases time spent on direct patient care

(Hardmeier, Tsourounis, Moore, Abbott, & Guglielmo, 2014; Seibert, Maddox, Flynn, &

Williams 2014; Wulff, Cummings, Marck, & Yurtseven 2011; Dwibedi, Sansgiry, Frost,

Dasgupta, Jacob, Tipton, et al., 2011).

Identifying and addressing barriers to MA technology encourages compliance (Gooder,

2013; Rack, Dudjak & Wolf, 2012; Debono, Greenfield, Travaglia, Long, Black, Johnson et al.,

2013).

Educational Intervention Promotes Adoption of MA Technology

Pockras and Smith (2013), conducted a process improvement study in a Children's'

Hospital in Cincinnati using a Neonatal ICU as the pilot unit. The purpose of the study was to

propose a change in the way nurses practice medication overrides in that hospital. Nurses were

overriding medications, and they were failing to link the medications to valid orders. The rate of

medication override reconciliation was 33%, and the researchers' goal was to increase the rate to

90% within six months. To achieve this goal, Pockras and Smith (2013) employed the Plan Do

Study Act (PDSA) technique. Data was collected using an observation method, and the Failure

Modes Effects Analysis (FMEA) was applied to understand areas of failure. The project team

implemented a checklist that required the out-going nurse to review the eMAR for any

unreconciled medication overrides. Nurses who failed to reconcile overridden medications

received email messages with prompts to link to orders. The email notification contained

instruction on how to link overrides to orders. The researchers developed a step-by-step

instruction on how to reconcile overrides which they combined with hands-on training to

improve the rate of override reconciliation to 70%. Study findings suggest that educational

interventions may improve clinicians 'documentation of medications overrides.

In a 2011 study by Early et al., the researchers used a combination of technological and

educational interventions to increase the rate of BCMA compliance from 82% to 97%. Early et

al. (2013), created a multi-professional team of clinicians and information technology experts to

investigate reasons for overrides during MA. The team found that both technology and human

factors are implicated in overrides; therefore, strategies on addressing the issues from three

angles were developed. The project team found that unreadable barcode labels caused by old

scanners on new bar-code labels encouraged the nurse to bypass BCMA (Early et al., 2011). The

project team ensured that old scanners were replaced with new ones, and educated the staff on

the appropriate actions to take in the event of unreadable or malfunctioning labels or scanners.

Staff education also included the need to change current culture and to move the organization

towards safety; staff was informed of the cost of medication errors to the organization and the

need to embrace best practice. The interventions led to the reduction in the rate of bar-code

overrides by 12.8%; it also reduced the length of stay and costs associated with medication errors

(Early et al., 2011). While the study encourages the use of the multidisciplinary team to address

this type of clinical problem, a major limitation is that it was conducted in acute care setting;

therefore, results from the study may not be generalized to an outpatient or public health

situations (Early et al., 2013).

A quasi-experimental study by Poon, Keohane, Yoon, Ditmore, Bane, Levtzion-Korach,

et al. (2010), evaluates the effect of BCMA on the safety of MA. The researchers collected data

on the rate of errors in transcription orders and MA pre-BCMA and post-BCMA implementation.

The setting for the study was 35 medical-surgical and ICU units of a tertiary hospital data was

collected over a nine-month period. Nurses in the BCMA units received a four-hour single

hands-on and classroom training on bar-code scanning and eMAR documentation before

implementation. Using direct observation for data collection, Poon et al. (2010) measured error

rates in units that implemented BCMA and compared the result to the error rates in the units

without BCMA. The authors report that 11.5% error rates were noted in units without BCMA

and 6.8% in units with BCMA. These findings suggest that the introduction of BCMA can

reduce medication error and adverse drug events. A limitation of the study is that BCMA may

reduce potential adverse drug events, but it may not prevent its occurrence (Poon et al., 2010).

Krautscheid, Orton, Chorpenning, & Ryerson (2011) conducted a qualitative study on a

focused group of students in their second year of nursing school. The aim of the study was to

determine if students could transfer knowledge and skills of medication administration from

academic simulation to clinical practice. The authors gathered participants' perceptions of the

effectiveness of MA education; students were asked to relate laboratory MA simulation to their

lived-experiences in acute care settings. Participants perceived that the different education

learning styles such as role-modeling, repetitive practice, and peer feedback prepared them for

MA in the clinical setting. A limitation of the study is that only the perceptions of the students in

a baccalaureate program were examined. The findings of the study may not be applied to

students from other programs due to the possibility of differences in the curriculum (Krautscheid,

et al., 2011).

In an expert opinion by Keane (2014), education is an effective tool in the reduction of

medication errors. The benefits of implementing technology may not be fully realized in the

absence of proper education (Keane, 2014). Keane (2014) emphasizes the role of BCMA

technology as a means of error reduction in health care environment via the application of the

Lewin theory of change to suggest that nurses must be trained on how to use technology to

minimize medication errors . One limitation of the article is that it focuses on the effects of

educating nurses in the medical, surgical units on the importance of technology. The author's

expert opinion may not be applied to other acute care settings such as the ICUs.

MA Technology Reduces Errors and Increases Time Spent on Direct Patient Care

Hardmeier, Tsourounis, Moore, Abbott, & Guglielmo (2014), completed an observational

study to examine the impact of BCMA workarounds on the number of medication errors. The

project team piloted the study in three units (2 acute care and 1 ICU) by observing nurses'

behaviors in the first month following BCMA and eMAR implementations. The authors found

that low rates of medication administration errors occurred following BCMA implementation;

the authors report that BCMA did not prevent error, and minimal workarounds were detected as

a result of BCMA. A limitation of the study is the possibility of bias due to lack of experience of

the observers (Hardmeier et al., 2014). Another limitation is that a one-month observation period

may be too short to conclude that nurses' compliance to BCMA was solely responsible for the

low rates of MA errors.

In another observational study by Seibert, Maddox, Flynn, & Williams (2014), the authors analyze the effects that BCMA and eMAR have on the occurrence of medication errors. Seibert et al. (2014), conducted a direct observation of nurses during patient care in two medical-surgical, two telemetry and two rehab units in two community-based hospitals. Observation of MA error was completed in 3 phases (phases 1, 2 & 3). The medication accuracy rate in Hospital #1 with the exclusion of MA time error increased from 92% in phase 1 to 96% in phase 3 (Seibert et al, 2014). In using the same criteria, the rates increased from 93% in phase 1 to 96% in phase 3 for hospital #2. The result indicates that BCMA when used with eMAR, increased MA accuracy and did not cause new MA error type to occur contrary to popular belief. These findings also suggest that direct observations of medication errors are more accurate than voluntary reporting of medication errors.

Wulff, Cummings, Marck, & Yurtseven (2011), performed a systematic review of both RCT and NonRCT (mixed- review) of research evidence on the relationship between MA innovations and the prevention of adverse drug events. Thirteen electronic databases and seven patient safety websites were searched for relevant studies; search spanned a period of 29 years (1980 – 2009). The authors evaluated the quality of the evidence in the reviewed studies using quality assessment and validity tool for correlational studies, Quality Assessment Tool for Pre- and Post-Intervention Design, and Critical Appraisal Skills Program. On average, all studies reviewed indicate the advantages that MA technologies pose to patient safety, but evidence presented were not consistent across the board. Some studies blame workarounds for lack of success of MA technology in error reductions. Another limitation is that only studies conducted in the United States (US) and Canadian were reviewed; therefore, the review may not be

generalized to MAT in other countries. Also, there are discrepancies between published studies result and data- reporting practice (Wulff et al., 2011).

Dwibedi, Sansgiry, Frost, Dasgupta, Jacob, Tipton, et al., (2011) evaluate the effects of BCMA on nursing activities in the ICU. The authors compared the time that ICU nurses spend on activities during Paper-Based Medication Administration (PBMA) to the time they spend on such activities after the implementation of BCMA. Dwibedi et al. (2011), observe nurses perform direct care, indirect care and administrative activities; stopwatches were used to measure time spent by nurses on these activities. The MA method used (PBMA vs BCMA) made a significant difference in the time spent on direct patient care and administration activities. The authors conclude that the adoption of BCMA is effective in reducing the amount of time ICU nurses spend on MA, and it increases time spent on direct patient care. A limitation of the study is that only ICU nurses were observed; therefore, the study cannot be generalized to other care areas. Another limitation is that the quality assessment of nurses' interactions with patients was inadequate (Dwibedi, et al., 2011).

Identifying and Addressing Barriers to MA Technology Encourages Compliance

A single randomized study that examined the effect of BCMA on nurses' perception of MA error, Gooder (2011) administered survey questionnaires using the Roger's theory of diffusion of innovation. The author hypothesized that a change from PBMA documentation to BCMA may heighten nurses' frustration and reduce their satisfaction with the overall MA process. Questionnaires were administered to 33 nurses from a BCMA unit and 26 nurses from a non-BCMA unit. The surveys were completed pre-BCMA and post-BCMA in the first and fifth month respectively. Results demonstrate a significant decrease in nurses' satisfaction with MA process after implementation of BCMA. Successful adoption of BCMA technology requires an

understanding of its impact on nursing processes (Gooder, 2011). The author cites a low nurses'

response rate to the questionnaire as a limitation to the study; the sample size of the surveyed

nurses was small, and there were no follow-up plans to contact nurses who did not complete the

questionnaire.

In an observational study by Rack, Dudjak and Wolf (2012), the authors examine the

reasons why nurses in an academic institution use workarounds during MA instead of the

approved process of bar-code scanning. The researchers used a mixed-method design of survey

questionnaires and focused group. Using the complex theory as the conceptual framework for

their study, Rack et al. (2012), argue that the hospital environment consists of multiple

components which include the nurse and the patient. The interactions between the patient and the

nurse are volatile; therefore, change or alteration in one component affects the other moving

parts of the system (Rack et al., 2012). An understanding of how nurses react to the change

(introduction of BCMA) is necessary so that technological innovations may be tailored to

support nursing workflows and not the other way around (Rack et al., 2012). The writers argue

that causes of workarounds must be identified so that steps may be taken to mitigate it.

A Systematic Review by Debono, Greenfield, Travaglia, Long, Black, Johnson et. al.

(2013), examined studies on how nurses in an acute care setting engage in workarounds. The

authors conclude that both individual and collective reasons are responsible for the prevalence of

workarounds. Debono et. al. (2013), advise that more studies should examine the common

reasons for a broad understanding of why nurses engage in such actions. The article did not

include results from most current studies on the topic which is a limitation of the review.

Gap in Knowledge and Applicability in Practice

The review of literature presents strong recommendations that education is effective in

promoting nursing compliance with MA technology. The studies and reviews support the notion

that MA technology reduces administration errors, and healthcare facilities must take measures

to obtain nursing buy-ins to encourage adoption of new technologies. The search for most

current and relevant evidence is central to the concept of using an evidence-based approach to

resolving clinical problems; a systematic review of RCT articles meet these criteria (Melnyk,

2003).

Pockras & Smith (2013), state that the major reasons for overrides in the facility are rapid

sequenced intubation medications and heparin flushes; however, the authors describe

implemented solutions that addressed heparin flushes only. The authors emphasize that nurses

continue to fail to reconcile overrides that occurred during emergency intubations, and a

challenge that includes the absence of orders to link sterile waters that were retrieved to

reconstitute medications (Pockras & Smith, 2013). A potential solution will be to examine the

introduction of a protocol that nurses may follow during medication overrides to address the

issue of the lack of valid orders when linking flushes and other medication that were retrieved

during emergencies (emergency intubation included). The goal is to develop a standardize

process that nurses should use to manage and document overrides while using education to

promote adoption.

Data collection methods such as observation poses bias that may impact the reliability of

data (Poon et. al., 2011; Hardmeier et. al., 2014; Seibert et. al., 2014; Dwibedi et al., 2011);

therefore, the PI used objective data such as the daily medication override reconciliation report to

determine the improvement in rates to minimize bias. Studies that used questionnaires to gauge

the effects of interventions had challenges such as low response (Gooder, 2011), but the PI in the

current project engaged in follow-up dialogues with participants to identify concerns and to

answer questions that participants may have regarding the training and the study.

Conceptual and Theoretical Framework

This section examines the relevance of the Rogers's Theory of Diffusion of Innovation

(RTDI) and Lewin's Theory of Change (LTC) to the use of technology during medication

administration. In this section, the author will relate the two theories to the adoption of

Electronic Medication Administration (eMA) processes. The purpose of the analysis is to aid the

Project Investigator (PI) to identify strategies that will inspire nurses to adopt the eMA process

during medication overrides. The PI will describe how a Plan Do Study Act (PDSA) technique is

used to enhance the documentation rates of overrides.

Roger's Theory of Diffusion of Innovation (RTDI)

RTDI involves two concepts - innovation and diffusion. Innovation is the introduction of

new ideas, knowledge, or evidence; diffusion is the dissemination of information regarding an

innovation (White & Dudley-Brown, 2012). Roger identifies individuals who accept change as

adopters (White & Dudley-Brown, 2012). Roger's theory describes five categories of adopters

and a five-step process of dissemination of information on the new idea or change (White &

Dudley-Brown, 2012). Approximately 2.5% of adopters are technology enthusiasts who are

grouped as innovators; these individuals are more receptive of risks or uncertainties (White &

Dudley-Brown, 2012). Early adopters account for 13.5% of total adopters, and the early

adopters are more likely to seek knowledge and information about innovation; the knowledge is

communicated to other staff within the organization (White and Dudley-Brown, 2012). Early

majority represents 34% of the population of adopters and are slower than the early adopters to

accept innovations (White & Dudley-Brown, 2012). Late majority are 34% of adopters who

initially doubt the success or the stability of the innovation but reluctantly accept the innovation

when there are no indications for other options (White & Dudley-Brown, 2012). Finally, the

laggards are 16% of individuals in the organization who are not tolerable of the introduction of

the new idea (White & Dudley-Brown, 2012).

The second component of RTDI is a two-step process that involves the dissemination of

information on the new idea or change (White & Dudley-Brown, 2012). Diffusion is the

communication of innovation to a group within a social system through channels over time

(Englebardt & Nelson, 2002). The five phases of diffusion are knowledge, persuasion, decision,

implementation, and confirmation. During the knowledge phase, leadership communicates

information about the innovation to promote staff awareness (Englebardt & Nelson, 2002; White

& Dudley-Brown, 2012; Cho, Kim, An, & Chae, 2015). The communication channel may

include written, verbal, mass or personal messages. Staff who read the communications forms an

opinion about the innovation. During the persuasion stage, staff develops a like or dislike for the

innovation based on opinions which were formed in the knowledge phase. Employees may

choose to interact with the innovation or not during the decision stage. At the implementation

stage, adopters incorporate the use of the innovation into practices. The last step in the diffusion

of innovation is confirmation; at this phase, it becomes clear that end-users have accepted or

rejected the innovation.

Lewin's theory of Change (LTC)

LTC consists of three elements: unfreezing, moving and refreezing (Englebardt &

Nelson, 2002). According to the theory, forces that promote a change must be stronger than the

forces that prevent innovation. Unfreezing is the promotion of forces that drive change and the

reduction of the forces that restrain change. The moving phase is the implementation of the

change, and refreezing includes monitoring, maintaining and supporting change (Englebardt &

Nelson, 2002).

Application of RTDI and LTC

The Medical Intensive Care Unit (MICU) and Surgical Intensive Care Unit (SICU) were

the pilot units for the project. The PI applied RTDI and LTC to identify key players and

members of the project team. The project team consisted of a physician, a pharmacist, a nurse

super-user (an individual who is skilled in using a computer application) from each of the two

pilot units. Two nurses from the Information Technology (IT) Department assisted during initial

huddles with the nurses. Huddles are 15-20 minutes daily staff gathering usually conducted by

managers of each nursing units to provide staff with important updates from previous shifts and

any relevant policy adjustments. Representatives of each clinical discipline served as innovators

and early adopters who assisted in obtaining staff buy-ins to the change. A unit director and the

nurse managers from the two units were the early and late majority. The managers gave the PI

information about the units' daily huddles. The managers also instructed the unit secretaries to

send "email blast" to nurses to communicate the planned hands-on training.

The application of LTC was demonstrated with the use of educational interventions to

increase end-users' awareness of the process of reconciling medication overrides. The use of

hands-on training is to safeguard staff commitments to the change.

Figure 2.1 Applying RTDI

Categories of Adopters	Knowledge Disemination	Outcome
(1) Innovators : project team (Information Techology nurses) (2) Early adopters : nurse superusers	Knowledge: hands-on training and "quick guide"	Rate of linking overrides to orders increased by 25% or more
(3) Early majority : Nurse leaders, administrators and policy makers	Persuasion : nursing huddles, follow-up dialogues	
(4) Late majority : some nurse end-users (5) Laggards : nurses less acceptable of Electronic Medical Record (EMR)	Decision : nurses linking overrides to orders	
	Implementation : rounding on nurses to drive compliance	
	Confirmation : measure rates from report over time	

Figure 2.2 Applying LTC

Unfreezing

 Hands-on training and "quick guide" - to improve knowledge

Moving/change

Frequent huddles - to promote communication and acceptance of the change

Refreezing

Monitoring daily overrides report - to safeguard commitment to the change
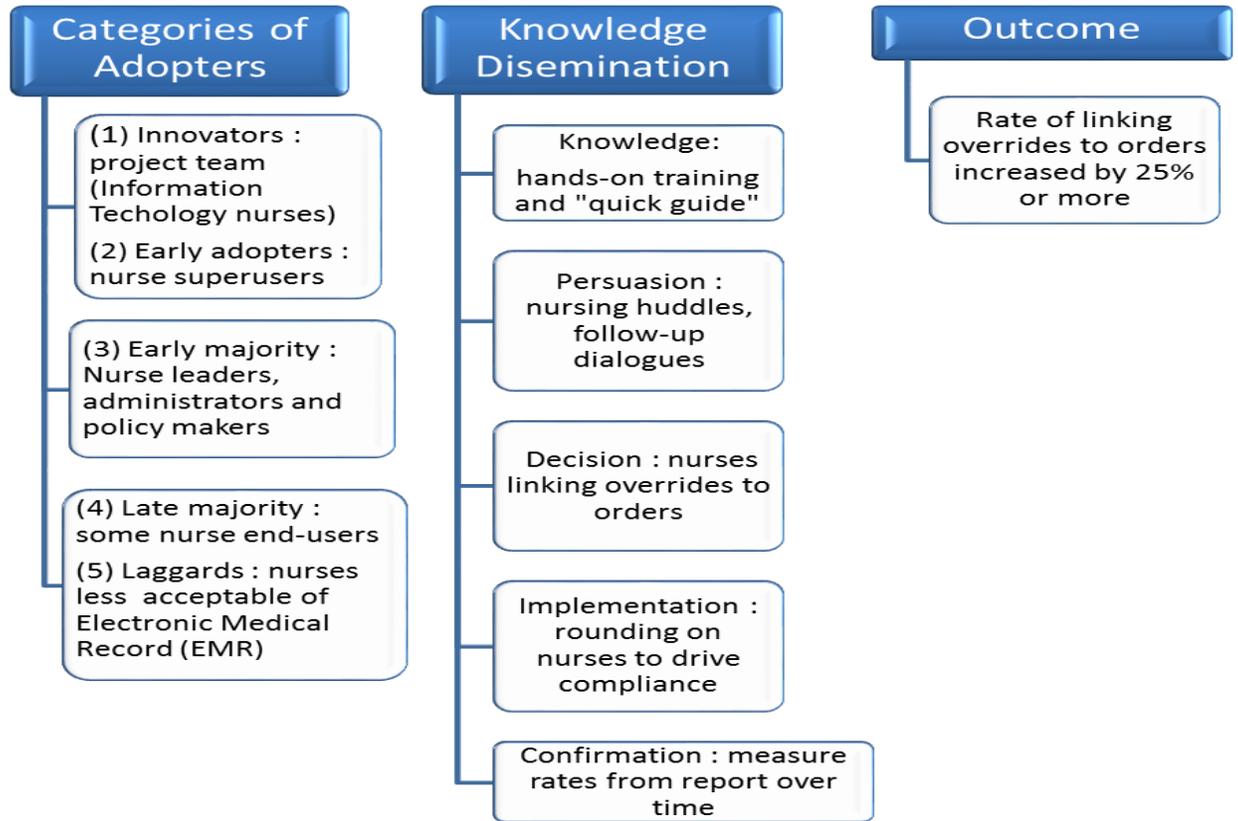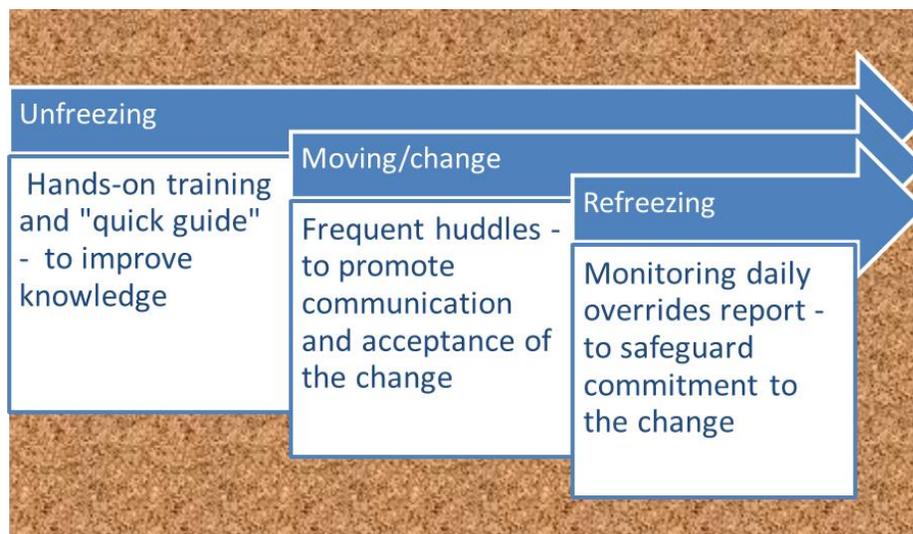
Methodology

The PI utilized the Plan Do Study Act (PDSA) to guide this quality improvement project. PDSA is the most widely used framework for quality improvement (McCaffrey, 2012). PDSA is a cycle that involves the development of a plan to test a change, executing the plan, evaluating the effectiveness of the plan and optimizing the change (Institute for Health Improvement, n.d.). Using the PDSA model, the project involved a cycle of developing, implementing, assessing, and enhancing the future state of the medication override documentation process.

Plan

The planning cycle began with the PI obtaining approval from nursing administration to use the facility as a project site. Information about current medication override process was gathered to identify gaps. Approval was obtained from the Internal Review Board (IRB) at Georgia State University (GSU) and the Nursing Research Council at the project site in July of 2016.

Do

The project site is a public urban academic healthcare institution that is in the south-eastern United States. The MICU and the SICU were the pilot units. ICUs have more critical

medications, and have the potential for higher incidents of overrides (D. Vigliotti, Sept 25, 2015). Total patient volume for the two units in 2016 was 4,345 out of which 1,903 were direct admissions and 2,442 were transferred patients from medical-surgical or step-down units. There are a total number of 30 beds in the MICU and 30 beds in the SICU. Typical patients in the MICU have hemodynamic instability involving one or more of the following systems: cardiovascular, hematological, gastrointestinal, endocrine, renal, and pulmonary system; patients with manifestations of infectious etiologies (e.g. sepsis) are commonly admitted into the MICU. The SICU admits are mainly trauma patients with gunshot wounds, motor vehicle accidents, post-operative care of cardiothoracic patients as in CABG and vascular surgeries and other unstable post-operative surgical patients.

Convenience sampling was used to include all nurses from weekday, weekend, day and evening shifts in the two units. The PI posted a notice on the bulletin boards in the units to invite participants to sign-up. The unit secretary in each unit also sent electronic mail (e-mail) blasts regarding the time and duration of the study to all staff nurses. There were no exclusion criteria because any staff nurse from the two units were welcomed to participate. The two units have approximately 60 beds, and nurse -to -patient ratio was 1:2. Each unit typically has 14 to 15 nurses per shift, and there are two shifts per 24-hour day.

Beginning in September 2016, the PI performed a 20-minutes hands-on demonstration of steps that nurses must follow to link overrides to orders in the electronic health record system (Epic). The PI and the two Information Technology (IT) nurses engaged in dialogues with the nurses to identify reasons why overridden medications were not linked to orders. The PI also attended some of the daily nursing huddles. The nursing huddles were used as forums to educate

staff about steps needed to reconcile medication overrides and to discuss the benefits of documenting the overrides.

Other educational strategies included the distribution of copies of a "quick guide" in the weeks following the completion of the hands-on exercise through mid-October. The "quick guide' contain a step-by-step instruction on how to link an override to order. The "quick guide" were laminated and shaped appropriately to enable nurses to carry the guide in badge holders for easy access. Copies of the laminated guide in postcard sizes were given to the managers who posted the guide on the units' bulletin boards.

Study

The PI gathered Daily Medication Override Reconciliation (DMOR) rates in the piloted units for 3 months (Mid-August through Mid-November 2016). The DMOR are collected and maintained daily by the pharmacy department to monitor dispensed medication and medication order volume in each department within the hospital. Only certain individuals receive copies of the daily report which is usually authorized by the medication safety officer for privacy and security of patient information. During the study phase and beginning in mid-October through mid-November, the PI collected information on the medication override reconciliation rates. DMOR rates were compiled to compare the pre-intervention rate to the post-intervention rate. The goal is to determine if the education of nurses resulted in an increase in the override reconciliation rates. The PI used simple descriptive statistics, P-Value and Chi-square to determine the statistical significance of the difference between the pre-intervention and the post-intervention rates.

Act

During the Act phase, the PI documents result of the analysis and plans to present recommendations to the Nursing Research Council, nursing leadership and hospital administrators.

Analysis

Members of the project committee including the course advisor for the project dissemination assisted the PI during the analysis of the data. In the pre-intervention weeks, 65 out of 114 overridden narcotic medications in the Medical Intensive Care Unit (MICU) and the Surgical Intensive Care Unit (SICU) were linked to valid orders. In the same period, 104 of the 457 overridden non-narcotics were linked to physician orders. Tables 1.1 and 1.2 are Chi-square tables that display the total number of overridden narcotics and non-narcotic medications, and the linked orders in the two units during the pre-intervention, and the post-intervention periods. During the post-intervention weeks, 71 out of 122 narcotic overridden medications were linked, and 119 of 502 non-narcotic overrides were linked to valid orders. In the pre-intervention period, a total of 236 narcotic medication overrides occurred in the MICU and the SICU, and 136 of the overrides were linked to orders while 100 remain unlinked. Total non-narcotic overrides in the two units was 959, and 736 were unlinked while 223 were linked to orders. The rate of reconciliation for narcotics = 0.57 during the pre-intervention weeks, and to 0.58 in the post-intervention periods. Non-narcotics reconciliation rate increased from 0.23pre-intervention to 0.24 post-intervention. There was no statistically significant difference in the reconciliation rates of medication overrides during the pre-intervention and the post-intervention periods, $x^2 (1) = 0.8$, p < .05 for the narcotic group; $x^2 (1) = 0.9$, p < .05 for the non-narcotic group.

The graphical representations of the reconciled narcotic and non-narcotic medications in the MICU and the SICU for the duration of the project are displayed in Figure 1. The graph displays the trends in weeks for the two medication groups from the pre-intervention to the post-intervention periods.

Table 1.1. **Comparison of the Pre-and Post-Intervention Narcotic Overrides in the two ICUs**

Narcotics

	Linked	Not Linked	Total
Pre	**65**	**49**	**114**
Post	**71**	**51**	**122**
Total	**136**	**100**	**236**

chi sq	**0.444174797**
p value	**0.800845369**

Table 1.2**. Comparison of the Pre-and Post-Intervention Non-Narcotic Overrides in the two ICUs**

Non-Narcotics

	Linked	Not Linked	Total

Pre	**104**	**353**	**457**
Post	**119**	**383**	**502**
Total	**223**	**736**	**959**

chi sq	**0.039467618**
p value	**0.980459628**

Figure 3.1. Graphical Representations of Reconciled Narcotic and Non-Narcotic Orders
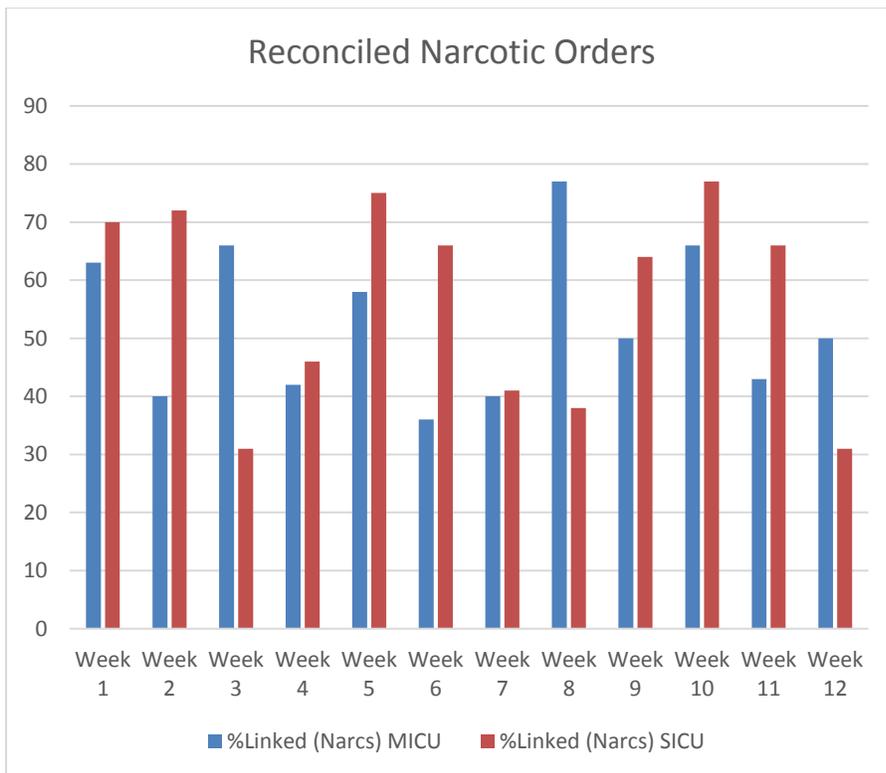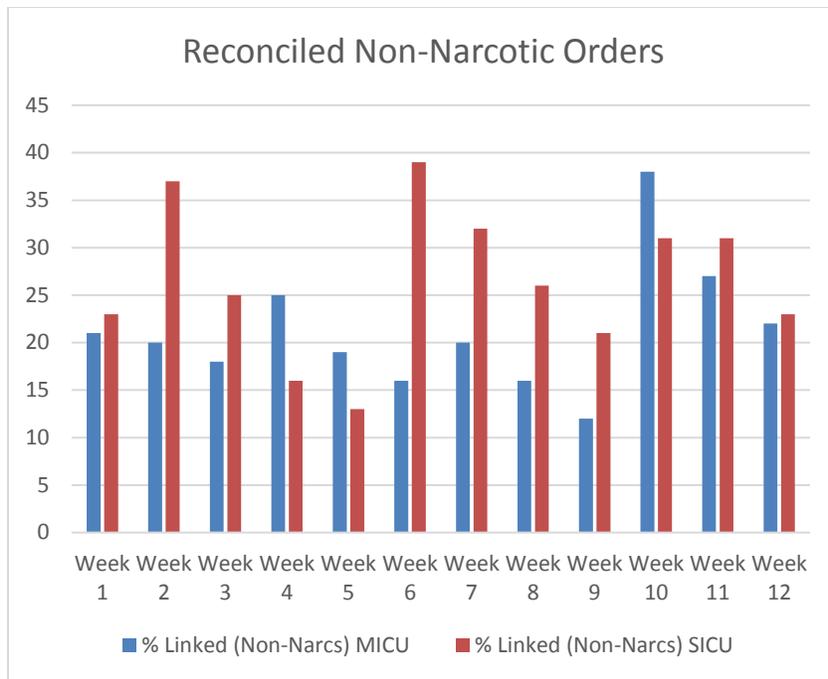
MICU = Medical Intensive Care Unit; SICU = Surgical Intensive Care Unit

Discussion

The PI found that majority of the unreconciled overrides in the MICU and the SICU do not have documented administrations. More non-narcotic medications were overridden in the two ICUs than narcotics drugs. Nurses informed the PI that a considerable amount of time elapses between the placement of orders and the pharmacy verification of orders. Many overridden non-narcotic medications were vasopressors which are necessary in the regulation of the hemodynamic status of the ICU patient. Narcotic medications such as Fentanyl, and Versed were overridden for pain control and to keep the ventilator-assisted patient calm and sedated for successful treatments. A safety risk exists where an order was placed and was not yet verified by the pharmacist, but the nurse had retrieved (via override) and given the medication. When the pharmacist completes verification on the ordered medication, a due time appears in a column on

the Electronic Medication Administration Record (eMAR) suggesting that the patient has not

received the medication. A second dose may be given by another nurse if proper hand-off was

not completed. In instances where no orders exist before the overrides and the nurse retrieved

and gave the medication, the lack of documentation of the administration may lead to a double or

a second dose if an order was placed subsequently. Again, the placement of the order will create

a due time in a column on the eMAR. Pockras and Smith (2013) used education to increase

nurses' awareness of reconciling medication overrides. Likewise, the PI in this study used a

combination of hands-on training, distribution of step-by-step instructions on how to reconcile

overrides ("quick guide") and discussions during nursing huddles (brief staff meetings at

beginning of each shift) to increase nurses' awareness in the pilot units. Keane (2014) also found

that mandatory education and investment in technology reduced the number of medication

errors.

Minimizing overrides reduces occurrence of medication errors and decreases costs

associated with patients' prolonged hospital stays (Early, Riha, Martin, Lowden & Harvey,

2011). During the intervention phase, it was discovered that some of the infused drugs were not

documented on the intake and output flowsheet. The PI explained to the nurses the rationale for

documenting the overridden diluent (used in mixing medications) in the intake and output

flowsheet. The omission of documentation of the volume infused from reconstituted overridden

medication is a patient safety concern. The monitoring of a patient's hemodynamic status relies

heavily on the observation of fluid volume which the physicians and other providers depend on

to make clinical decisions. The existence of incomplete documentation is problematic as

providers do not have all the information needed to make quality and patient-centered decisions.

Undocumented administration of overrides also have financial implications. Loss of revenue

occur when nurses retrieve vials and diluents to reconstitute into infusion drips and forget to document the administration on the eMAR. Per hospital policy, charges for all medications are filed when nurses or providers document administration on the eMAR. PI founds several cases of lavender-colored lines on the eMAR with no documented administration which suggest that no charges were filed for those dispensed medications indicating loss of revenue for the organization.

At the project site, nurses were unable to reconcile overrides because of the discrepancies between ordered route and the dispensed route. For example, Nor-epinephrine is ordered as an infusion drip such as 16,000 mcg in Sodium Chloride 0.9% 500 mL bag, while an override is dispensed in vials of 1mg/mL solution. Vials must be reconstituted in diluent to produce infusion medications using appropriate drug instructions. Physicians order the medications as Intravenous (IV) infusion routes, and the medications appear as such on the eMAR. When nurses retrieve the medications from the Automatic Dispensing System (ADS) in vials, lavender-colored lines appear on the eMAR which prompt for the linkage of the colored overrides to physicians' orders. Institutional policy prohibits nurses from using verbal order mode to place orders for overridden medications unless during surgical procedures; therefore, there are no means of generating orders to link to the overrides. In other institutions that use the same Electronic Medical Record (EMR) system, nurses may use verbal mode to place orders for medication overrides. In a study on nurses' attitude on Bar Code Medication Administration (BCMA) technology, the author describes a major challenge to nursing's full adoption of the medication administration technology of BCMA as the lack of proper integration of technology to current nursing workflow (Gooder, 2011). Institutions must seek to understand nursing processes when introducing technology so that the full benefits of the innovation may be realized (Rack, Dudjak and Wolf

2012). The PI of this project uncovered that current nursing processes in the MICU and the SICU

permit staff to reconstitute vials into infusion drips, but there are no standardizations (such as a

protocol) of the ordering and documentation of the retrieved vials except for the automatic

creation of overrides. The technology that creates the lavender-colored overrides should have

techniques or tools (such as reminders) that could ease the process of the linkage to orders.

Limitations

Time for project was limited and extremely brief; a longer intervention time and post-

intervention period of data gathering may have produced slightly higher rates of reconciliation.

The results of the interventions may only be applied in institutions that use EPIC applications.

While overrides may occur in institutions that use different EMR applications, the setup in such

systems may or may not address some of the issues uncovered during the implementation of this

project. There are 8,820 organizations that use the EPIC software as EMR. Another limitation is

that the project was piloted in two ICU units only; similar interventions in other units could have

produced different results.

Implication for Nursing Practice

Organizations could benefit from knowing that medication overrides need not lead to

negative outcomes for patients if proper steps are taken to ensure complete and accurate

documentations. Financially, institutions may reduce wastes and be assured that medications that

were given during emergency situations are reimbursed because documentations to support such

actions exist. Taking prompt actions to prevent injuries and to save patients' lives (as nurses do

during medication overrides) must be properly documented. The project reveals that educational

interventions must be combined with approved process such as nursing protocols and electronic

reminders to improve the rate of reconciling medication overrides.

The risk to patient safety, the cost of undocumented administration and the impact on the

quality of care should drive future studies to examine the use of a nursing protocol. The protocol

should outline the steps that nurses must follow when overriding medications including

instructions on the number of vials and diluents needed to reconstitute medications that are

commonly overridden. The protocol must be written with inputs from physicians, pharmacists,

nurses, and Information Technology (IT) representatives who will create and maintain the

records in the EMR system. The IT personnel could look into creating panel records consisting

of the vial and the infusion bag which the physician must place together at the time of ordering.

The vial should be configured on an "as needed" mode where nurses use the order in the event of

delays in pharmacy dispensing time.

Future projects should investigate the use of electronic reminders or color-coded tabs in

the eMAR that signals to nurses when documentation of overrides have not been completed. The

Electronic Privacy Information Center (EPIC) – the EMR in use at the project institution

designed the system to automatically create orders (lavender-colored lines) when overrides

occur; however, an additional step of documenting the administration of the overridden

medication in the eMAR is dependent on the nurse. The system may be enhanced by including

settings that could remind nurses to document administration or to document the return of the

medication if not given. If retrieved medications were not given, nurses must document as such

to clear up any confusion that may arise thereafter.

Conclusion

The result of study suggests that educational intervention must be combined with appropriate tools to improve the documentation of medication overrides. In the project location, the policy and the nursing processes require standardization so that instances of overrides are managed more safely and efficiently. Adoption of the new process will promote patient safety, reduce overall costs resulting from medication errors, and upholds compliance with regulatory standards.

<div align="center">References</div>

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Appendix A

Evidence Matrix Table

Hypothesis/Question	Design	Sample	Measurement	Results/Implications
To evaluate the effect of BCMA on nursing activities in the ICU	Cohort Study (Correlational Observation study)	Comparing time ICU nurses spend on activities during Paper-Based Medication Administration (PBMA) era and after implementing BCMA; PBMA (N=101); BCMA (N=151)	Validated data collection tool used to measure Medication Administration (MA) date, time, study phase; tools to list 5 nursing activities such as direct and indirect care and administrative activities. Use of stopwatches to measure time spent by nurse on activities.	- The MA method used (PBMA vs BCMA) made significant difference in the time spent on direct patient care and administration activities *(p<0.0001 and p<0.01 respectively)* - Adoption of BCMA is effective in reducing the amount of time ICU nurses spend on MA, and it increases time spent on direct patient care. - **Limitations:** only ICU nurses were observed; therefore, study cannot be generalized to other care areas. Also, quality assessment of nurses' interactions with patients was inadequate.
Dwibedi, N., Sansgiry, S., Frost, C., Dasgupta, A., Jacob, S., Tipton, J., & Shippy, A. (2011). Effect of bar-code-assisted medication administration on nurses' activities in an intensive care unit: A time–motion study. *American Journal of Health System Pharmacy, 68.*				**Grade Level of Evidence:** Strong recommendation; moderate quality evidence (III)
To analyze the effects that BCMA and eMAR have on the occurrence of medication errors	Observational study	Direct observation of nurses during patient care (in 2 med-surg, 2 telemetry and 2 rehab units) in two community-based hospitals.	- Observation of MA error completed in 3 phases (phases 1, 2 & 3); phase 1 = before the study, phase 2 = 6 months after, and phase 3 = 12 months after the start of study. - AU Med System used to calculate MA errors (AU software is	- Med accuracy rate in Hospital #1 with the exclusion of med admin time error increased from 92% in phase 1 to 96% in phase 3 (p<0.015), and using same criteria the rates increased from 93% in phase 1 to 96% in phase 3 for hospital #2. - BCMA when used with eMAR increased MA accuracy and did not

			nationally accepted for measuring MA error rates).	cause new MA error type to occur contrary to popular belief. - Direct observations of med errors are more accurate than voluntary reporting of med errors.
Seibert, H., Maddox, R., Flynn, E., & Williams, C. (2014). Effect of barcode technology with electronic medication administration record on medication accuracy rates. *American Journal of Health System Pharmacy, 71.*				**Grade Level of Evidence:** Strong recommendation; high quality evidence (II)
Evaluate the effect of BCMA on the safety of MA	Quasi-Experimental Study	Collected data on transcription and med admin errors in 35 med-surg and ICU units of a tertiary hospital over a nine-month period	Used direct observation to measure error rates in units that implemented BCMA and units did not.	-11.5% error rate noted in units without BCMA and 6.8% in unit that with BCMA. - Introduction of BCMA reduced medication error and potential adverse drug events. - Limitation: BCMA reduce potential adverse drug events, but it may not prevent it.
Poon, E., Keohane, C., Yoon, C., Ditmore, M., Bane, A., Levtzion-Korach, O., & Moniz, T. Et Al. (2010). Effect of bar-code technology on the safety of medication administration. *New England Journal of Medicine, 362(18).*				**Grade Level of Evidence:** Strong recommendation; moderate quality evidence (III)
Evaluate research evidence on relationship between MA innovations and the prevention of adverse drug events to guide improvements on patient safety.	Systematic Review of both RCT and NonRCT (mixed-review)	13 electronic databases and 7 patient safety websites were searched for relevant studies; search span period of 29 years (1980 – 2009)	Quality assessment and validity tool for correlational studies, Quality Assessment Tool for Pre- and PostIntervention Design, and Critical Appraisal Skills Programme	- On the average, all studies reviewed indicate the advantages that MA technologies pose to patient safety, but evidence presented were not consistent across the board. Some studies blame workarounds for the lack of success of MA technology in error reductions - **Limitations**: Only US and Canadian studies were reviewed; therefore, review may not be generalized to MAT in other countries - Discrepancies between published studies result and data- reporting practice -

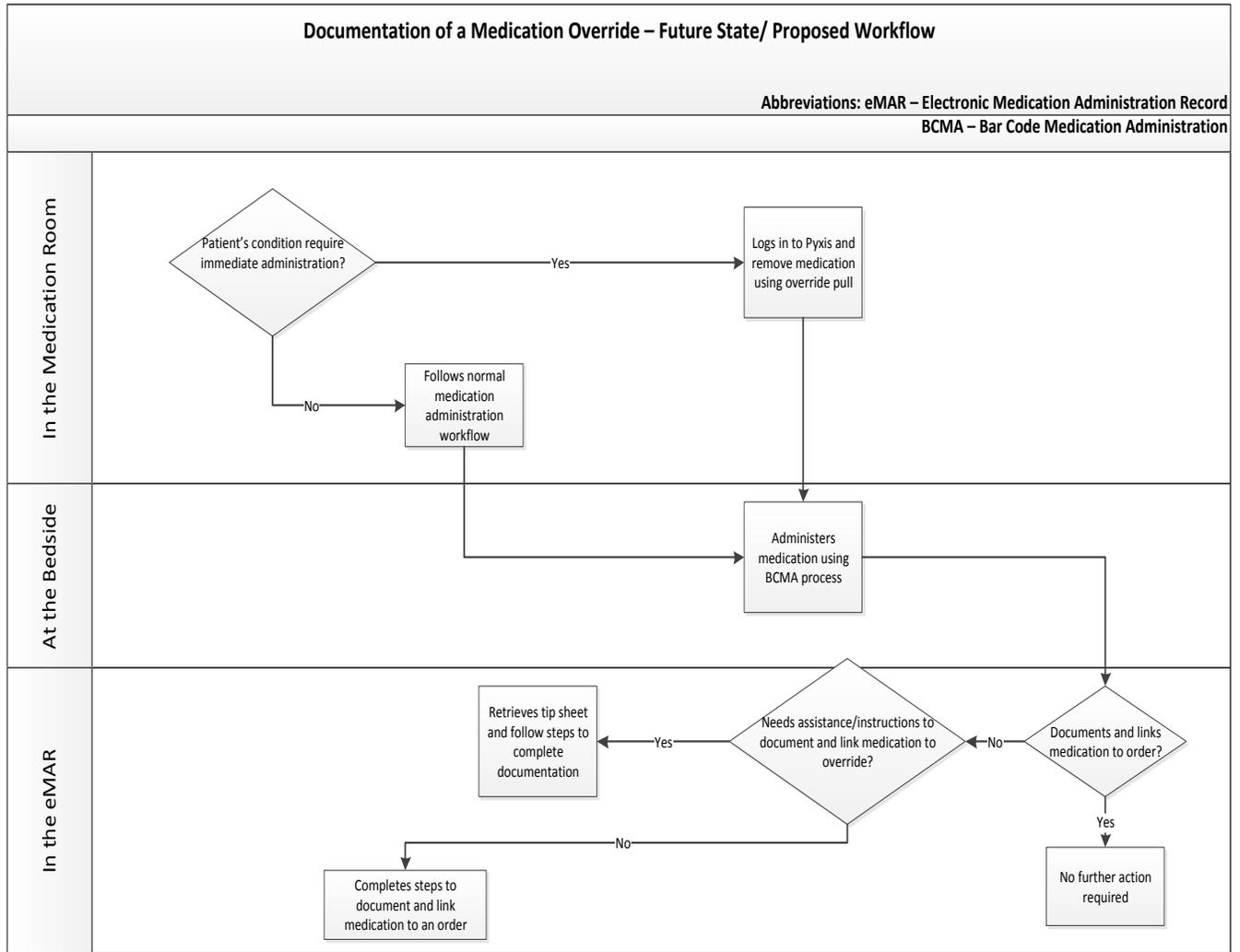| Wulff, K., Cummings, G., Marck, P., & Yurtseven, O. (2011). Medication administration technologies and patient safety: a mixed-method systematic review. *Journal of Advanced Nursing 67(10).*				**Grade Level of Evidence:** Strong recommendation; high quality evidence (I)
Examine how humans interact with computer systems and the potential impact on patient safety	Single Randomized Trial	Nurses in Neonatal Intensive Care Unit (NICU) of a children's hospital in Cincinnati over a six-months period	- Observation using Failure Modes and Effects Analysis (FMEA) - Use of Quality improvement process of Plan Do Study Act (PDSA)	- Protect patients from injury/harm resulting from use of medication overrides - Ensure that electronic medication administration process carries little or no error - Discourage nurses from practicing outside of their scope. - Inform hospitals on strategies to use to improve reconciliation of overridden medications
Pockras, P.J., & Smith, R, M. (2013) Reconciling Pyxis overrides after the implementation of EPIC. *Online Journal of Nursing Informatics, 17 (3).*				**Grade Level of Evidence:** Strong recommendation; high quality evidence (II)
To examine the effect of BCMA on nurses' perception of MA error and their satisfaction with the overall MA process	Single Randomized Trial	Nurses from BCMA and Non-BCMA units (BCMA n = 33, control = 26).	Questionnaires administered to nurses in piloted unit 1 month prior to BCMA and 5 months after BCMA	- Significant decrease in nurses' satisfaction with MA process after implementation of BCMA *(p=0.001)* - Successful adoption of BCMA technology require understanding of its impact on nursing processes **Limitations**: nurses' response to questionnaire was low; sample size was small and no follow-up plan existed to contact nurses who did not complete questionnaire.

Gooder, V. (2011). Nurses' perceptions of a (BCMA) Bar-coded Medication Administration System: A case-control study. *Online Journal of Nursing Informatics*, *15 (2)*.				**Grade Level of Evidence:** Strong recommendation; moderate quality evidence (II)
To review studies on nurses' use of workarounds in acute care environments	Systematic Review	Nurses in acute care setting engaged in workarounds	Used analytical frame to examine workarounds; how they develop and factors leading to their rise as well as data on nurses' understanding of what constitutes workarounds	- Multiple factors contribute to workarounds such as organizational processes, individual nurse, nature of patient care, local and non-local culture and influences from other individuals. - Workaround is generally viewed as detrimental to patient safety, but may be necessary in certain instances. - Workarounds are caused by both individual and collective reasons and more studies should examine the latter for an all-round understanding of the reasons why nurses engage in workarounds - **Limitation** – differences in time between old and new studies; thus, the review did not include results from most current studies on the topic.
Debono, D., Greenfield, D., Travaglia, J., Long, J., Black, D., Johnson, J., & Braithwaite, J. (2013). Nurses' workarounds in acute healthcare settings: a scoping review. *BMC Health Services Research, 13 (175).*				**Grade Level of Evidence:** Strong recommendation; high quality evidence (I)
To examine the impact of BCMA workarounds on the number of medication errors	Observational study	3 piloted units (2 acute care and 1 ICU) observed in the first month following BCMA and eMAR implementation	Quality Improvement using naïve-observer technique	- Low rate of medication administration error following BCMA implementation; BCMA did not prevent error and very little workarounds detected as a result of BCMA

				- **Limitations**; possibility of bias due to lack of experience of observers
Hardmeier, A., Tsourounis, C., Moore, M., Abbott, W., & Guglielmo, J. (2014). Pediatric medication administration errors and workflow following implementation of a bar code medication administration system. *Journal for Healthcare Quality*, *36(4).*				**Grade Level of Evidence:** Strong recommendation Low-quality evidence (IV)
To review the study of a project that aim at examining reasons for overrides, to correct the problem and change the culture	Systematic Review	Not-for-profit organization with 27 adult inpatient care units	Reviewed equipment problems, documented overrides, and nurses' feedbacks	- Systematic implementation of change reduced BCMA overrides by 12.8% - Process for continuous monitoring was also put in place
Early, C., Riha, C., Martin, J., Lowden, K., and Harvey, E. (2011). Scanning for safety: An Integrated Approach toIimproved Bar- Code Medication Administration. *Computers, Informatics, Nursing, 29(3).*				**Grade Level of Evidence:** Strong recommendation; high quality evidence (I)
Examine the reasons why nurses in an academic institution use workarounds during MA category.	Single observational study	Staff nurse survey (n=463) and nurse focused group (6 focused groups)	-10-item survey questionnaire sent via Survey Monkey tool link to email addresses of Medical-Surgical nurses. Focused group sessions over 3 months.	Interactions between nurses and patients are dynamic and complex. Institutions must study how nurses react to the change so that technological innovations (such as BCMA) may be designed to support nursing workflows.
Rack, L., Dudjak, L., & Wolf, G (2012). Study of nurse workarounds in a hospital using barcode medication administration system. *Journal of Nursing Care, 27(3).*				**Grade Level of Evidence:** Strong recommendation Low-quality evidence (IV)
Determine if students can transfer their knowledge and skills of medication administration from academic simulation to clinical practice.	Qualitative study – (phenomenological research design)	Second-semester nursing students enrolled in a medical-surgical course (n=13)	Three 90-minute focus group interview sessions. Participants interviewed during the first two to three weeks of medical-surgical acute care clinical experience.	Participants perceived that role-modeling, repetitive practice, and peer feedback prepared them for MA in the clinical setting.
Krautscheid, L., Orton, V., Chorpenning, L., & Ryerson, R. (2011). Student nurse perceptions of effective medication administration education. *International Journal of Nursing Education Scholarship, 8(1).*				**Grade Level of Evidence:** Strong recommendation Moderate-quality evidence (II)

Education of nursing staff is effective in the reduction of medication errors.	Expert Opinion	Not applicable	Application of Lewin's theory of change	Implementing BCMA technology may help to reduce medication administration error in a health care environment.
Keane, K. (2014). Reducing medication errors by educating nurses on barcode technology. *Academy of Medical Surgical Nurses, 23(5).*				**Grade Level of Evidence:** Strong recommendation Low-quality evidence (IV)

Appendix B

Medication Override – Future State Workflow

Documentation of a Medication Override – Future State/ Proposed Workflow

Abbreviations: eMAR – Electronic Medication Administration Record
BCMA – Bar Code Medication Administration

In the Medication Room

- Patient's condition require immediate administration? — Yes → Logs in to Pyxis and remove medication using override pull
- No → Follows normal medication administration workflow

At the Bedside

- Administers medication using BCMA process

In the eMAR

- Documents and links medication to order? — No → Needs assistance/instructions to document and link medication to override? — Yes → Retrieves tip sheet and follow steps to complete documentation
- Yes → No further action required
- No → Completes steps to document and link medication to an order

LEGENDS

Square - Processes or actions   **Diamond - Questions**

Appendix C

Copy of the Step-by-step Instructions ("Quick Guide") I

Linking an override after administration (when no order exists)

1.   Find the order on the eMAR, and click to the right of the medication name to display details
2.   Click **Link to related order** link.
3.   Select the given medication
4.   For the order on the right, select the due time
5.   Select New administration if there is no due time
6.   Click **Accept**

Epic Training Companion (2014). Administering Medications. Epic Care Inpatient Fundamentals Epic 2014
        Training Companion, PP 7.51 – 7.55

Copy of the Step-by-step Instructions ("Quick Guide") II

Linking an Override to an Order prior to administration (when an order exists)

1.   Open patient's eMAR and click on **Link to related order** link for either the override or
         the order
2.   Select due time on the left side (override window)
3.   Select New administration on the right side (medication window)
4.   Click **Accept**

Epic Training Companion (2014). Administering Medications. Epic Care Inpatient Fundamentals Epic 2014
         Training Companion, PP 7.51 – 7.55