

Executive Summary

The Oregon Health and Sciences University Doctor of Nursing Practice program was designed to support professional growth through attainment of three program competencies. The following summarizes how these competencies were accomplished within a Veteran acute care population during the didactic, residency and clinical inquiry components of the program.

1. Practice within an advanced practice nursing specialty in a professional, evidence-based, skilled and ethical manner.
 - Through facilitation of an interdisciplinary group, wrote a manuscript for submission to a peer referred journal. The manuscript described the development and implementation of an evidence based nursing protocol to treat hypoglycemia.
 - Presented an overview of the changes implemented by the Center for Medicare and Medicaid Services that effect reimbursement of hospital acquired conditions at local conference.
 - Submitted a case study for publication that illustrates the analysis of an ethical dilemma.
2. Influence health and health outcomes of individuals, groups, and populations through clinical inquiry.
 - Developed a Clinical Nurse Specialist (CNS) facilitation intervention aimed at improving glycemic outcomes in the acute care setting.
 - Facilitated the collaborative development and implementation of a method to extract diagnosis specific data from the electronic medical record. The extraction produced specialty specific discharge data. As a result, the organization can report the number of patients discharged with a diagnosis of diabetes and the corresponding length of stay.
 - Completed a gap analysis using disease specific criteria provided by the Joint Commission to determine areas of improvement in glycemic management within the organization. Utilized the results to develop a presentation for executive leadership highlighting the areas of improvement and resources required to position the organization to obtain a Joint Commission disease specific certification in inpatient diabetes.
 - Participated in the development of a nursing research proposal aimed at improving the clinical judgment of Registered Nurses through the use of high fidelity simulation.
 - Utilized case reports to complete an in-depth analysis of several aspects of diabetes to include hypoglycemia, health disparity, and organizational requirements for improvements in diabetes care.
 - Reviewed and evaluated the current evidence to assess environmental risk factors for falling in the acute care setting and provided evidence based recommendations using a case report format.
3. Influence health policy and systems of health care in the local, regional, state, national and international forums.
 - Expanded knowledge of nursing quality within the VA system and nationally through attendance at community, regional, and national meetings and conferences. This broadened my perspective of quality and supported working collaboratively with VA nursing leadership to explore models of nursing quality.
 - Led the collaborative development of a database to analyze glucose values at the unit level for all clinical areas. Standardized definitions and calculations using national guidance to determine and report glucose outcomes from the executive and unit level. Developed a user manual to facilitate use of the database at a national VA level.
 - Served on a grant review panel for gulf war illness. Reviewed and scored 14 grant proposals.
 - Completed a policy analysis focused on staffing legislation and mandatory staffing levels in the acute care setting.

The accomplishment of these competencies has supported my professional growth by broadening my perspectives and challenging me to explore and understand unfamiliar areas. I was able to accomplish this by narrowing my focus and performing an in-depth evaluation of particular aspects of my practice. I can now apply the skills gained through the in-depth evaluation to everyday practice.

Running head: IMPROVING GLYCEMIC OUTCOMES

Improving Glycemic Outcomes
Through Facilitation at the Point of Care
Christy Locke
Oregon Health and Science University
School of Nursing

Introduction

Description and Significance

Achieving quality and excellence are not new concepts to healthcare. In 1999, the Institute of Medicine (IOM) released the landmark report “To Err is Human: Building a Safer Health System” that launched the national patient safety and quality movement that continues today (Institute of Medicine of the National Academies, 1999). In 2001, the IOM released a second report, “Crossing the Quality Chasm: A New Health System for the 21st Century” citing the inability to translate knowledge into the practice environment as a substantial obstacle to achieving quality health care (Institute of Medicine of the National Academies, 2001). In 2003, a third report, “Keeping Patients Safe: Transforming the Work Environment of Nurses,” was released. This report recommends several patient safeguards to make the workplace more conducive to patient safety. One of several recommendations is to provide Registered Nurses (RNs) with decision support at the point of care (Institute of Medicine of the National Academies, 2003).

Another national-level effort to improve the quality of health care is the Deficit Reduction Act (DRA) of 2005. The DRA stipulates that the Centers for Medicare and Medicaid Services (CMS) implement the Hospital-Acquired Conditions and Present on Admission Indicator Reporting program (U.S. Department of Health and Human Services, 2007). This program requires CMS to select several conditions which they deem preventable and reduce payments for these conditions if presence on admission is not documented (Patel, n.d.), in other words, are conditions acquired during the hospital stay. The effective date of the implementation was October 1, 2008 and reduces payment for 10 hospital acquired conditions during the first year (U.S. Department of Health and Human Services, 2007).

Evidence based practice (EBP) is a recognized approach to provide high quality patient care (Melynk & Fineout-Overhold, 2005). EBP is defined as “the conscientious use of the current best evidence in making decisions about patient care” (Melynk & Fineout-Overhold, 2005, pg 6). The EBP movement which became active in the mid-1990s continues to gain momentum because it has been demonstrated that evidence based care leads to better outcomes than traditional care (Melynk, Fineout-Overhold, Stetler, & Allan, 2005; Stetler, 2004). Nonetheless, barriers to the implementation of EBP techniques within nursing continue to interfere with the achievement of desired health outcomes (Melynk et al., 2005).

The focus of this clinical inquiry is to promote EBP through the development of a Clinical Nurse Specialist (CNS) facilitation intervention. Clinical Nurse Specialists (CNS) can serve as change agents in reducing barriers to evidence based practice. The CNS role is recognized for its ability to advance nursing practice through the infusion of evidence-based nursing at the system level and by facilitating the use of evidence based care to improve patient outcomes (National, 2004). When RNs, through CNS facilitation, acknowledge, integrate, and act upon patient specific outcome data at the point of care it is expected to improve patient care outcomes. This clinical inquiry project will be conducted with RNs on two acute care units of a Magnet® designated VA hospital.

The purpose of this clinical inquiry project is to test the effect of a CNS facilitation intervention designed to improve glycemic control in the acute care setting. This will be accomplished in two phases. During phase one the CNS facilitation intervention will be evaluated. Success of the intervention will be measured by comparing rates of hypo and hyperglycemia episodes in the intervention and control groups.

Glycemic control refers to maintaining blood glucose within a predefined target range. Glycemic control in the acute care setting can be evaluated by episodes of hypo and hyperglycemia using capillary blood glucose or serum glucose values. This differs from evaluating glycemic control in the outpatient setting where a glycosolated hemoglobin is used as a marker of glycemic control (Goldberg et al., 2006).

In 2006, Goldberg et al. tested three analytical models to standardize the collection and analysis of glycemic control data in the inpatient setting. They called the models glucometrics. The Society of Hospital Medicine (n.d.) defines glucometrics as the systematic analysis of blood glucose data. The three models tested by Goldberg et al. (2007) were population (all glucose values), patient day (all values per patient per day), and patient (all values per patient per hospital stay). Using the work of Goldberg et al. (2007) the Society of Hospital Medicine published “practical recommendations” to evaluate glycemic control using the three units of analysis. Application of these standardized methods supports internal trending, benchmarking and quality improvement efforts.

Glycemic control is a particularly important clinical measure. The Center for Medicare and Medicaid Services (CMS) as part of the Hospital Acquired Conditions and Present on Admission program has selected manifestations of poor glycemic control as one of 10 initial categories (Centers, 2008). The program calls for a reduction in reimbursement for hospital acquired diabetic ketoacidosis, nonketotic hyperosmolar coma, hypoglycemic coma, secondary diabetes with ketoacidosis, and secondary diabetes with hyperosmolarity all considered manifestation of poor glycemic control (Centers, 2008). The CMS change does not have direct impact on the VA system as the Department of Veterans Affairs does not receive CMS

reimbursement, however it is expected that secondary insurance companies will adopt similar programs from which the VA does receive reimbursement.

Glycemic control is particularly suitable for a DNP clinical inquiry because the outcome is responsive to nursing intervention. Within the Portland VA Medical Center (PVAMC) nursing staff perform point of care glucose testing and nurse driven treatment protocols are used to manage insulin infusions and to treat hypoglycemia.

The issue of glycemic control is important as 17.5 million people in the United States have been diagnosed with diabetes and it is estimated that 2.2% of the population has undiagnosed diabetes. Of those with diabetes, half utilize medical insurance provided by the government; this includes veterans (American Diabetes, 2008b). In 2002, diabetes was reported as the third most common diagnosis for a veteran and accounted for 1.7 million hospital days of care (Reiber, Koepsell, Maynard, Haas, & Boyko, 2004). In general, patients with diabetes have a higher use of inpatient services and are at higher risk for a variety of complications including infection and cardiovascular events (American Diabetes, 2008b). The American Diabetes Association (2008b) estimates that annually 22% of the 186 million inpatient hospital days are incurred by those with diabetes and 13% of the days are attributed directly to diabetes. The average cost of one inpatient hospital day is \$1,853 (American Diabetes, 2008b).

The Joint Commission, in collaboration with the American Diabetes Association, also recognizes the importance of glycemic control and offers the Certificate of Distinction for Inpatient Diabetes Care. This disease-specific certification recognizes “hospitals that make exceptional efforts to foster better outcomes across all inpatient settings” (The Joint, n.d.).

This inquiry project is designed to answer the following questions:

- 1) Is there a difference in rates between nursing units where CNS facilitation specific to glycemic control was implemented versus usual care?
- 2) What are Registered Nurse perceptions of CNS facilitation?

Conceptual Framework

In 1998, Kitson, Harvey, and McCormack conceptualized the Promoting Action on Research Implementation in Health Services (PARIHS) framework. This conceptual framework describes the interplay and interdependence of three factors which influence the use of evidence in practice. These factors include: (a) nature of evidence, (b) context in which changes will occur, and (c) mechanisms of facilitation (Rycroft-Malone et al., 2002). In 2002, Rycroft-Malone et al. reformulated the PARIHS framework to expand the description of the nature of evidence to include research information, clinical expertise, and patient preference. Ultimately acknowledging that there are different types of evidence needed in clinical situations besides randomized controlled trials (Doran & Sidani, 2007).

In 2007, Doran and Sidani proposed the Outcomes-Focused Knowledge Translation (OFKT) framework (see Figure 1). The OFKT framework is an adaptation of the PARIHS framework and will be utilized in this clinical inquiry project. The framework was developed on the premise that patient outcome feedback is needed to continuously inform and improve nursing practice by supporting the uptake of evidence at the point of care. Uptake of evidence, defined as acknowledging, integrating, and taking action on feedback data, using practice guidelines, and other patient outcome specific evidence, is expected to improve when outcome feedback and advanced practice nurse facilitation are incorporated into the EBP process (Doran & Sidani, 2007). Knowledge translation within the framework is defined as deliberately using information

to develop an intervention strategy to ensure that information is being utilized in current practice to reach a specified outcome in a target population (Doran & Sidani, 2007).

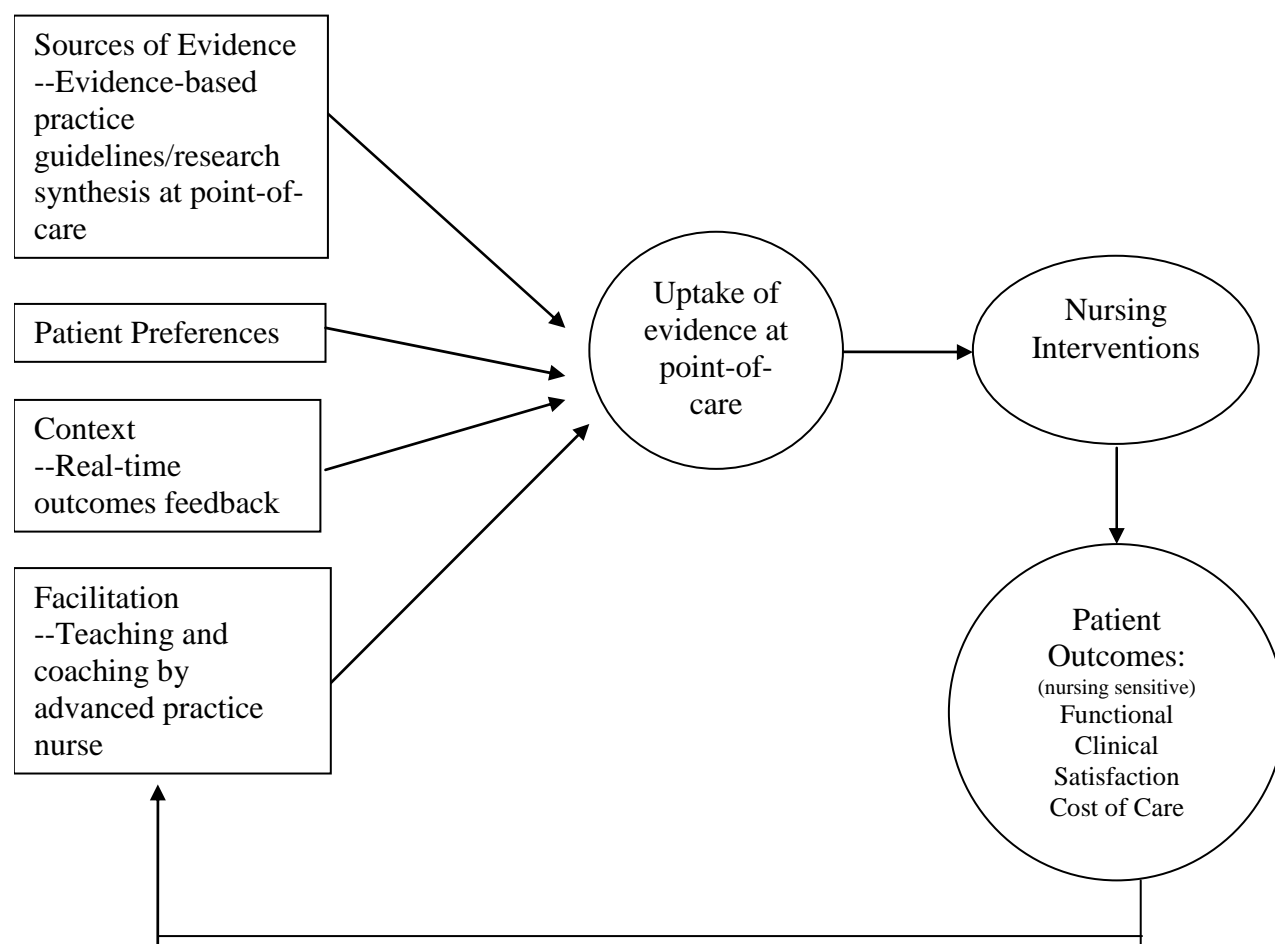
Doran and Sidani (2007) proposed this adaptation because they identified two gaps in the PARIHS framework. First, the framework did not define what indicators should be used for evaluating patient outcomes, and second the framework did not suggest how feedback should be used to design and evaluate practice. In order to address the gaps, Doran and Sidani (2007) applied quality improvement methodology to the framework. In quality improvement, individuals review and modify work processes in an effort to improve performance, reduce cost, and optimize patient outcomes. This application of quality improvement resulted in the development of four patient outcome categories to address the identified gap related to outcome indicators. These include: (a) functional, (b) clinical, (c) satisfaction, and (d) cost of care. Quality improvement methodology also contains a feedback mechanism to support continuous improvement. Facilitation, defined as training and coaching, by a Clinical Nurse Specialist is the mechanism applied to the OFKT framework to promote the use of feedback to design and evaluate practice (Doran & Sidani, 2007). Doran and Sidani (2007) viewed that CNS facilitated outcome review would support continuous improvement.

Doran and Sidani (2007) apply the framework specifically to nursing by incorporating nursing interventions and nursing sensitive patient outcomes. Nursing interventions are defined as any treatment, based on clinical judgment and knowledge that a RN performs to enhance patient outcomes. Nursing sensitive patient outcomes are defined as changes in patient outcomes that are responsive to nursing interventions (Doran & Sidani, 2007).

Review of Literature

The use of CNS facilitation to support the uptake of evidence at the point of care and to

Figure. 1 Outcomes-focused knowledge translation framework.



ultimately translate it into evidence based nursing interventions is the focus of this clinical inquiry.

OFKT framework.

The Outcomes-Focused Knowledge Translation framework was introduced in 2007. As a result, there are no published evaluations. The framework is considered by Doran and Sidani (2007) to be an operationalization of the PARIHS framework elements. The PARIHS framework has undergone some initial testing which led Kitson et al. (2008) to conclude that the framework is practical and useful. However, Kitson (2008) in a paper summarizing the framework's

conceptual and theoretical phases of development acknowledges that the framework has not been sufficiently tested to develop a strong evidence base. Brown and McCormack (2005) in a review of the literature utilize the PARIHS framework to examine the framework's relevance to post operative pain assessment and management. The review consisted of 58 articles evaluating the three key constructs of the framework. Brown and McCormack (2005) conclude that it appears the constructs are beneficial to getting evidence into practice. This conclusion is consistent with Kitson (2008).

Feedback.

In the OFKT framework, outcome feedback is one component which supports the uptake of evidence at the point of care. Outcome feedback is defined as “any summary of clinical performance of health care over a specified period of time” (Jamtvedt et al., 2008). This broad definition of feedback can be operationally applied as written, verbal or electronic outcome feedback related to any quality indicator. Feedback, as part of the EBP process, is expected to provide RNs with the necessary knowledge to reflect on nursing practice, to demonstrate improvements in performance over time and to reinforce EBP care (Doran & Sidani, 2007).

In a recent Cochrane review, Jamtvedt et al. (2008) examines the effectiveness of feedback. The 118 studies included underwent a quality assessment with twenty-four studies rated as high quality and most receiving a moderate quality rating. Three studies were conducted with nurses. The findings demonstrate the adjusted risk difference ranged from -0.16 to 0.70. This translates to a 16% decrease in improvement in intervention compliance between the control and intervention groups to a 70% increase in improvement in intervention compliance between the two groups. The authors conclude that implementation of a feedback intervention can be a useful strategy in improving care outcomes.

Facilitation.

In the OFKT framework facilitation is identified as a component which supports the uptake of evidence at the point of care. Doran and Sidani (2007) define facilitation as a “technique by which one person helps others to understand what they have to change and how they change it to achieve desired outcomes.”

In 2002 Rycroft-Malone et al. conducted a systematic concept analysis to examine and provide conceptual clarity to the three main concepts of the PARIHS framework. Facilitation is one of the analyzed concepts. The analysis concludes that a facilitation technique that includes a combination of approaches is most effective and that the role of the facilitator is to help clinicians make sense of the evidence. In addition to the conclusions, several key factors of the facilitation role emerged: 1) the role is about helping and enabling not telling or persuading, 2) the role is appointed, and 3) the focus ranges from helping with tasks to enabling individuals to review their attitudes, skills, habits, and thinking patterns.

Uptake of evidence.

The OFKT framework suggests that there are four sources of information that influence the uptake of evidence at the point of care. These sources are: (a) evidence, (b) patient preferences, (c) outcome feedback, and (d) facilitation. For each source Doran and Sidani (2007) present a hypothesis describing its role in the uptake of evidence which ultimately leads to improved patient outcomes. The hypotheses are: (a) timely access to preprocessed resources (e.g. national guidelines) will improve uptake, (b) patients engaged in decision making by presenting alternative evidence-based treatment options will increase uptake of evidence, (c) nurses provided with patient outcome feedback will be motivated to reflect on their practice and seek

evidence to fill in knowledge gaps, and (d) advanced practice nurses can facilitate outcomes review and the use of evidence in decision making.

A systematic review of the literature by Kawamoto, Houlihan, Balas, and Lobach (2005) provides good evidence regarding decision support system characteristics that support the uptake of evidence at the point of care. The most notable finding is that 75% of the interventions were successful when the decision support system provided automatic outcome feedback versus having to seek outcome feedback from within the system. Additionally, systems that were incorporated with charting processes were more likely to succeed by 37% and those that were computer based were more effective.

Literature gaps.

The OFKT framework was first published in 2007, as a result there is no available literature to support or refute its credibility. The framework is an adaptation of the PARIHS framework, therefore an evaluation of the PARIHS framework was included. Unfortunately, the evaluation revealed there has been minimal testing of the PARIHS framework. The few investigators who have tested the PARIHS framework report it is practical and useful. Even though there has been minimal testing, the OFKT framework does have merit as the concepts and relationships are adequately defined, logical and fit with personal observations from the clinical setting. These characteristics make it reasonable to apply and test the framework in this inquiry project.

Doran and Sidani (2007) identified that the PARIHS framework does not suggest how to use patient outcome feedback to continually design and evaluate practice. The OFKT framework addresses this shortfall through incorporation of a continuous feedback mechanism. The mechanism feeds patient outcome data to an advanced practice nurse who, through facilitation,

promotes the uptake of evidence at the point care to design evidence based nursing interventions. Since this is a modification to the PARIHS framework and it is untested, the relationship between CNS facilitation and improved patient outcomes requires testing.

Summary

The evidence reviewed for this clinical inquiry project implies that a practice change focused on CNS facilitation has the potential to improve patient outcomes and reduce barriers to the use of evidence at the point of care. However, since the OFKT framework has not been adequately tested, a clinical inquiry project which tests the effect of CNS facilitation on patient outcomes is proposed. This approach will address identified gaps in the literature and is expected to improve patient outcomes by promoting the uptake of evidence at the point of care.

Methods

This two phase clinical inquiry project will use an experimental design to evaluate the effect of CNS facilitation on glycemic control in an acute care setting. Phase one will focus on development of the CNS facilitation intervention. Phase two will test the intervention in one of two randomly assigned acute care units. The project will begin December 2008 and conclude May 2009 as described in Table 1.

Table 1
Project Timeline

October 2008 - May 2009						
	Dec	Jan	Feb	Mar	Apr	May
Activity	Phase 1	Phase 2	Phase 2	Phase 2	Data analysis	Present findings

Design

A two-group pretest-posttest design (see Table 2) will be used to examine the effect of CNS facilitation on glycemic control. This design allows for detecting a change in the dependant variable (glycemic control) as a result of the intervention (Norwood, 2000).

Table 2

Study Design

Unit A	R	O ₁	O ₂	O ₃	X	O ₁	O ₂	O ₃
Unit B	R	O ₁	O ₂	O ₃		O ₁	O ₂	O ₃
Note: R= randomization; O= observation; X = intervention								

Setting

The Portland VA Medical Center is a tertiary care university affiliated medical center with four acute care units that contain a total of 112 beds. Within these 112 beds there is a 52 bed capacity for telemetry monitoring. PVAMC RNs provide typical medical and surgical services plus care to post-operative open heart, liver and renal transplant, spinal cord injury, mechanically ventilated, and seizure monitored patients. The two acute care units where the project will be conducted have a total of 65 beds. The units are predominately surgical but do accept medicine patients when beds are available. Ventilated and seizure monitored patients are not admitted to the two units where the project will take place.

Context.

Context refers to the environment or setting and is an element that has been identified within the OFKT and PARIHS frameworks as a factor which influences the use of evidence in practice (Cummings, 2007; Doran & Sidani, 2007). The OFKT framework focuses on mechanisms of feedback within the element of context while the PARIHS framework describes

context as having three dimensions, culture, leadership, and evaluation (Cummings, 2007).

Within PVAMC there are several contextual features that are expected to influence this clinical inquiry project. First, PVAMC is a Magnet[®] organization that utilizes a shared-decision making model within nursing service. The model promotes and supports unit level decision making to identify and resolve clinical issues. The model further supports units with a nursing committee structure that reports directly to the Chief Nurse Executive. All nursing committees provide a forum for the integration of evidence based practice principles at the point of care (NPS MEMO 118-05-01).

Second, in 2003, PVAMC expanded the CNS role within the organization by creating two unit based, acute care CNS positions. The unit based specialists function in three spheres of influence as described within the Statement on CNS Practice and Education (2004) with the majority of their time spent in the organizational/system sphere (70%), followed by the staff education sphere (20%) and finally the direct patient care sphere (10%). The CNSs report to the Inpatient and Emergency Services Division director.

In 2004, PVAMC formed an interdisciplinary team to evaluate glycemic control in the acute care setting. The team reports to the Pharmacy and Therapeutics Committee and is co-led by a Clinical Nurse Specialist and Hospitalist. The team members meet monthly and discuss a multitude of issues related to glycemic control including the development of evidenced-based protocols, standardizing definitions, establishing target ranges, and product evaluation. Over the past four years the team has implemented many changes directed at the promotion of tight glycemic control with the goal of improving patient outcomes. In 2007, the team received national recognition from the Veterans Administration Office of Nursing Service for their innovative work. Three noteworthy activities include the development and implementation of a

glycemic monitoring window (see Appendix A), development of an electronic acute care insulin infusion protocol and a hypoglycemia protocol. The glycemic monitoring window was implemented in early 2006 and the electronic insulin infusion protocol in late 2006. The hypoglycemia protocol is scheduled for release in November 2008.

Finally, the Department of Veterans Affairs is known for its sophisticated electronic medical record. This electronic environment creates the infrastructure to evaluate the quality of care both internally and externally and serves as a mechanism to provide feedback to health care professionals. The electronic medical record and information technology resources to support the electronic record provide a mechanism for internal evaluation of data. The ability to provide valid and reliable data for evaluation, in combination with the resources to take action at the organizational level, has resulted in an environment that supports change and promotes quality.

Sample

The purpose of this clinical inquiry project is to determine whether CNS facilitation effects unit level rates of hypo and hyperglycemia. This project will examine glycemic control using a data set maintained by the Inpatient Glycemic Control Team (IGCT). The data set contains only capillary blood glucose (CBG) values acquired by point of care testing with a glucometer. The data set does not include serum glucose values. CBG values will be referred to as glucose values. Glucose values are collected on all acute care patients (with and without diabetes) as ordered by the primary team managing the patient. The timing of the glucose value, such as post-prandial, is not a consideration. All glucose values are weighted equally. This project will evaluate values from two acute care units, 9D and 9C.

Nursing units 9C and 9D will be randomly assigned to receive the intervention or usual care. A convenience sample of RNs on each nursing unit will participate in the intervention or

usual care, depending on which unit they work. Participation will be voluntary. The characteristics of the accessible population (N=86) include 71 (83%) females and 15 (17 %) males with a mean age of 39 years (range 22-60). Education levels include 1 (1%) with Diploma, 31 (36%) with an Associate degree and 54 (63%) with a Bachelor's degree. More than 78% (n=67) work full-time and 42% (n=36) work night shift. Race and ethnicity statistics are not available (email communication with Y.Trieu, November 4, 2008).

Inclusion/exclusion criteria.

All RNs providing care on 9D or 9C will be invited to participate in the study as CNS facilitation is a routine activity for RNs on these units.

Randomization.

Two nursing units will participate in the study. The investigator will place the name of each unit in a sealed envelope and an administrative assistant will select one envelope out of a bag. The unit selected will become the intervention unit and the unit not selected will be the control unit.

Recruitment.

Four 15-minute informational sessions to introduce acute care RNs to the project will be held. Recruitment flyers will be posted in areas frequented by acute care RNs and sent via email using the internal email system (see Appendix C). Participation is voluntary and participants will not be compensated. However, RNs can use participation to fulfill the research requirement on their annual proficiency.

An informational sheet will be used as an alteration to a consent form (see Attachment D). This investigator will provide all RNs assigned to 9C and 9D with an electronic copy using

the internal email system. RNs will self-select participation by completion of the RN perception assessment.

Intervention

Doran and Sidani (2007) in the OFKT framework hypothesize that CNS facilitation will increase the use of evidence in practice when patient outcomes are reviewed (training) and evidence-based decision making is supported (coaching). In this study, the intervention unit will receive the CNS facilitation intervention developed during phase one and the non-intervention unit will receive usual care. CNS facilitation is a routine activity in the acute care setting and occurs on both 9D and 9C. For this study two additional activities will be included; 1) journal entries and 2) an RN perception assessment. These activities are necessary in order to capture details during the intervention phase and to make improvements to the intervention based on RN feedback. No identifying information will be collected with either of these activities.

The facilitation intervention will be directed toward improving glycemic control in the acute care setting. This will include basic information about the use of the glycemic monitoring window (GMW) and a discussion about glycemic control. All health care professionals have access to the GMW (see Appendix A) in the electronic medical record and can view it at any time during a patient's hospital stay. The window has been available in the acute care setting form ore than two years.

CNS Facilitation.

During phase one a structured facilitation process will be designed drawing from the existing evidence base on facilitation, learner-centered education theory and the concepts from the OFKT framework. CNS Facilitation will be performed by this investigator on both day and night shifts on the intervention unit and will be integrated into the RNs normal patient care

activities. RNs will receive the intervention in stages , therefore the intervention is expected to have a cumulative effect as the number of RNs who receive the intervention will build over time.

Acute Care RNs utilize individual, mobile computer work stations. When RNs are not in the patient room they tend to cluster in alcoves that have chairs and electrical outlets to recharge the mobile stations. CNS interaction typically happens at the mobile computers where there is access to the patient record and other electronic resources. The CNS will assess if it's an appropriate time to approach a RN for a facilitation session. Patient care activities will always take precedence over facilitation. If it is not an appropriate time, the CNS will approach the RN at another time.

The facilitation session will be designed to last about 10 minutes and will review a single patient scenario; however since RNs tend to work in clusters, the session may include more than one RN. If other RNs actively participate in the facilitation session they will be considered to have received the intervention. Participation is defined as active engagement in the conversation. This will be determined by the RNs activity during the facilitation session. If an RN continues to focus on patient care activities such as charting or are called away from the session, they will not be documented as having received the intervention. The RN must be present for the entire facilitation session. If a participating RN is called away from the session, the CNS will determine if the interruption is expected to be short-term (less than three minutes) or long-term (three minutes or more). If it is short-term the session will be halted until the RN returns. If it is long term, the session will continue with any other participants. If there are no other participants, a new facilitation session will be initiated with another RN. After an interruption of more than 10 minutes the RN must start a new facilitation session to be considered as having received the intervention.

RNs regularly serve as preceptors to student nurses and newly hired RNs. Student nurses can participate in the facilitation session but they will not be counted as a RN. The presence of a student will be documented in the journal. Newly hired RNs in their orientation phase will receive the intervention the same as all other RNs assigned to the unit.

RNs on all acute care units float to other acute care units on a rotational basis. The determination is made based on staffing needs. If a RN from any unit floats to the intervention unit, they can receive the facilitation intervention and will be given the opportunity to complete an assessment.

The CNS facilitator will be on the intervention unit for no more than 60 minutes 2-3 times per week on both day and night shifts. The actual amount of time on the unit will be recorded in the journal. A new facilitation session will not be initiated once the 45 minute mark has been reached.

As part of each individual facilitation session, several items will be recorded in a journal such as: 1) the number of RNs who completed and did not complete the intervention, 2) length of facilitation session, and 3) a description of the content of the session to include questions asked and focus of discussion. No identifying information will be recorded.

RN assessment of facilitation.

In order to evaluate RN perceptions of the CNS facilitation intervention, an anonymous assessment tool will be developed during phase one. This will include testing the tool for clarity and ease of use with at least five RNs on two acute care units at PVAMC that are not participating in the project.

RNs may have the opportunity to receive facilitation more than once while the CNS is on the unit; especially since RNs tend to cluster together when at their mobile work stations. RNs

can complete more than one facilitation session. If facilitation occurs more than once on the same day, the RN will only complete one assessment. It would not be practical to expect a nurse to complete an assessment for each session.

Usual practice.

The non-intervention unit will continue with their usual support from the acute care CNSs during the intervention phase. Usual support includes CNS facilitation. In order to ensure that both the intervention and usual care units receive the same amount of CNS attention, RNs assigned to the usual care unit will receive CNS visits 2-3 times per week on both day and night shifts to discuss topics unrelated to glycemic control. The CNS will make an attempt to have a specific topic to discuss with RNs such as a product update (e.g. new intravenous securement device) or practice reminder (e.g. remember to scrub intravenous access ports). Otherwise the visits will be friendly check-in visits. The topic(s) discussed, the number of RNs, and time on the unit will be recorded in a journal. An attempt will be made to approach all RNs during the visits (even if they denied participation) as presenting clinically relevant information is part of the normal CNS role.

This investigator is known to the acute care staff as the glycemic monitoring window expert, as a result formal or informal consultation may occur. Any consultation with a RN regarding glycemic control and/or the monitoring window during the intervention phase will be documented in the journal.

Usual care also consists of presentation of nursing sensitive outcome data on each unit. Graphs reflecting trends (see Appendix F) are posted on the nursing quality bulletin board monthly. The data are sent electronically to unit managers to review during staff meetings. This includes glycemic control data.

Measures

This project will examine glycemic control using a data set maintained by the Inpatient Glycemic Control Team (IGCT). Glycemic control will be reported as hypo and hyperglycemia rates. A hypoglycemic event will be defined as any random glucose value less than 70mg/dL (American Diabetes, 2008a). A hyperglycemic event will be defined as any random glucose value greater than 200mg/dL (Clement et al., 200). Data are currently reported monthly and trends are followed through time (see Appendix B). The IGCT utilizes the Society of Hospital Medicine (n.d.) recommended definitions for calculating hypo and hyperglycemia rates. This project will utilize the four unit level calculations presented in Table 3.

Table 3 Unit Level Variables and Calculations

Variable	Calculation
Unit hypoglycemia rate	$\frac{\text{Total number of hypoglycemia events/unit}}{\text{Total number of glucose values/unit}} \times 100$
Unit hyperglycemia rate	$\frac{\text{Total number of hyperglycemia events/unit}}{\text{Total number of glucose values/unit}} \times 100$
Unit hypoglycemia rate per monitored patient days	$\frac{\text{Total number of patient days with 1 or more hypoglycemia event/unit}}{\text{Total number of monitored patient days/unit}} \times 100$
Unit hyperglycemia rate per monitored patient days	$\frac{\text{Total number of patient days with 1 or more hyperglycemia event/unit}}{\text{Total number of monitored patient days/unit}} \times 100$

As previously described there are three potential units of analysis to consider when evaluating glycemic control (Goldberg et al. 2007; Society, n.d.). This project will utilize glucose values and monitored patient days. Several factors were considered in selecting these to include simplicity, sensitivity and clinical relevance. Simplicity describes how easy it is to collect and analyze the data. Sensitivity refers to the ability of the data to accurately reflect the situation.

This is most relevant when evaluating hypoglycemia as the unit of analysis must reflect risk of hypoglycemia. Finally, clinical relevance, is the data meaningful to clinicians and can it be applied to a clinical situation to improve care.

Glucose values.

Analyzing unit-level data using all glucose values is the simplest unit of analysis as the data are easy to analyze. However, it is not sensitive enough to adequately capture hypoglycemia risk. In terms of clinical relevance, the data are easy to interpret by all clinicians and is unit specific. Using all glucose values also provides the opportunity to benchmark nationally. In 2007, Cook, Moghissi, Joshi, Kongable, and Abad reported acute care hypo and hyperglycemia rates using all glucose values. The data were obtained from 10 hospitals (two academic, six urban, and two rural) and serve as a benchmark for the IGCT dataset.

All glucose values obtained on the units where the project is carried out will be included in the study. This method represents block control such as control for a unit (Goldberg, 2007). Using the glucose values in this fashion prevents any examination of the effects of patient variation, such as prolonged length of stay, or repeated measures during episodes of poor control that has the potential to skew data (Society, n.d). The primary purpose of this study is to determine whether CNS facilitation reduces the rate of hypo and hyperglycemic events; individual patient variation is not being examined.

Monitored patient day.

A patient monitored day is defined as a calendar day that contains two or more glucose values. The use of patient monitored days as the unit of analysis is recognized as a method to provide clinically relevant data and is less biased by length of stay (Society, n.d.). The data analysis is more complicated than glucose values however, it more accurately reflects clinical

risk for hypoglycemia (Goldberg et al., 2007). As with glucose values the data can be trended over time and is unit specific.

Sample size calculation.

The dependent variable for this project is glycemic control which is reported as rates of hypo and hyperglycemia at the unit level. Since this project will use the two methods previously described to report the rates, the more conservative of the two, monitored patient days was selected to estimate the sample size. An alpha value of $p=0.1$ will be used to determine significance as the intervention poses minimal risk.

Goldberg et al. (2007) reported glycemic control findings from one month of glucose values on a single medicine unit. The hypoglycemia rate for monitored patient day was 4.5% and 21.8% for hyperglycemia. Estimating that at least a 20% improvement from the benchmark can be attained, results in a sample size of 513 (hyperglycemia) and 2998 (hypoglycemia) patient monitored days for each acute care unit. Thus the total sample size necessary to detect a significant difference between the intervention and control groups using an alpha of 0.1 and a power level of 0.8 is 1026 (hyperglycemia) and 5996 (hypoglycemia) patient monitored days. It is anticipated that an adequate sample size can be obtained using two units.

Data Collection Procedures

The following data collection procedures have been established to test the CNS facilitation intervention in the acute care setting.

RN perception assessment.

After each facilitation session, the CNS will provide the RN with an anonymous assessment to evaluate their perceptions regarding the facilitation session. A locked box will be placed on the nursing unit for RNs to return the assessment. Assessments will be collected and

evaluated throughout the project, and used to improve the intervention. Assessments will only be retrieved from the locked box every two weeks to ensure that anonymity is maintained. All alterations to the intervention will be documented and approved by the Institutional Review Board prior to implementation.

Glycemic control.

Capillary blood glucose (CBG) values are the basis for analysis in this clinical inquiry project. PVAMC utilizes the Accu-Chek® Inform glucometer manufactured by Roche Diagnostics, Indianapolis, Indiana. The meter can evaluate CBG values in the range of 10-600 mg/dL with a 15% margin of error. CBGs are obtained by certified personnel at regular intervals as directed by a provider order or nursing protocol. CBGs may be obtained without an order as part of patient assessment when indicated. PVAMC's established Glucose Testing Policy (2007) directs clinical indications for testing, contraindications, operator certification requirements, quality control, specimen collection, infection control guidelines, handling of test strips, methods for charting, and cleaning and troubleshooting the meter (see Appendix E).

CBG testing is routinely performed by nursing assistants assigned to the care unit. All glucometer operators are certified annually to perform tests. The glucometer will accept the operator identification of a certified operator only. To perform a test the operator enters (or scans) his or her personal number followed by the patient's wristband to record the patient's identification. Once an adequate sample has been obtained, the operator is required to enter at least one comment code. Following entry of the comment code, the value is transmitted to the electronic patient record (Nursing, 2007).

Glucometers require quality control testing once every 24 hours using solutions provided by the manufacturer. If the meter has not met the quality control requirements, the meter locks

automatically to prevent further testing. Glucometers must be placed in the download station at least every four hours to download values to the electronic patient record and to have the battery charged. Meters will lock once the four hour limit has been reached (Nursing, 2007).

The Inpatient and Emergency Services Division (IESD) will provide unit specific, de-identified blood glucose values to the IGCT for use in this project. The following is a description of how capillary blood glucose data are collected. The glucometer is connected to RALS-Plus[®], a point of care information management system, which captures user identification, patient identification, download location (nursing unit), date and time of test and test result (Cook et al., 2007). The internal RALS coordinator authorizes access to the database. Fields in the database can be queried by applying filters such as location or date range.

Data are exported on a monthly basis to an Excel file by an administrative assistant using a scripted set of instructions. The data are de-identified by replacing the patient identification number and with an unique identifier. A log of the patient identification number and unique identifier is maintained in a locked filing cabinet behind a locked door in the administrative assistant's office. The assistant reviews the data for all values recorded as HI and LO. HI, that represents a value greater than 600 mg/dL is converted to a value of 601mg/dL and LO, that represents a value less than 10 mg/dL is converted to 9mg/dL. The number of HI and LO values are recorded.

The Inpatient Glycemic Control team reports the aggregate, de-identified data using the Society of Hospital Medicine definitions described in the *Measures* section. The data reported in this fashion will be used for this project.

Analysis

This clinical inquiry project is designed to answer two clinical questions:

- 1) Is there a difference in rates between nursing units where CNS facilitation specific to glycemic control was implemented versus usual care?
- 2) What are Registered Nurse perceptions of CNS facilitation?

Question 1.

A two-sided binomial test will be used to examine the difference in rates between the intervention and control groups as shown in Table 4. Additional comparisons will be made between the posttest conditions and the published benchmark rates (Cook et al. 2007; Goldberg et al., 2007). It is anticipated, based on the sample size calculation, that an adequate sample will be obtained within the time constraints of the project to demonstrate significance in all comparison groups except hypoglycemia per monitored patient day. This is due to the low occurrence rate of hypoglycemia in conjunction with a condensed project timeframe.

Table 4

Binomial Test Comparison Groups

All Glucose Values
Intervention group hypoglycemia rate versus control group hypoglycemia rate
Intervention group hypoglycemia rate versus benchmark ¹
Control group hypoglycemia rate versus benchmark ¹
Intervention group hyperglycemia rate versus control group hyperglycemia rate
Intervention group hyperglycemia rate versus benchmark ¹
Control group hyperglycemia rate versus benchmark ¹
Monitored Patient Day
Intervention group hypoglycemia rate versus control group hypoglycemia rate
Intervention group hypoglycemia rate versus benchmark ²
Control group hypoglycemia rate versus benchmark ²
Intervention group hyperglycemia rate versus control group hyperglycemia rate
Intervention group hyperglycemia rate versus benchmark ²
Control group hyperglycemia rate versus benchmark ²
Note: ¹ Benchmark = Cook et. al, 2007; ² Benchmark =Goldberg et al., 2007

Question 2.

A relational content analysis will be performed using the data collected from the RN perception assessment. The analysis will be conducted by first identifying and coding concepts. Then the concepts will be placed into categories and evaluated to determine the meaning of the concepts (Colorado, n.d.).

Cost analysis

This project will be cost neutral as it will be implemented using existing PVAMC resources. There are several potential reasons a cost savings may occur. First, if a reduction in the hyperglycemia rate is demonstrated there would be an expected cost savings related to a reduction in complications associated with hyperglycemia such as surgical site infection. Next, if an expanded length of stay is avoided this translates to bed availability. The availability of beds reduces the number of veteran's diverted to the community for care; a cost that is absorbed by the VA. Finally, cost savings associated with loss of revenue from secondary insurance billing would be avoided now that the hospital acquired condition program has been implemented.

Limitations

Admittedly there are limitations to this study. First, the CBG data may or may not contain the same participants' pre and post-intervention. Retrospective, de-identified, pre-intervention CBG data will be used making it impossible to determine patient characteristics of the pre-intervention population. It is possible that the characteristics of the intervention group could be different than the characteristics of the pre-intervention group. However, the patient population in general based on acuity, admission diagnosis, and length of stay is expected to be similar as the population is relatively stable.

Conducting the project on two units will limit the generalizability of the findings to all acute care units since the intervention and usual care units are predominantly surgical. However,

the two unit approach supports feasibility as only one CNS is available to perform the facilitation intervention on both day and night shifts.

Another limitation is access to acute care RNs. Since the primary role of the RN is to provide direct patient care this will always supersede the facilitation intervention. The investigator will avoid scheduling facilitation sessions during known busy times such as change of shift, meals, and major medication administration times. Finally, access to night shift RNs can be challenging as their scheduled hours are 7:00 pm to 7:00 am with the beginning and end of shift being the busiest times. Prime facilitation times would be between 11:00 pm and 4:00am. As there is only one CNS facilitator, facilitating during these prime times is not feasible. The investigator will make every attempt to provide facilitation to as many night shift RNs as possible.

Protection of Human Subjects

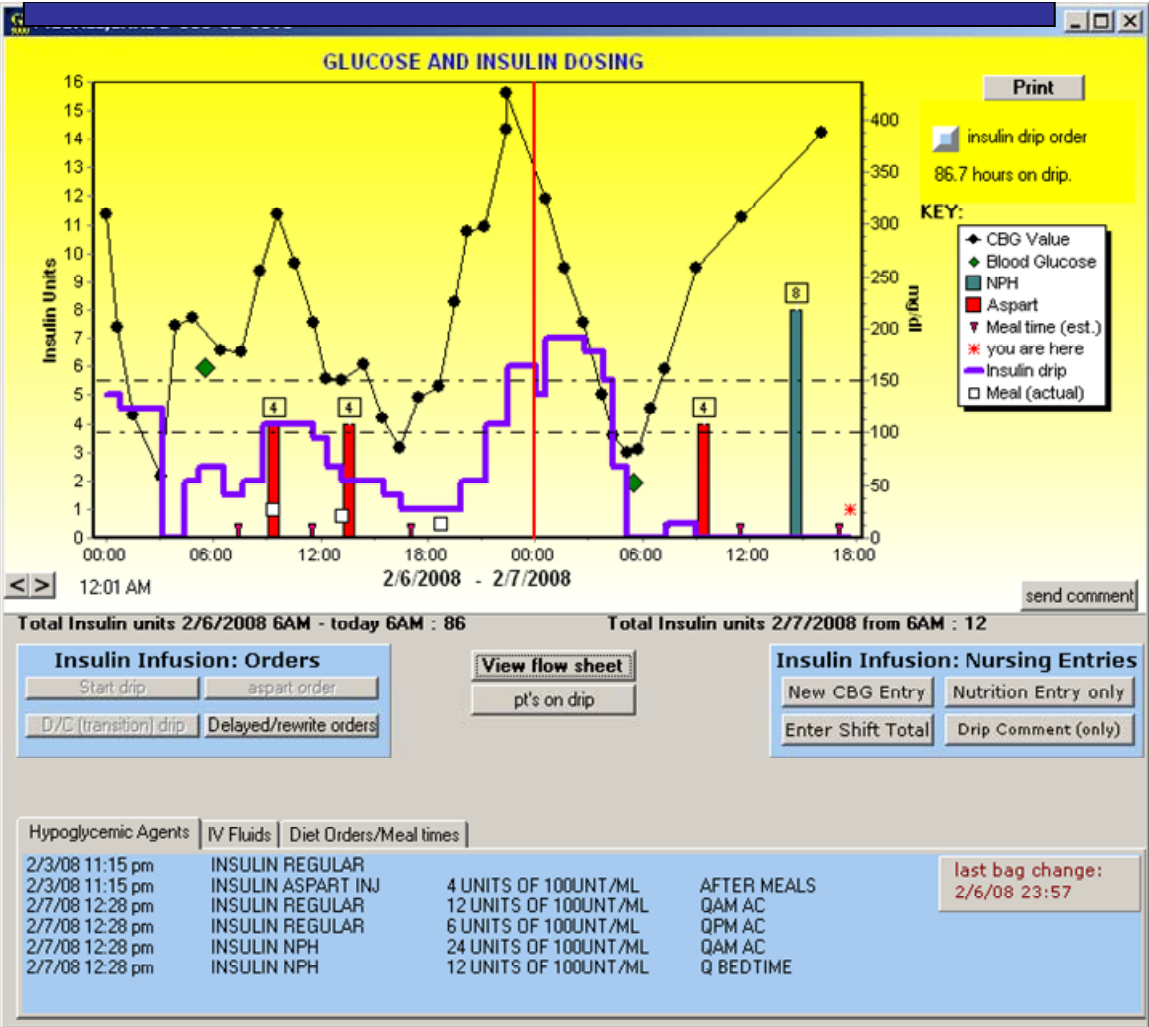
Nurse participants in this project will be exposed to minimal risk. RNs will be asked to complete an anonymous perception assessment. Assessment responses will be reported as common themes and any response that would potentially identify a nurse will be either deleted or altered to conceal identity. CNS interactions with RNs during the intervention phase will be recorded in a journal. No identifying information will be recorded.

Patient CBG data provided for analysis will be de-identified and aggregated at the unit-level. The CBG data is collected as part of routine care so there is no additional risk to participants. All project materials will be locked in a file cabinet behind a locked door. Only this investigator will have access to materials.

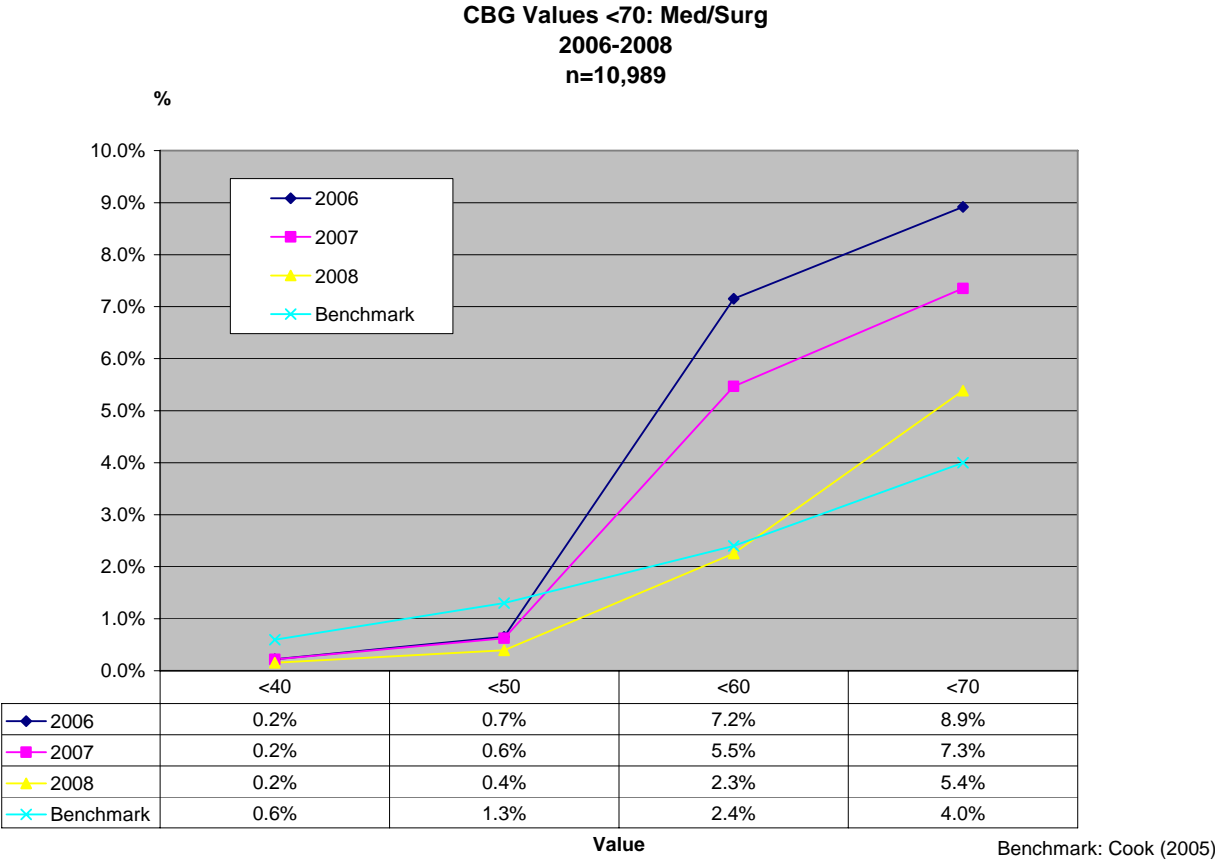
Dissemination Plan

The findings from this project will be disseminated beginning in May 2009. The final report will be presented to the public at the Oregon Health & Science University School of Nursing. In addition,, the findings will be distributed within the Portland VA Medical Center to ensure RN participants are aware of the results and their contributions. A detailed report will be presented to PVAMC leadership as the findings of this project will guide decisions regarding future support for glycemic control. Next, submissions will be made to present findings at regional and national conferences. Finally, submissions to publish findings will be made to peer reviewed nursing and/or quality journals.

Appendix A. Glycemic Monitoring Window



Appendix B. Glycemic Control Trends



Appendix C. Recruitment Flyer

Registered Nurses

Volunteers needed to participate in a Practice Improvement Project

What is the project? The purpose of the project is improve glycemic control in the acute care setting

9D and 9C will be randomized to receive CNS facilitation or no intervention (usual practice).

Who is eligible to participate? RNs providing patient care on 9C and 9D.

What information will be collected? No identifying information will be collected from RN participants.

How do I volunteer? After a facilitation session, complete the RN perception assessment.

Will I receive anything for my participation? Participants will not be compensated. However, participation can be documented on your annual proficiency.

**For more information attend an informational sessions or contact
Christy Locke, CNS (x56177)**

Appendix D. Participant Information Sheet

Participant Information Sheet**Improving Glycemic Outcomes Through Facilitation at the Point of Care****What is the purpose of the study?**

The purpose is to improve glycemic control in the acute care setting through Clinical Nurse Specialist (CNS) facilitation.

Acute care units will be randomized to receive CNS facilitation or no intervention (usual practice).

Who can participate?

RNs providing patient care on 9C and 9D.

What should I expect if I participate?

During your duty hours a unit based CNS will provide facilitation on your unit. Facilitation will involve a 5-15 discussion regarding glycemic control. You will be asked to complete an anonymous assessment at the end of each facilitation session.

What are the risks/benefits?

There is minimal risk to you for participating. You will not be compensated. You can include participation on your annual proficiency.

Will my privacy be protected?

No personal or identifying information will be collected from you. A journal will be kept recording the themes of discussion during the facilitation session.

For more information contact: Christy Locke, CNS 503-220-8262 x56177

Appendix E. Blood Glucose Testing Policy

Blood Glucose Point of Care Testing Using Accu-Chek Inform™ System**Table of Contents****PART I: Portland VAMC Glucose Testing Policies**

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PART I: Portland VAMC Glucose Testing Policies

A. General Policies

1. This document is the official policy and procedure for the use of the Accu-Chek Inform™ System glucose point of care testing throughout the Medical Center.
2. The policies and procedures pertaining to blood glucose monitoring, quality control, and record keeping with the Accu-Chek Inform™ System are reviewed annually by the Ancillary Testing Coordinator and the Glucose Testing (Nursing) Site Coordinator and will be signed by the Laboratory Director.
3. The Accu-Chek Inform™ System is currently the standard of care for point-of-care glucose testing in all areas where nursing staff are assigned, with the exception of the following areas where Accu-Chek Inform™ System is not used: Operating Room, Anesthesia, Home-Based Primary Care, and the Substance Abuse Treatment Program (SATP).
4. For a current list of glucose testing locations, contact the Glucose Testing Nursing Site Coordinator.
5. If the Accu-Chek Inform™ System should fail during any of its tasks, the [Troubleshooting section \(pg 6\)](#) in this procedure or in the User's Manual should be referenced for problem-solving information and patient management.

B. Clinical Indications: Any patient requiring blood glucose levels for the purpose of monitoring and managing diabetes control.

1. The Accu-Chek Inform™ System will provide blood glucose readings in the operating range of 10 – 600 mg/dL, however the upper and lower extremes of the operating range will not produce accurate results. Therefore, only results greater or equal to 30 and less than or equal to 500 will be charted with a numerical value (i.e. the reportable range).
2. Glucose readings should only be used with patients who have hematocrit (HCT) levels in the near normal range (20 – 65%).¹ Glucose results are inaccurate in patients whose HCT levels are outside this range, and only lab glucose results may be used.
3. Values may be falsely low in patients with severe dehydration which can accompany hyperglycemia. Therefore, patients with diabetic ketoacidosis or hyperosmolar nonketotic coma should have periodic laboratory glucose samples drawn when glucose levels remain above 300 mg/dL.
4. Patients with severe edema, impaired circulation, infection, or a mastectomy should have capillary blood samples taken from the earlobe instead of the fingertip.
5. The Accu-Chek Inform meter should **NOT** be used on patients who have received IV immunoglobulin solutions, have taken oral xylose or have been on PD (i.e. peritoneal dialysis solutions that contain icodextrin (e.g. Extraneal) or galactose) within the past 24 hours. If a patient receives products containing maltose, galactose, or oral xylose and is then tested using an Accu-Chek Inform, the glucose reading may be falsely high. Hypoglycemia may go untreated. The Inform meter cannot distinguish the sugars glucose, maltose, galactose, and xylose. Use of the Inform meter may result in cases of inappropriate insulin administration and consequent life-threatening or fatal hypoglycemia because of erroneous blood glucose test results for patients receiving products that may contain or may be metabolized into maltose, galactose, or xylose.
6. Refer to "[Limitations of the Method](#)" section (page 3) or the test strip packaging information for further clinical information.

¹ HCT <20% and glucose >200 mg/dL = falsely elevated glucose result.
HCT >55% and glucose >200 mg/dL = falsely decreased glucose result.

C. Limitations of the Method: Test strips give dependable test results if the following limitations are understood:

1. Do not use during xylose absorption testing.
2. No effect was found at 20% to 65% hematocrit and glucose concentrations up to 200 mg/dL. At glucose concentrations above 200 mg/dL, low hematocrits (below 20%) may cause falsely elevated results and high hematocrits (above 55%) may cause falsely low results versus a whole blood reference.
3. The following compounds, when determined to be in excess of their limitations, may produce elevated glucose results:

Compound	Limitation
Galactose	>10 mg/dL
Maltose	>16 mg/dL
Bilirubin (unconjugated)	>20 mg/dL
Lipemic Samples	>5000 mg/dL
Acetaminophen	>8 mg/dL
Uric Acid:	
Hypoglycemic range	>10 mg/dL
Euglycemic range	>12 mg/dL
Hyperglycemic range	>16 mg/dL

4. In situations of decreased peripheral blood flow, fingerstick blood testing may not be appropriate as it may not reflect the true physiological state. Examples would include but are not limited to: severe dehydration caused by diabetic ketoacidosis or the hyperglycemic hyperosmolar nonketotic state, hypotension, shock, or peripheral vascular disease.

D. Operator Certification/Recertification Policies:

1. Only personnel whose certification and competency can be tracked in the Laboratory glucose database are permitted to perform patient testing independently. Agency nurses may perform CBG testing after obtaining computer access and CBG certification. Student nurses may perform CBG testing under their own access if they have computer (VistA) access and have been certified for CBG testing.
2. Operators must maintain certification to perform glucose testing and be proficient in the use of the Accu-Chek Inform™ System. Employees authorized to perform glucose testing after completing the certification process include: RNs, LPNs, NAs, SNTs, MAs, Student Nurses, NPs, CNSs, MDs, Health Techs, and Clinical Pharmacists.
3. An Accu-Chek Inform™ System Instructors must be certified by the Glucose Testing Nursing Site Coordinator(s) based on demonstrated advanced knowledge of the testing system, CAP standards, and observation of performance as an Accu-Chek Inform™ System trainer.
4. Initial certification and training records will be maintained on the nursing unit. Initial certification is limited to a six-month period, annually thereafter.
5. To become a certified operator of the Accu-Chek Inform™ System, each operator will demonstrate the following:
 - a. Achievement of the knowledge and skills to perform blood glucose testing as defined in this policy/procedure. The operator is required to pass a knowledge test based on the content of this policy/procedure with a score of at least 90%.
 - b. Achieve a PASS on a complete QC routine.
 - c. Be observed by a certified trainer performing a patient test, which includes obtaining the specimen. (Employee testing of self or other employees for training is not acceptable.) Trainees should refer to the step-by-step instructions for obtaining a [patient blood droplet as indicated in this procedure](#).
 - d. Each operator must successfully complete the [attached knowledge and skills checklist to be certified](#) to perform blood glucose testing using this equipment.

- e. A copy of the initial certification checklist must be forwarded to the Glucose Testing Nursing Site Coordinator(s). The original stays in the employee competency folder.
- f. The meter will not allow a new operator access to perform testing until the certification information has been entered into the Lab Information Management System.
6. Recertification requires the following:
 - a. A passing score on the knowledge-based test,
 - b. Observation of testing performance by a Certified Trainer.
 - c. Perform a successful QC routine (both levels of controls) after the first six months of certification and at least annually thereafter. (Ongoing certification is automatically tracked via the Lab Information System, which updates recertification following a successful QC routine).
 - d. Meters will not work for the operator after certification has expired.
7. Each operator will also be assessed for ongoing competency based on
 - a. Monthly unit-based review of quality control and statistical reports,
 - b. Triennial proficiency testing of a randomly selected certified staff member, and
 - c. Individualized findings from ongoing review of flagged results and errors by the Glucose Testing Nursing Site Coordinator(s).

E. Quality Control Testing Policies

Quality control testing validates the integrity of the strips, the correct coding and calibration of the meter, and operator technique. Therefore, it should be done on a routine basis and whenever there is a change in the meter, strips or when there are questionable test results. The meter will alert the user when the QC testing is due. If QC is not performed, the meter will lock-out further patient testing until QC is performed.

1. Low (level 1) and high (level 2) control tests are performed each day the meter will be in use, or, in areas with infrequent use, prior to patient testing, and in the following situations:
 - Each time a new vial of test strips is opened
 - When a vial of strips has been left opened more than 60 seconds
 - If the Accu-Chek Inform™ System has been dropped
 - When test results contradict clinical symptoms
 - After the battery in the Accu-Chek Inform™ System has been replaced, or
 - After the Accu-Chek Inform™ System has been recoded.
2. Patient testing may only proceed when quality control results are within the acceptable control range. This is indicated as PASS or FAIL. If the QC results FAIL, the problem must be corrected before any patient testing.
3. The corrective actions taken to restore failed QC results to acceptable range (PASS) must be recorded using comment codes. Quality control comment codes may be free text or may be chosen from the following:

Quality Control Comment Codes			
Acceptable QC	Will Repeat Test	Ran Wrong Control	Operator Error
New Strip Lot	New Test Strips	New QC Solutions	(Or use free text)

4. If problem persists, call Accu-Chek Customer Care at 1-800-440-3638. This number is available 24 hours per day, 7 days per week..
5. Glucose control solutions must be stored at room temperature. Glucose control solutions are stable for three months after opening or until the expiration date, whichever comes first. The discard date should be written on the vial label.
6. Test strips should remain in the tightly sealed vial. Test strips remain stable for CBG testing for only 30 – 60 seconds after removal from the vial.
7. The Ancillary Testing Coordinator (LAB) will review QC on a weekly basis, prepare monthly QC and error reports for each testing site, and notify the Glucose Testing Nursing Site Coordinator(s) when corrective action is needed for identified problems..

8. Each clinical testing area will designate an individual for oversight of performance quality related to glucose testing. This includes checking dating of control solutions, expiration dates of control solutions, operator certification/recertification, review of QC results and monthly error reports, as well as acting on QC results which identify trends that may indicate potential problems. These trends include acting on the analysis and recommendations for each site in the monthly QC reports.

F. Expected Values

1. The normal fasting blood glucose range for a non-diabetic adult is 70-110 mg/dL.⁴
2. One to two hours after meals, normal blood glucose levels for a non-diabetic adult should be less than 145 mg/dL. The recommended level for a diabetic patient is a peak postprandial glucose less than 180 mg/dL. Peak levels may be somewhat higher sooner and also somewhat higher with older patients.

G. Critical Values

If a whole blood glucose value is **less than 60 mg/dL or greater than 500 mg/dL**, the operator will:

- a. repeat the test with a new strip,
- b. if result is still in critical value range and unexpected, acute care areas must collect a specimen and order a stat glucose to be performed in the laboratory,
- c. notify the provider of a high or low glucose critical value as measured by the glucometer, and
- d. document the event using the glucometer comment code(s).

H. Specimen Collection and Handling *(Refer to the test strip package insert for the most current Information)*

1. Capillary, venous and arterial whole blood specimens may be used for testing on the Accu-Chek Inform™ System with Accu-Chek Comfort Curve test strips. Do not use serum or plasma.
2. The capillary fingertip sample must be tested immediately after collection. Sufficient sample size is required to ensure accurate results.
3. Venous and Arterial specimens: Blood glucose determinations using venous and arterial blood specimens should be performed within 30 minutes of specimen collection to avoid glycolysis. Mix samples thoroughly.
 - For best results with arterial and venous blood, heparin and EDTA are the recommended anticoagulants/preservatives.
 - Serum separator tubes and red-topped tubes are acceptable if blood is used immediately before the clotting process begins.
 - Iodoacetate or fluoride/oxalate should not be used as a preservative.
 - Caution should be taken to clear arterial lines before blood is drawn and dosed on the test strip.

I. Patient Testing Policies

1. Blood glucose tests must be ordered by a provider unless the patient is experiencing symptoms of hypoglycemia or hyperglycemia, and quality care dictates a STAT test. Each test result is uploaded to CPRS from the meter and will be processed by the software as a new “policy” order.
2. The operator must view the patient’s hospital wristband, veterans’ ID card, or drivers license and ask the patient to state his/her name and social security number, and/or compare any photo identification to the patient and his/her CPRS photo, if available.
3. Have patient wash hands with warm water and soap and dry thoroughly. If patient is unable to wash, cleanse the puncture site (the side of the fingertip) with an alcohol swab and allow it to thoroughly dry. Alcohol at the puncture site must be dry or an error code/inaccurate result may occur.
4. A bar code scanner is used to enter patient ID and/or operator ID in the Accu-Chek Inform™ System. Manual input should be used only in situations where scanning is not available or not feasible. Manual entry causes frequent errors and will be tracked.
5. Testing should be performed on patients only. Employee self-testing is not appropriate. Employee testing of other employees, visitors and/or non-patients is also inappropriate, including the use of own blood sample(s) or those of other employees’ as part of glucose testing training. Employees not feeling well should go to Occupational Health or the Emergency **Care Unit** for evaluation instead.
6. Any employee receiving verbal or telephone communication of any testing results, especially critical values, should write down the result and confirm it by reading it back to the person giving the result.
7. For ECU only, an emergency situation may necessitate running a patient test without the patient’s SSN, if not immediately available. The ECU will use patient ID #“00000911” plus the user’s operator ID. Test results including date, time, and operator must be manually documented into the progress notes of the medical record when this occurs, since these results cannot be uploaded to CPRS. ECU will provide patient information on each use of the “911” patient ID to the glucose POC Coordinator(s) for reconciliation.
8. All patient results obtained by non-RN staff will be communicated to the RN. Critical values as well as unexpected results must be reported immediately.

J. Infection Control Guidelines

1. Standard precautions are required during patient testing, for handling blood-contaminated lancets and/or tests strips, and for cleaning the meter. Disposable gloves must be used.
2. The Accu-Chek Inform™ meter must be disinfected if contaminated with blood.
3. Lancet devices will be utilized with disposable tips. Used lancet tips will be discarded in sharps containers. Tips will be changed between patients.
4. The lancet device will be disinfected if it is contaminated with blood.
5. To guard against accidental needlesticks, tips are removed from the lancet device after each use and are not replaced until the next fingerstick is to be performed. This allows anyone, anytime to determine whether the device is loaded with a lancet.
6. Used test strips and gloves used for glucose testing may be discarded in regular trash containers.
7. For patients in Contact isolation, place meter in a sealed biohazard bag or clear plastic bag . Pierce a small hole in the bag for the strip guide area of the meter. After performing testing, remove and dispose of test strip and bag in the room. Outside the room, wipe down the meter (See Cleaning Procedure for the Meter on pg 11) and wash hands.

K. Documentation of Blood Glucose Result

The test results are electronically uploaded to CPRS/VISTA to the Lab results. This is the official documentation of the result. Frequent data uploads are required to maintain current results in the official electronic record. Use comment codes (scan or enter code numbers as needed to document problems, maintenance, clinical status such as fasting state, or other pertinent information to interpret results.

L. Downtime Process for Glucose Testing

In the event of downtime related to network failure or inability to upload data to CPRS/VISTA, glucose testing information may be recalled from each meter for up to 10 days or 4000 tests, whichever occurs first. The procedures to recall tests from meter memory for a group of patients or a single patient are described below:

M. Meter Repair/Troubleshooting

1. Prior to exchanging any meter, the following steps must be taken. Call Roche Tech Support line at 1-800-440-3638 for 24 hour troubleshooting assistance. If the meter will not work at all, or will display a blank screen. In this case, the user should reset the meter as described on page 9 (Error Codes.)
2. If staff are unable to correct a problem with the Accu-Chek Inform™ System, it is removed from service and sent to the Lab for repair/replacement. *The Accu-Chek Inform™ System must be cleaned and disinfected before it is sent out for repair or replacement.*
3. Meters will lock-out if the battery has not been recharged in the cradle within 48 hours.

PART II: Procedures for Use of the Accu-Chek Inform Meter

A. Coding (Calibration/Recalibration)

1. **Calibration:** Coding is always verified by matching the code on the Accu-Chek Inform™ display screen with the code number printed on the side of the vial of test strips. The meter is “calibrated” when the instrument is turned on with the Code Key inserted. It is recommended that the Code Key be changed with each new vial of test strips.
 - a. Remove the Code Key from the test strip box.
 - b. Compare the three-digit number on the Code Key with the number on the test strip vial.
 - c. Remove old Code Key from Accu-Chek Inform™ meter, if necessary and discard.
 - d. Snap the new Code Key (slots facing towards the meter) into the Code Key slot with the printed side facing up.
 - e. Leave the Code Key in the meter.
 - f. With each new vial of test strips, switch to the new Code Key.
2. **Recalibration:** If the test strip code displayed by the Accu-Chek Inform™ System does not match the code of the test strips in use, the meter must be recoded (recalibrated) and the new code information must be entered in the Accu-Chek Inform™ System. This may occur with patient testing or during quality control testing. If this occurs, place the correct code key into the meter according to the Calibration instructions above. In some cases, there could be a new lot of strips released for the meters, and if the meter has not been recently uploaded, this information will not be present. Simply re-dock the meter into the cradle to be certain the meter has the most recent information.

B. Test Strip Storage and Handling (*obtain strips from Pharmacy*)

1. Test strips must be stored at room temperature. Do not freeze.
2. Test strips are stored in the same tightly capped vial in which they are packaged. The vial cap must be immediately replaced after removal of a test strip. Strips should be used within 30-60 seconds after taking them out of the vial.
3. Test strips may be used until the expiration date on the vial.

C. Patient Preparation

1. The following items should be gathered and taken to the patient’s bedside: (*test strips and control solutions are available from Pharmacy*)
 - Accu-Chek Inform™ System and Accu-Chek Comfort Curve test strips.
 - Glucolet2 automatic lancing device and disposable fingerstick lancet
 - Alcohol swab
 - Cotton ball, tissue, or gauze for wiping finger after stick
 - Disposable gloves

2. Identify the correct patient to be tested using two methods. ([See page 6 Patient Testing policy.](#))
3. Assure that the skin at the site (fingerstick or earlobe) has been cleansed according to policy ([See Clinical Indications page 2, #4.](#))

D. Patient Testing Procedure

1. Standard precautions must be observed. Put on protective gloves.
2. Prepare Glucolet2 automatic lancing device by pressing the clean plastic plunger on a flat surface until a "click" sounds, then load fingerstick lancet onto Glucolet2 and twist off protective lancet cap with a twisting motion.
3. Press power ON button.
4. Scan (or enter) your operator ID. (If operator is not certified or certification has expired, the Operator ID will not work and meter cannot be used.) Press the forward arrow button. If the barcode is not available to scan, enter your assigned operator ID#. Press ENTER. (Note: The operator's DUZ (VISTA user identifier) number is used for this application.
5. Select Patient Test.
6. Scan (or enter) the patient ID. Press the forward arrow button. If patient barcode (wristband or Veterans' ID card) is not available, use full 9 digit SS#. (Be sure to enter the patient ID BEFORE scanning the test strip vial. This is a frequent error.)
7. Verify the correct test strip lot number by scanning the vial or by entering YES/NO response to menu screen. (Code key must match test strip code or meter will not work.) ([See Recalibration on page 3.](#))
8. For a capillary specimen, hang the patient's arm in a dependent position for 30 seconds to increase blood flow to fingertips.
9. When the flashing strip icon appears on the meter display, gently insert test strip with the yellow target area or test strip window facing up. (Insert the end with the silver bars.)
10. Note: Insert test strip BEFORE dosing with blood.
11. When the flashing drop icon appears on the monitor display, obtain a blood sample. You may use a whole blood capillary, venous, or arterial sample.
12. Perform the finger puncture by positioning the loaded Glucolet2 on the side of the patient's fingertip and press the blue release button. (The needle advances, penetrates skin, and instantly retracts.) Gently squeeze until a small drop of blood rests on the patient's finger. (Not a hanging drop.)
 - Touch and hold the drop of blood to the edge of the yellow window and blood will be drawn into the strip. Fill the yellow window completely. Visually inspect to be sure yellow area is covered completely. If any yellow color is seen, more blood may be added within 15 seconds of the first drop.
 - If more than 15 seconds have passed, the test result may be erroneous, and you should discard the test strip and repeat the test.
13. An hourglass will appear on the display while waiting for the result. (Usually about 26 seconds.)
14. Each patient result must include at least one comment code, i.e. OK to Chart, if applicable, as a minimum. Select up to three preprogrammed comments and one custom comment based on results. After selecting comments, press the forward arrow button to record the test result and again to return to the Main Menu screen. Standard comment codes include:

Patient Testing Comment Codes			
OK to Chart	Request Lab Draw	Non-patient Test	Error Do Not Chart
Notify Provider	Will Repeat Test	Fasting	Proficiency Test
Notify RN	Repeated Test	MD Aware of Result	Will give insulin
Asymptomatic	Unexpected Result	Ate within 2 hours	Hypoglycemia Protocol
Symptomatic	Expected Result	Insulin Protocol	(Or use free text)

15. Remove the test strip from the meter and discard it in regular trash.
16. Discard the used lancet in a biohazard sharps container.
17. Press the purple POWER button to turn the Accu-Chek Inform™ System off.
18. Remove gloves and dispose of them in regular trash. Wash hands thoroughly with soap and water.
19. Replace the meter in its cradle (making sure it is OFF) as soon as possible after testing or after using for multiple patients to upload the results to CPRS. This will make the data immediately available to the providers within CPRS.

E. Error Codes/Messages

If the Accu-Chek Inform™ System displays anything other than a numerical blood glucose result, troubleshoot the results using the table below:

Error Code/Message	Interpretation	Operator Action(s)
HI	Test result may be higher than the reading range of the meter.	If result contradicts patient's condition, perform QC (quality control) test with QC solution and a new test strip. If QC is in acceptable range, repeat the patient test with a new test strip. If patient test still HI, report to physician and verify result with a Lab test. If control result is not within acceptable range, do not perform any further patient testing with that meter.
Testing error-133 A glucose overflow error has occurred, type 71	Test result may be extremely high and above the meter's reading range.	(Same as above) If this result contradicts the patient's condition, perform a QC test with QC solution and a new test strip. If the QC is in acceptable range, repeat the patient test with a new test strip. If patient test still HI, report to physician and verify result with a Lab test. If the control result is not within acceptable range, do not perform any further patient testing with that meter.
LO	Test result may be lower than the reading range of the meter.	(Same as above.) If this result contradicts the patient's condition, perform a QC (quality control) test with QC solution and a new test strip. If the QC is in acceptable range, repeat the patient test with a new test strip. If patient test still LO, report to physician and verify result with a Lab test. If the control result is not within acceptable range, do not perform any further patient testing with that meter.
Strip Defect	Test strip may be damaged or the test was not performed correctly.	The test strip should be inserted into the meter prior to applying blood to the test strip. If this display appears <i>before</i> blood is placed on the strip, remove the test strip and reinsert. If the error display remains, repeat the test with a new strip.
Error 88-Bad Dose	Incorrect amount of blood on the strip.	A second drop of blood may be applied to the test strip within 15 seconds of the first drop. If more than 15 seconds have passed, the test result may be erroneous. Discard test strip and repeat the test.
Fatal Alert Memory mgr_e line 4340 Null Handle	Reset the meter.	Reset the Inform meter by pressing the reset button on the lower right side of the back of the meter with the tip of a paperclip. (See reset button on picture at bottom of page 14).
Error-83	Bad strip or extremely low result	The test strips may be defective or the blood glucose result may be extremely low and below the meter's

Error Code/Message	Interpretation	Operator Action(s)
		reading range. Refer to the test strip package insert, perform a QC test using a new test strip, review proper testing procedure, and repeat the patient test or obtain a lab draw.
Meter will not come on (blank screen) when power button is pressed.	Reset the meter.	Reset the Inform meter by pressing the reset button on the lower right side of the back of the meter with the tip of a paperclip. (See reset button on picture at bottom of page 14)

F. Recalling Testing Information From Meter Memory

1. Press power ON button.
2. Press MENU.
3. To review multi-patient results, select REVIEW RESULTS on the Main Menu screen to review the most recent results.
4. Press the up and down arrow keys to display various test results for multiple patients.
5. For a single patient, select PATIENT to specify a single patient whose results you want to see.
6. Scan (or enter) the patient ID for desired patient.
7. Press up and down arrows to review all of that patient's results.
8. Select ALL to return to viewing all patients' results.
9. Select QC to review QC results.

G. Quality Control Procedure

1. Put on disposable gloves.
2. Press power ON button.
3. Scan (or enter) your operator ID, then press the forward arrow button.
4. Select Control Test.
5. Scan the bar code for either one of the control solutions bottles: Level 1 (Low) or Level 2 (High).
6. Scan the test strip vial barcode.
7. Remove a test strip from the vial and replace the vial cap immediately.
8. When the flashing strip icon appears on the meter display, gently insert test strip with the yellow target area or test window facing up. (Insert the end with the silver bars.)
- Note:** Insert test strip **BEFORE** dosing.
9. Using the Accu-Chek Comfort Curve test strip, touch and hold drop of control solution to the curved edge of the yellow target area. The glucose control solution is drawn into the test strip automatically.
10. An hourglass will be displayed on the Accu-Chek Inform™ meter while waiting for the result.
11. Enter the appropriate comment(s), if needed. Then press the forward arrow button to record the test and then once again to test the second control solution or to proceed to patient testing. For the second control level, repeat steps 5 – 10 above.
12. Remove the used test strip(s) and disposable gloves and discard.

H. Linearity Testing: (Performed by Lab Only) Linearity testing is performed by the Ancillary Testing Coordinator/designee as follows:

- Before a blood glucose meter is put into use
- Anytime the Accu-Chek Inform™ System has been repaired
- Reagent reliability is checked prior to release of a new lot of test strips
- When controls begin to reflect an unusual trend or are consistently out of range
- Calibration verification is performed every 6 months
- The reportable range of each instrument is verified.
- The linear reporting range of each Accu-Chek Inform™ System is 30 mg/dL to 500 mg/dL.

- If a patient test result falls outside of the linear range, it is verified by the laboratory by an alternative method and is reported as less than (<) or greater than (>) the linear limits.
- The linearity results of each Accu-Chek Inform™ System are recorded and retained for meter linearity for the life of the meter and strip linearity records for 2 years.

I. Proficiency Testing

1. Randomly selected operators will be requested to run tests on five unknown samples according to the College of American Pathology (CAP) proficiency testing methodology to verify meter accuracy and operator competency.
2. Proficiency testing is performed three times per year at every testing site by a certified operator.
3. The test sample may be a blood product or derivative, therefore standard precautions, including glove use must be observed.
4. The procedure for proficiency testing is nearly identical to patient testing, except that the operator must go to the Main Menu after scanning in Operator ID, press the ARROW for “MORE OPTIONS” and then select “Proficiency”. (This will permit the user to scan or enter the SAMPLE ID instead of a patient ID.) Press the forward arrow button to return to the “Main Menu 2” screen to run the next sample. A Laboratory person will assist testing sites with proficiency testing meter menus.

J. Transferring Data from the Accu-Chek Inform™ System

1. Data is transferred from an Accu-Chek Inform™ System to a computer with specialized software immediately upon docking the meter in the base unit. Assuring prompt and ongoing data transfer is the responsibility of every certified operator. When not in use, leave the meter in the cradle to recharge.
2. The meter will retain testing data after an upload has been done to permit users to recall patient data from meter memory for 10 days before the data is automatically cleared.
3. To transfer data from an Accu-Chek Inform™ System, replace meter firmly into docking station cradle. Data will automatically upload to CPRS/VISTA. Two-way information exchange from the meter to the Lab occurs every 10 minutes while the meter is docked in the cradle. (Assure that all the wire connections to and from the cradle are properly plugged in and that the green indicator light on the cradle is on.)

K. Cleaning Procedure for the Meter

1. Cleaning is NOT required for meter accuracy, etc. However, the outside surfaces and communication window of the Accu-Chek Inform™ System meter should be cleaned as needed using a soft cloth slightly dampened with 70% isopropyl alcohol. Do NOT get wet or get moisture into the meter test strip guide.
2. Protective gloves are worn when performing preventive maintenance and cleaning on the GTS and blood glucose testing equipment.
3. Cleaning of the meter and battery changes should be documented in the Maintenance section of the meter by comment codes. On the Main Menu, press the ARROW for “MORE OPTIONS” then MAINTENANCE, and choose comments from those listed below. Press the ARROW to record comments, and then press ARROW 3 more times after comment selection to get back to Main Menu.

Comment Codes for Cleaning/Meter Maintenance		
New test strips	Meter cleaned	Meter inspected
New QC solutions	Called Tech Support #	New firmware

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ATTACHMENTS: ["Accu-Chek Inform™ Operator Certification Checklist"](#)
[Pictures of Accu-Chek Inform System](#)

DOCUMENT REVIEWED/REVISED BY: Nadine Johnson, MSN, RN, CPHQ and Brent Stevens, BA, RN

APPROVED BY: Clinical Practice Committee/Nursing Professional Council

REVIEW DATE: September 2008

RESCISSION: September 2007, same title

REVIEWED/APPROVED: *(Electronic concurrence(s) and/or signed original are on file in the Office of Nursing Professional Services.)*

Michael Nichols, MD
Chief, Pathology and Laboratory Medicine Services

Kathleen M. Chapman, MSN, RN, CNAA, FACHE
Deputy Director Patient Care Services

Accu-Chek Inform™ System**OPERATOR CERTIFICATION CHECKLIST****Unit:** _____

Certified Trainer: Complete one Checklist for each operator-trainee. The student must meet objectives below.

Trainee has read **PART I** of the PVAMC (Nursing) procedure on CBG testing. _____**Trainee Signature****1. KNOWLEDGE-BASED TEST**

- ☐ Passed test with score of at least 90%
- ☐ Retake test for score below 90%

2. TRAINEE IS ABLE TO:

a. Accu-Chek Inform™ System

☐ Identify Meter Features - (QC Mode, Testing Mode, Forward button, Backlight, On/Off, RESET button)

☐ Demonstrate calibrating or recoding the meter.

b. Test Strips (bar codes)

☐ Identify the lot # code on vial

☐ Verbalizes strip vial storage: closed container, length of time stable outside vial, and expiration date

4. DEMONSTRATES A COMPLETE QC ROUTINE WITH PASS RESULTSa. **Quality Control Testing**

☐ QC solutions, open date, expiration date (barcodes) Obtain from Pharmacy

☐ Bar code scan.

☐ Scans Operator ID

☐ Using Level 1 and 2 solution testing demonstration

☐ Glucose Control test skill demonstration by operator-trainee to preceptor, including comment codes

☐ Verbalizes policy on PRN and routine frequency of QC testing

☐ Employee has a working Operator ID barcode

QC Results

Low

HighWithin expected range? ☐ YES ☐ No**5. DEMONSTRATES PATIENT TESTING PROCEDURE**

☐ Demonstrates patient finger preparation for the test. (Preferably soap and water wash, or alcohol wipe, dried.)

☐ Demonstrate scanning operator ID

☐ Demonstrates scanning barcode of actual patient or "Ttest Patient" ID (Use Ttest, Andy, Ttest, Richard, etc.)

☐ Demonstrates scanning or Yes/No entry for correct strip lot verification

☐ Demonstrates use of correct location of fingertip for test. If actual patient or simulated test.

☐ Demonstrates correct application of blood to strip. Uses visual verification of correct dosing.

☐ Verbalizes policy for confirmation of results <60 or >500 mg/dl. for acute care and non-acute care.

☐ Demonstrates use of appropriate comment codes, notifications of MD/RN, and patient management

considerations for critical results.

☐ Demonstrates cradling meter for data uploading

Actual or Simulated Patient Results _____ Skills demonstrated satisfactorily? ☐ YES

☐ No

5. VERBALIZES KNOWLEDGE OF CRITICAL CBG TESTING INFORMATION:

a. ☐ How/where to find the "Blood Glucose Point of Care Testing Using Accu-Chek Inform™ System" procedure.

b. Knowledge of PVAMC Nursing Procedure

☐ Test Range (10 - 600mg/dl) Understands implications of accuracy limitations of results at both extremes.

☐ Infection Control Procedure (Lancets, used strips, isolation, cleaning meters)

☐ Resetting meter. Procedure for meter malfunction and exchange/battery replacement

☐ Labeling discard date QC Solution policy (expiration 3 months after open date)

☐ Call Accu-Chek Customer Care at 1-800-440-3638 for help troubleshooting (available 24/7)

Operator Certified ☐ YES

☐ NO

Instructor Name

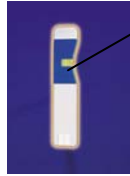
Date

Operator-Trainee Name

*Notify Nadine Johnson, Yen Trieu or Brent Stevens of new certifications by e-mail. Include name, date and unit.

**Unit is responsible to enter education into TEMPO. Maintain completed form in competency folder, copy/fax to Yen Trieu
P2NPS

ACCU-CHEK INFORM SYSTEM



Comfort Curve strip
doses from side and pulls
the sample into the strip.
Use the yellow pad as a
visual for adequate
sample. You can re-dose
strip within 15 seconds.

TEST STRIP PORT

TOUCH SCREEN

Use this area to enter data,
answer prompts and
observe results from a test
or control.

MENU BUTTON

Use this to go to the
Main menu screen at
any time.

FORWARD ARROW

Use this button to move to the
next screen.

BACK LIGHT

Turn on or off.

POWER ON/OFF

Turn meter off prior to
returning to base unit.

When removing from

CODE KEY

BASE UNIT

Meter home to
charge and

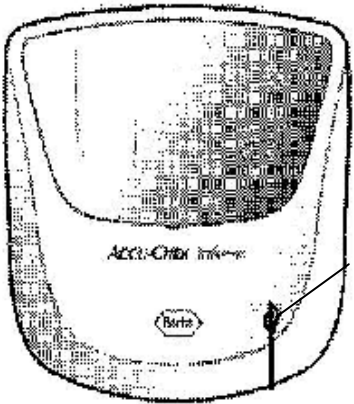


**BAR CODE
SCANNER**

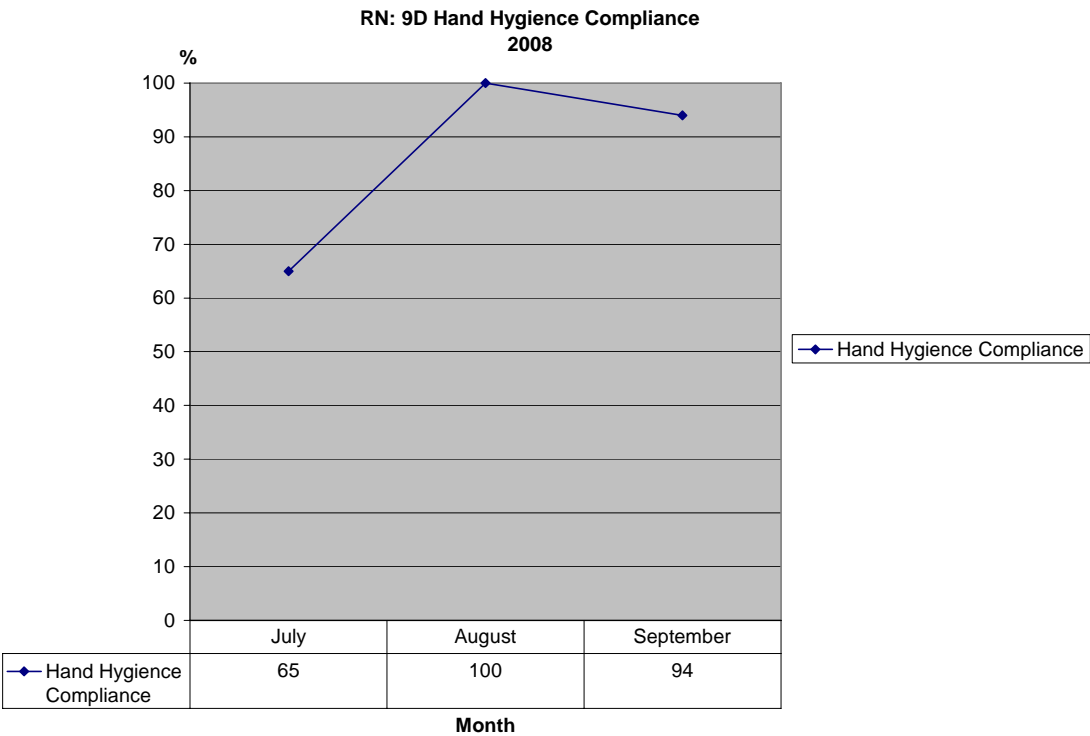
RESET

Push to reset
meter when
necessary.

**POWER
INDICATOR**
Green light on.



Appendix F. Nursing Sensitive Outcome Data Graphic Presentation



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Running head: IMPROVING GLYCEMIC OUTCOMES

Improving Glycemic Outcomes
Through Facilitation at the Point of Care
Christy Locke
Oregon Health and Science University
School of Nursing

Introduction

Achieving quality and excellence are not new concepts to healthcare. In 1999, the Institute of Medicine (IOM) released the landmark report “To Err is Human: Building a Safer Health System” that launched the national patient safety and quality movement that continues today (Institute of Medicine of the National Academies, 1999). In 2001, the IOM released a second report, “Crossing the Quality Chasm: A New Health System for the 21st Century” citing the inability to translate knowledge into the practice environment as a substantial obstacle to achieving quality health care (Institute of Medicine of the National Academies, 2001). In 2003, a third report, “Keeping Patients Safe: Transforming the Work Environment of Nurses,” was released. This report recommends several patient safeguards to make the workplace more conducive to patient safety. One of several recommendations is to provide Registered Nurses (RNs) with decision support at the point of care (Institute of Medicine of the National Academies, 2003).

In addition to the work of IOM, the National Quality Forum (NQF) has developed a set of safe practices designed to reduce the risk of harm to patients. In 2003, the first set of 30 NQF endorsed practices was released. Health care organizations were encouraged to implement the practices as they reflect the current evidence base and were expected to improve the quality of care (National Quality, n.d.). The practices were updated in 2006 and again in 2009. The NQF states the 34 practices included in the 2009 update have been shown to improve health care outcomes (National Quality, 2009).

Another national-level effort to improve the quality of health care is the Deficit Reduction Act (DRA) of 2005. The DRA stipulated that the Centers for Medicare and Medicaid Services (CMS) implement the Hospital-Acquired Conditions and Present on

Admission Indicator Reporting program (U.S. Department of Health and Human Services, 2007). This program required CMS to select several conditions which they deemed preventable and reduce payments for these conditions if presence on admission is not documented (Patel, n.d.). The effective date of the implementation was October 1, 2008 and the program reduced payment for 10 hospital acquired conditions during the first year (U.S. Department of Health and Human Services, 2007).

Evidence based practice (EBP) is a recognized approach to provide high quality patient care (Melynck & Fineout-Overhold, 2005). EBP is defined as “the conscientious use of the current best evidence in making decisions about patient care” (Melynck & Fineout-Overhold, 2005, pg 6). The EBP movement which became active in the mid-1990s continues to gain momentum because it has been demonstrated that evidence based care leads to better outcomes than traditional care (Melynck, Fineout-Overhold, Stetler, & Allan, 2005; Stetler, 2004). Nonetheless, barriers to the implementation of EBP techniques within nursing continue to interfere with the achievement of desired health outcomes (Melynck et al., 2005).

Problem

Glycemic control refers to maintaining blood glucose within a predefined target range. Glycemic control in the acute care setting can be evaluated by episodes of hypo and hyperglycemia using capillary blood glucose or serum glucose values. This differs from evaluating glycemic control in the outpatient setting where glycosolated hemoglobin is used as a marker of glycemic control (Goldberg et al., 2006).

The issue of glycemic control is important as 17.5 million people in the United States have been diagnosed with diabetes and it is estimated that 2.2% of the population

has undiagnosed diabetes. Of those with diabetes, half utilize medical insurance provided by the government; this includes Veterans (American Diabetes, 2008b). In 2002, diabetes was reported as the third most common diagnosis for a Veteran and accounted for 1.7 million hospital days of care (Reiber, Koepsell, Maynard, Haas, & Boyko, 2004). In general, patients with diabetes have a higher use of inpatient services and are at higher risk for a variety of complications including infection and cardiovascular events (American Diabetes, 2008b). The American Diabetes Association (2008b) estimates that annually 22% of the 186 million inpatient hospital days are incurred by those with diabetes and 13% of the days are attributed directly to diabetes. The average cost of one inpatient hospital day is \$1,853 (American Diabetes, 2008b).

The estimates provided by the ADA highlight the need for interventions nationally to address the economic burden related to diabetes. Within the Veterans Administration (VA) system there is an even larger need as Reiber et al. (2004) reported a higher prevalence of diabetes in the veteran population (16%) than the non-veteran population (6.2%). This identified disparity places an even larger economic burden on the VA system.

The Joint Commission, in collaboration with the ADA, also recognizes the importance of glycemic control and offers the Certificate of Distinction for Inpatient Diabetes Care. This disease-specific certification recognizes “hospitals that make exceptional efforts to foster better outcomes across all inpatient settings” (The Joint, n.d.).

The NQF in the 2009 Safe Healthcare Practices Update includes glycemic control as a practice that is expected to reduce the risk of patient harm. The consensus statement

recommends organizations take actions that will improve glycemic control. Some of the recommended actions include tracking glucose data and implementing evidence based practices.

The CMS also recognizes glycemic control as an important clinical measure. The CMS as part of the Hospital Acquired Conditions and Present on Admission program has selected manifestations of poor glycemic control as one of 10 initial categories (Centers, 2008). The program calls for a reduction in reimbursement for hospital acquired diabetic ketoacidosis, nonketotic hyperosmolar coma, hypoglycemic coma, secondary diabetes with ketoacidosis, and secondary diabetes with hyperosmolarity all considered manifestation of poor glycemic control (Centers, 2008). This change does not have a direct impact on the VA system as the Department of Veterans Affairs does not receive CMS reimbursement; however it is expected that secondary insurance companies will adopt similar programs from which the VA does receive reimbursement.

In 2006, Goldberg et al. tested three analytical models to standardize the collection and analysis of glycemic control data in the inpatient setting. They called the models glucometrics. The Society of Hospital Medicine (n.d.) defines glucometrics as the systematic analysis of blood glucose data. The three models tested by Goldberg et al. (2007) were population (all glucose values), patient day (all values per patient per day), and patient (all values per patient per hospital stay). Using the work of Goldberg et al. (2007) the Society of Hospital Medicine published “practical recommendations” to evaluate glycemic control using the three units of analysis. Application of these standardized methods supports internal trending, benchmarking and quality improvement efforts.

Glycemic control was particularly suitable for a DNP clinical inquiry because the outcome is responsive to nursing intervention. Within the clinical site nursing staff performed point of care glucose testing and nurse driven treatment protocols were used to manage insulin infusions and to treat hypoglycemia.

Purpose

The focus of this clinical inquiry was to promote EBP through the development of a Clinical Nurse Specialist (CNS) facilitation intervention. CNSs can serve as change agents in reducing barriers to evidence based practice. The CNS role is recognized for its ability to advance nursing practice through the infusion of evidence-based nursing at the system level and by facilitating the use of evidence based care to improve patient outcomes (National, 2004). When RNs, through CNS facilitation, acknowledge, integrate, and act upon patient specific outcome data at the point of care, it was expected to improve patient care outcomes. This clinical inquiry project was conducted with RNs on two acute care units of a Magnet® designated VA hospital.

The purpose of this clinical inquiry project was to test the effect of a CNS facilitation intervention designed to improve glycemic control in the acute care setting. This was accomplished in two phases. During phase one the CNS facilitation intervention was developed, tested, and refined. During phase two one unit received the intervention.

This inquiry project was designed to answer the following questions:

- 1) Is there a difference in rates between nursing units where CNS facilitation specific to glycemic control was implemented versus usual care?
- 2) What are Registered Nurse perceptions of CNS facilitation?

Conceptual Framework

In 1998, Kitson, Harvey, and McCormack conceptualized the Promoting Action on Research Implementation in Health Services (PARIHS) framework. This conceptual framework describes the interplay and interdependence of three factors which influence the use of evidence in practice. These factors include: (a) nature of evidence, (b) context in which changes will occur, and (c) mechanisms of facilitation (Rycroft-Malone et al., 2002). In 2002, Rycroft-Malone et al. reformulated the PARIHS framework to expand the description of the nature of evidence to include research information, clinical expertise, and patient preference. This change ultimately acknowledged that there are different types of evidence needed in clinical situations in addition to randomized controlled trials (Doran & Sidani, 2007).

In 2007, Doran and Sidani proposed the Outcomes-Focused Knowledge Translation (OFKT) framework (see Figure 1). The OFKT framework is an adaptation of the PARIHS framework and was utilized in this clinical inquiry project. The framework was developed on the premise that patient outcome feedback is needed to continuously inform and improve nursing practice by supporting the uptake of evidence at the point of care. Uptake of evidence is defined as acknowledging, integrating, and taking action on feedback data, using practice guidelines, and other patient outcome specific evidence. Uptake is expected to improve when outcome feedback and advanced practice nurse facilitation are incorporated into the EBP process (Doran & Sidani, 2007). Knowledge translation within the framework is defined as deliberately using information to develop an intervention strategy to ensure that information is being utilized in current practice to reach a specified outcome in a target population (Doran & Sidani, 2007).

Doran and Sidani (2007) proposed this adaptation because they identified two gaps in the PARIHS framework. First, the framework did not define what indicators should be used for evaluating patient outcomes, and second, the framework did not suggest how feedback should be used to design and evaluate practice. In order to address the gaps, Doran and Sidani (2007) applied quality improvement methodology to the framework. In quality improvement, individuals review and modify work processes in an effort to improve performance, reduce cost, and optimize patient outcomes. This application of quality improvement resulted in the development of four patient outcome categories to address the identified gap related to outcome indicators. These include: (a) functional, (b) clinical, (c) satisfaction, and (d) cost of care. Quality improvement methodology also contains a feedback mechanism to support continuous improvement. Facilitation, defined as training and coaching, by an advanced practice nurse is the mechanism applied to the OFKT framework to promote the use of feedback to design and evaluate practice (Doran & Sidani, 2007). Doran and Sidani (2007) viewed that CNS facilitated outcome review would support continuous improvement.

Doran and Sidani (2007) apply the framework specifically to nursing by incorporating nursing interventions and nursing sensitive patient outcomes. Nursing interventions are defined as any treatment, based on clinical judgment and knowledge that a RN performs to enhance patient outcomes. Nursing sensitive patient outcomes are defined as changes in patient outcomes that are responsive to nursing interventions (Doran & Sidani, 2007).

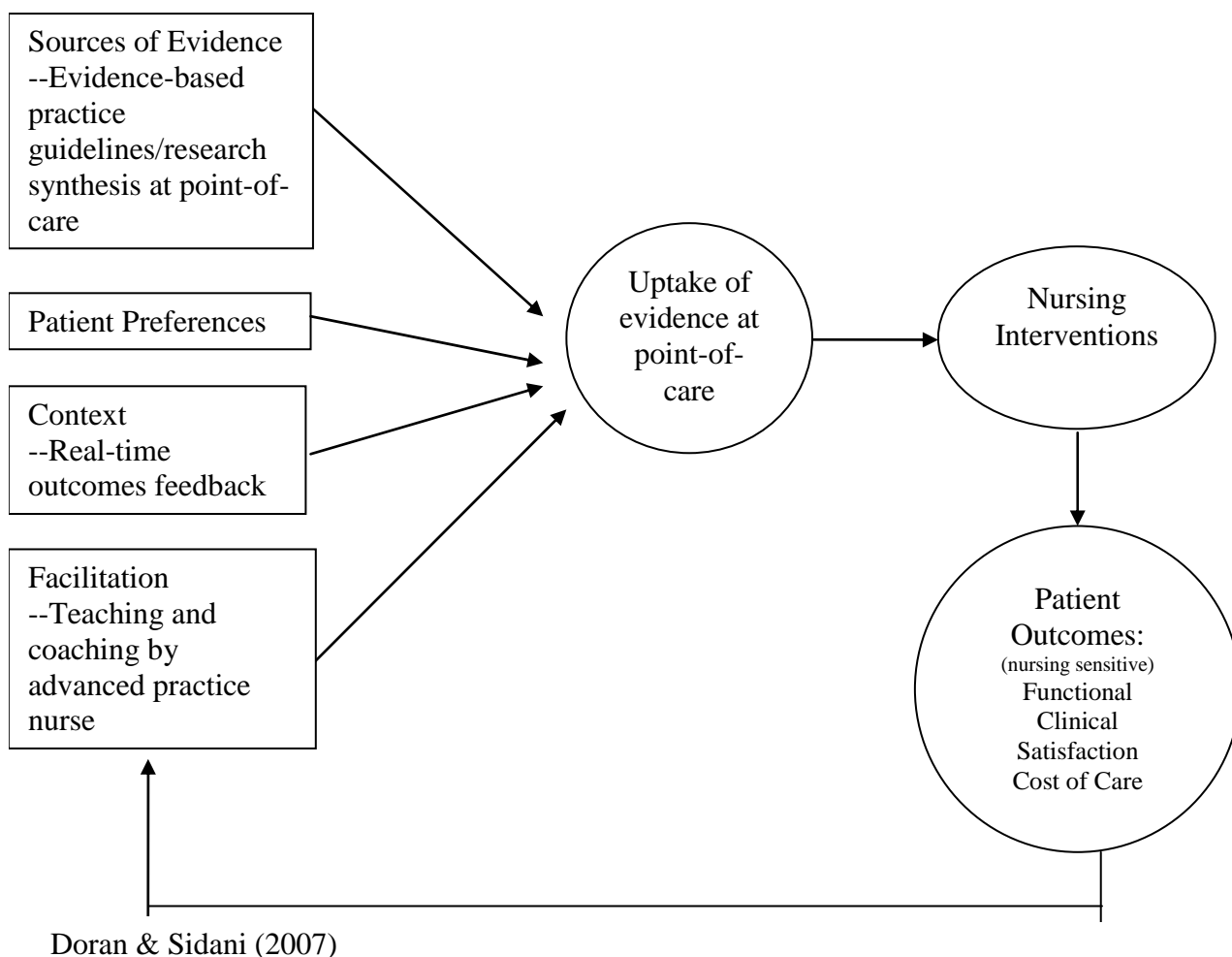
Review of Literature

The use of CNS facilitation to support the uptake of evidence at the point of care and to ultimately translate the evidence into evidence based nursing interventions that improve patient outcomes was the focus of this clinical inquiry.

OFKT Framework

The Outcomes-Focused Knowledge Translation framework was introduced in 2007. As a result, there are no published evaluations. The framework is considered by Doran and Sidani (2007) to be an operationalization of the PARIHS framework elements. The PARIHS framework has undergone some initial testing which led Kitson et al. (2008) to conclude that the framework is practical and useful. However, Kitson (2008) in a paper summarizing the framework's conceptual and theoretical phases of development acknowledges that the framework has not been sufficiently tested to develop a strong evidence base. Brown and McCormack (2005) in a review of the literature utilize the PARIHS framework to examine the framework's relevance to

Figure 1. Outcomes-focused knowledge translation framework



post operative pain assessment and management. The review consisted of 58 articles evaluating the three key constructs of the framework. Brown and McCormack (2005) conclude that it appears the constructs are beneficial to getting evidence into practice. This conclusion is consistent with Kitson (2008).

Feedback

In the OFKT framework, outcome feedback is one component which supports the uptake of evidence at the point of care. Outcome feedback is defined as “any summary of clinical performance of health care over a specified period of time” (Jamtvedt et al., 2008). This broad definition of feedback can be operationally applied as written, verbal

or electronic outcome feedback related to any quality indicator. Feedback, as part of the EBP process, is expected to provide RNs with the necessary knowledge to reflect on nursing practice, to demonstrate improvements in performance over time, and to reinforce EBP care (Doran & Sidani, 2007).

In a recent Cochrane review, Jamtvedt et al. (2008) examined the effectiveness of feedback. The 118 studies included underwent a quality assessment with 24 studies rated as high quality and most receiving a moderate quality rating. Three studies were conducted with nurses. The overall findings demonstrate the adjusted risk difference ranged from -0.16 to 0.70. This translates to a 16% decrease in improvement in intervention compliance between the control and intervention groups to a 70% increase in improvement in intervention compliance between the two groups. The authors conclude that implementation of a feedback intervention can be a useful strategy in improving care outcomes.

Facilitation

In the OFKT framework facilitation is identified as a component which supports the uptake of evidence at the point of care. Doran and Sidani (2007) define facilitation as a “technique by which one person helps others to understand what they have to change and how they change it to achieve desired outcomes.”

In 2002, Rycroft-Malone et al. conducted a systematic concept analysis to examine and provide conceptual clarity to the three main concepts of the PARIHS framework. Facilitation is one of the analyzed concepts. The analysis concluded that a facilitation technique that includes a combination of approaches is most effective and that the role of the facilitator is to help clinicians make sense of the evidence. In addition to

the conclusions, several key factors of the facilitation role emerged: 1) the role is about helping and enabling, not telling or persuading, 2) the role is appointed, and 3) the focus ranges from helping with tasks to enabling individuals to review their attitudes, skills, habits, and thinking patterns.

Uptake of Evidence

The OFKT framework suggests that there are four sources of information that influence the uptake of evidence at the point of care. These sources are: (a) evidence, (b) patient preferences, (c) outcome feedback, and (d) facilitation. For each source Doran and Sidani (2007) present a hypothesis describing its role in the uptake of evidence which ultimately leads to improved patient outcomes. The hypotheses are: (a) timely access to preprocessed resources (e.g. national guidelines) will improve uptake, (b) engaging patients in decision making by presenting alternative evidence-based treatment options will increase uptake of evidence, (c) nurses provided with patient outcome feedback will be motivated to reflect on their practice and seek evidence to fill in knowledge gaps, and (d) advanced practice nurses can facilitate outcomes review and the use of evidence in decision making.

A systematic review of the literature by Kawamoto, Houlihan, Balas, and Lobach (2005) provides good evidence regarding decision support system characteristics that support the uptake of evidence at the point of care. The most notable finding is that 75% of the interventions were successful when the decision support system provided automatic outcome feedback versus having to seek outcome feedback from within the system. Additionally, systems that were incorporated with charting processes were more likely to succeed by 37% and those that were computer based were more effective.

Literature Gaps

The OFKT framework was first published in 2007, as a result there was no available literature to support or refute its credibility. The framework is an adaptation of the PARIHS framework; therefore an evaluation of the PARIHS framework was included. Unfortunately, the evaluation revealed there had been minimal testing of the PARIHS framework. The few investigators who had tested the PARIHS framework reported it is practical and useful. Even though there had only been minimal testing, the OFKT framework did have merit as the concepts and relationships were adequately defined, logical and fit with personal observations from the clinical setting. These characteristics made it reasonable to apply and test the framework in this inquiry project.

Doran and Sidani (2007) identified that the PARIHS framework did not suggest how to use patient outcome feedback to continually design and evaluate practice. The OFKT framework addressed this shortfall through incorporation of a continuous feedback mechanism. The mechanism supplies patient outcome data to an advanced practice nurse who, through facilitation, promotes the uptake of evidence at the point care to design evidence based nursing interventions. Because this was a modification to the PARIHS framework and it was untested, the relationship between CNS facilitation and improved patient outcomes required testing.

Summary

The evidence reviewed for this clinical inquiry project implied that a practice change focused on CNS facilitation had the potential to improve patient outcomes and reduce barriers to the use of evidence at the point of care. However, since the OFKT framework had not been adequately tested, a clinical inquiry project which tested the

effect of CNS facilitation on patient outcomes was proposed. This approach addressed identified gaps in the literature and was expected to improve patient outcomes by promoting the uptake of evidence at the point of care.

Methods

This two phase clinical inquiry project used an experimental design to evaluate the effect of CNS facilitation on glycemic control in an acute care setting. Phase one focused on development of the CNS facilitation intervention and RN perception assessment. In phase two one randomly assigned acute care unit received the intervention. The project was reviewed and approved by the organization's institutional review board (IRB) and the Oregon Health and Science University IRB. Phase one began in January 2009 and phase two in March 2009 as shown in Table 1.

Table 1
Project Timeline

January - April 2009				
	Jan	Feb	Mar	May
Activity	Phase 1	IRB review (phase 1)	Phase 2	Data analysis
Note. IRB= Institutional Review Board				

Design

A two-group pretest-posttest design (see Table 2) was used to examine the effect of CNS facilitation on glycemic control. This design allowed for detecting a change in the dependant variable (glycemic control) as a result of the CNS facilitation intervention (Norwood, 2000).

Table 2
Two-group Pretest-posttest Study Design

Unit E (experimental)	R	O ₁	O ₂	O ₃	X	O ₁
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Unit C (control)	R	O ₁	O ₂	O ₃		O ₁
Note. R= randomization; O= observation; X = intervention						

Setting

The project was carried out in the acute care setting of a university affiliated tertiary care VA Medical Center with Magnet designation. There were four acute care units that provided typical medical and surgical services. In addition to typical services, there was a 52 bed capacity for telemetry monitoring and care provided to post-operative open heart, liver and renal transplant, spinal cord injury, mechanically ventilated, and seizure monitored patients. The two acute care units where the project was conducted had a total of 65 beds. Unit E (experimental) was a surgical unit that admits medicine overflow patients as needed and Unit C (control) was a mixed medical-surgical unit. Ventilated and seizure monitored patients are not admitted to these units.

Context

Glycemic control had been a patient care priority at the VA since 2004 when an interdisciplinary inpatient glycemic control team (IGCT) was formed and charged with evaluating glycemic control in the acute care setting. The team was co-led by a Clinical Nurse Specialist and Hospitalist and met monthly to discuss a multitude of issues related to glycemic control such as the development of evidenced-based protocols, standardizing definitions, and establishing target ranges. Over the past four years the team implemented many changes directed at promoting glycemic control with the goal of improving patient outcomes. Three past successes of the team included the development and implementation of a glycemic monitoring window (GMW), an electronic acute care

insulin infusion protocol, and a hypoglycemia protocol. These activities occurred from early 2006 until as recent as November 2008.

Over the years the team had been challenged by access to data. Until late 2008 the only data available was insulin infusion data. These data, over about two years, reflected a downward trend in glucose values of about 10 mg/dL. Beginning in November 2008 the team gained access to capillary blood glucose (CBG) data. Shortly after, the Quality and Performance department provided the team with the resources to create a database that allowed for review of CBG data at the unit level. As a result, the team started reviewing hypo and hyperglycemia trends monthly.

Sample

The purpose of this clinical inquiry project was to determine whether CNS facilitation effects unit level rates of hypo and hyperglycemia and evaluate RN perceptions about CNS facilitation. The project examined glycemic control data from two acute care units, Unit C and Unit E, using a data set maintained by the IGCT. The data contained only CBG values acquired by point of care testing with a glucometer. The data did not include serum glucose values. CBG values will be referred to as glucose values. Glucose values were collected on all patients (with and without diabetes) as ordered by the primary team and as directed by nursing protocol from December 2008 through April 2009 (N= 17,314). Values collected during March 2009 were excluded since RNs received the intervention during this month. The timing of the glucose value, such as post-prandial, was not considered.

All RNs providing care on Units E and C during the intervention period were eligible to participate. Recruitment flyers (see Appendix A) were posted in areas

frequented by acute care nurses. Units were randomized to receive the intervention or usual care. A convenience sample of 35 RNs from the intervention unit participated. Participation was voluntary and no compensation was provided. RNs self-selected participation by completing of the RN perception assessment. An information sheet was used as an alternative consent (see Appendix B). No identifying information was collected from RN participants. The RN characteristics displayed in Table 3 were provided by Nursing Professional Services and reflect the characteristics of RNs assigned to Units C and E on one day during the intervention period. Race and ethnicity descriptors were not available.

Table 3
RN Characteristics of Study Units

	Unit C	Unit E
N	44	42
Gender	n (%)	n (%)
Female	39 (88.64)	34 (80.95)
Male	5 (11.36)	8 (19.05)
Education level	n (%)	n (%)
Diploma	0 (0.00)	1 (2.38)
Associate's	16 (36.36)	13 (30.95)
Bachelor's	28 (63.64)	28 (66.67)
Certified	n (%)	n (%)
Yes	4 (9.10)	5 (11.90)
No	40 (90.90)	37 (88.10)
Age (years)		
Mean	36	42
Range	23-59	23-61
Years at VA		
Mean	2	9
Median	2	7
Range	<1-20	<1-29

Note. RN= Registered Nurse;
VA=Veterans Affairs; Unit C= control;
Unit E= experimental

Intervention Phase

Doran and Sidani (2007) in the OFKT framework hypothesize that CNS facilitation will increase the use of evidence in practice when patient outcomes are reviewed (training) and evidence-based decision making is supported (coaching). In this study, Unit E received the CNS intervention developed during phase one and Unit C received usual care. CNS facilitation is a routine activity in the acute care setting and occurred on both units during the study timeframe. For this study two additional activities were included in facilitation; 1) journal entries on both units and 2) an RN perception assessment on Unit E. These activities were necessary in order to capture details about the intervention phase.

CNS Facilitation Intervention

It was anticipated that the facilitation intervention would improve glycemic control in the acute care setting by influencing the uptake of evidence at the point of care. The glycemic monitoring window (see Appendix C) was the tool selected to provide real-time patient level outcome feedback. All health care professionals had access to the GMW in the electronic medical record and could view it at any time during a patient's hospital stay. The window was available for more than two years prior to the study.

Development (Phase 1).

During phase one a structured facilitation process (intervention) was designed to operationalize concepts of the OFKT framework, and learner-centered education theory (see Appendix D). The following four learning outcomes were developed: 1) understand

the current evidence base regarding glycemic control, 2) understand the key features of the GMW, 3) evaluate the glucose management of one patient and determine the level of control, and 4) identify factors contributing to the patient's level of glucose control.

CNS Facilitation was planned to be integrated into the RNs normal patient care activities, occur at the point of care, and last about 10 minutes so that patient care activities were not affected. Conducting the intervention at the point of care was selected because Doran and Sidani (2007) hypothesized that nurses provided with real-time patient outcome feedback will be motivated to reflect on their practice and seek evidence to fill in knowledge gaps. Providing the intervention at the point of care also allowed RNs to select a patient from their unit (preferably one from their assignment) and process the information at the point of care.

The session consisted of two components, a brief introduction followed by discussion and review of a patient. Portions of the intervention were scripted (see Appendix E) to ensure standardization. The introduction was designed to provide RNs with information about the project and provide an overview of the evidence base regarding glycemic control. A presentation of the evidence, one component of the OFKT framework, is a mechanism to support the uptake of evidence at the point of care. Additionally, the framework suggests that it is the responsibility of the facilitator to help clinicians "make sense" of the evidence. Providing a concise overview of the evidence was an opportunity to assist RNs with "making sense" of the growing and changing body of evidence related to glycemic control.

Two considerations were the impetus behind the development of the patient review and discussion component of the facilitation session. First, active discussion

between the facilitator and the RN(s) was imperative to support a learner-centered facilitation session (North, n.d.). Therefore, open ended questions to assess prior knowledge, support construction of new knowledge, and support the connection of isolated ideas were included in the session. The second consideration was the inclusion of a review process. Review is a technique identified in the OFKT framework that can be used by a facilitator to assist learners with assessing attitudes, skills, habits, and thinking patterns. RNs on the intervention unit have had access to the GMW for two years and have utilized nursing protocols to manage glucose for several years. The review process was necessary to provide RNs the opportunity to evaluate current practice and make a determination about how to achieve adequate glucose control through improved practices.

Implementation (Phase 2).

RNs regularly serve as preceptors to student nurses and newly hired RNs. Student nurses did participate in the facilitation session but were not counted as an RN. The presence of a student was documented in the journal. Newly hired RNs in their orientation phase received the intervention the same as all other RNs assigned to the unit. RNs on all acute care units float to other acute care units on a rotational basis. If a RN from any unit floated to the intervention unit, they were eligible to receive the facilitation intervention.

RNs on Unit E utilize individual, mobile computer work stations. When RNs were not in the patient room they tended to cluster in alcoves that have chairs and electrical outlets to recharge the mobile stations. CNS interaction happened at the mobile computers where there was access to the patient record and other electronic resources.

Because RNs tended to work in clusters, the session sometimes included more than one RN. If other RNs actively participated in the facilitation session they were considered to have received the intervention. Participation was defined as active engagement in the discussion and review process. This was determined by the RNs activity during the facilitation session. If a nurse continued to focus on patient care activities such as charting or preparing medications, they were not documented as having received the intervention. The RN had to be present for the entire facilitation session. If a participating RN was called away from the session, the CNS determined if the interruption was expected to be short-term or long-term. If it was short-term the session was halted until the RN returned. If the interruption was long term (more than 5 minutes), the session was continued with any other participants. If there were no other participants the session ended. After a long-term interruption the RN was required to start a new facilitation session to be considered as having received the intervention.

RNs on Unit E were approached by this investigator on both day and night shifts and asked if they had 10 minutes to review a patient. If the RN was available the facilitation session was initiated. If they were not available, the CNS approached the RN at another time. Patient care activities always took precedence over facilitation. The intervention was conducted utilizing scripts and the intervention algorithm. The two components of the intervention were timed in minutes and recorded in the journal.

During the introduction, RNs were provided with a copy of the participant information sheet (see Appendix B). The facilitator then verbally reviewed the evidence using a script. Following the introduction, RNs were given the opportunity to self-select a patient receiving insulin from their patient assignment. If the RN(s) was not assigned a

patient receiving insulin, another patient from the unit was used for discussion and review. This was documented in the journal. Next, RNs were asked to self-report their level of familiarity with the GMW. If familiar, they were asked to open the window. If unfamiliar, a script was used to assist the RN in opening the window. This was followed by a review of the features (e.g. tabs, links) and content (e.g. glucose values, insulin administered). Next, the RN was asked to describe the patient's level of control (e.g. good control, poor control). Finally, the RN was asked what they thought were contributing factors to the patient's level of control. To conclude the session, RNs were provided with a copy of the RN perception assessment. They were instructed that if they would like to volunteer to participate in the project they should complete the anonymous assessment and return it to the locked box in the nurse's station.

In order to ensure consistency between sessions and fully describe the facilitation sessions a journal was maintained. No identifying information was recorded. The journal contained information such as the number of participants, the length of the session, whether the patient reviewed was assigned to the RN, and the RN's level of familiarity with the GMW.

Unit E received the intervention by this investigator during a nine day period (March 23-31, 2009). A total of 12 visits were made to Unit E (day= 8; night= 4). A summary of the facilitation sessions is shown in Table 4.

Table 4
CNS Facilitation Session (intervention) Summary

Shift			
Unit E (experimental)	Day	Night	Total
N	21	14	35
Introduction length (minutes)			
Mean	2.14	1.79	2.00

Median	2.00	2.00	2.00
Range	2-3	1-2	1-3
SD	.36	.43	.42
Session length (minutes)			
Mean	9.10	8.93	9.00
Median	8.00	8.00	8.00
Range	6-14	6-14	6-14
SD	2.437	3.00	2.63
Familiar with GMW?	n (%)	n (%)	n (%)
Yes	20 (57)	12 (34)	32 (91)
No	0	0	0
Somewhat	1 (3)	2 (6)	3 (9)
Patient reviewed was assigned to RN	n (%)	n (%)	n (%)
Yes	15 (43)	7 (20)	22 (63)
No	6 (17)	7 (20)	13 (37)
Note. CNS= Clinical Nurse Specialist; GMW= glycemic monitoring window; RN= Registered Nurse			

Usual Practice

Unit C received their usual support from the acute care CNS (this investigator) during the intervention phase. Usual support included CNS facilitation. In order to ensure Unit C received the same amount of CNS attention as Unit E, purposeful visits were made on both day and night shifts during phase two. Purposeful visits included discussions about topics unrelated to glycemic control such as medication safety, 2009 National Patient Safety Goals, and documentation of a fall episode. An attempt was made to approach all RNs during the visits as presenting clinically relevant information was part of the normal CNS role.

Since this investigator was known to Unit C staff as a glycemic control expert, some visits did include discussion about glycemic control. For example, there was discussion about the documentation of hypoglycemia. All discussion regarding glycemic

control and/or the monitoring window during the intervention phase was documented in the journal. Additionally, journal entries were made regarding the topic(s) discussed during planned visits and the number of visits to the unit. No identifying information was recorded. A total of seven visits were made to Unit C (day= 5; night= 2).

Measures

This project measured two variables; 1) RN perceptions about facilitation and 2) glycemic control.

RN Perception Assessment

A 6-item assessment tool (see Appendix F) was developed during phase one to evaluate RN perceptions about the CNS facilitation intervention. The tool consisted of two items (questions one and two) to assess the method of learning and two items (questions three and four) to assess the content of the facilitation session. One item (question five) measured the overall effect and the final open ended item (question six) provided respondents with an opportunity to provide feedback. The tool was tested for clarity and ease of use with five acute care RNs on units at the VA that were not participating in the project.

At the conclusion of each facilitation session on Unit E, all RNs who completed the session were provided with a copy of the RN perception assessment by this investigator. RNs were instructed that completion of the anonymous assessment was voluntary. A locked box was placed in the nurses' station for RNs to return completed assessments. The box was checked daily and assessments were removed only when the box was full.

Glycemic Control

This project examined the variable of glycemic control using an aggregated data set maintained by the IGCT. The CBG data in the data set were collected as part of routine patient care. Glycemic control was reported as rates of hypo and hyperglycemia. A hypoglycemic event was defined as any random glucose value less than 70mg/dL (American Diabetes, 2008a). A hyperglycemic event was defined as any random glucose value greater than 200mg/dL (Clement et al., 2004).

This project utilized four definitions recommended by the Society of Hospital Medicine (n.d.) for calculating hypo and hyperglycemia rates (see Table 5). There are three potential units of analysis to consider when evaluating glycemic control (Goldberg et al. 2007; Society, n.d.). All glucose values and monitored patient days were selected. Several factors were considered in the selection to include simplicity, sensitivity and clinical relevance. Simplicity describes how easy it was to collect and analyze the data. Sensitivity refers to the ability of the data to accurately reflect the situation. This was most relevant when evaluating hypoglycemia as the unit of analysis must reflect risk of hypoglycemia. Finally, clinical relevance, was considered as the data must be meaningful to clinicians and must be applicable to clinical situations in order to improve care.

Patient monitored day.

A patient monitored day was defined as a calendar day that contained at least one glucose value. The use of patient monitored day as the unit of analysis was recognized as a method to provide clinically relevant data and is less biased by length of stay (Society, n.d.). The data analysis is more complicated than glucose values; however it more accurately reflects clinical risk for hypoglycemia (Goldberg et al., 2007).

Table 5
Unit Level Variables and Calculation of Rate

Variable	Calculation
Unit hypoglycemia rate	$\frac{\text{Total number of hypoglycemia events/unit}}{\text{Total number of glucose values/unit}} \times 100$
Unit hyperglycemia rate	$\frac{\text{Total number of hyperglycemia events/unit}}{\text{Total number of glucose values/unit}} \times 100$
Unit hypoglycemia rate per monitored patient days	$\frac{\text{Total number of patient days with 1 or more hypoglycemia event/unit}}{\text{Total number of monitored patient days/unit}} \times 100$
Unit hyperglycemia rate per monitored patient days	$\frac{\text{Total number of patient days with 1 or more hyperglycemia event/unit}}{\text{Total number of monitored patient days/unit}} \times 100$

All glucose values.

All glucose values was defined as all capillary blood glucose values obtained on Units C and E with one exception. Any glucose value obtained five minutes or less from another value was eliminated. For consistency, the older of the two values was removed. This decreased the risk of inflated hypo and hyperglycemia rates as policy directed staff to repeat the glucose test if an unexpected value (hypo or hyper value) was obtained. If the repeat test also produced a hypo or hyperglycemia value, both tests were potentially charted therefore double documenting the event. Any out of range value (HI represented a value greater than 600 mg/dL and LO represented a value less than 10 mg/dL) were converted to a numeric value. HI was converted to 601mg/dL and LO to 9mg/dL. The conversion allowed the data to be included in the data analysis. The number of HI (n= 52) and LO (n=1) conversions reflected 0.3% of all glucose values in the data set.

Using the glucose values in this fashion prevents any examination of the effects of patient variation, such as prolonged length of stay, or repeated measures during episodes of poor control that has the potential to skew data (Society, n.d). The primary purpose of

this project was to determine whether CNS facilitation reduced the rate of hypo and hyperglycemic events; individual patient variation was not examined.

Capillary blood glucose.

CBG values were the basis for determining glycemic control. The Accu-Chek[®] Inform glucometer manufactured by Roche Diagnostics, Indianapolis, Indiana was utilized. The meter evaluated CBG values in the range of 10-600 mg/dL with a 15% margin of error. CBGs were obtained by certified personnel at regular intervals as directed by a provider order or nursing protocol. CBGs could be obtained without an order as part of patient assessment when indicated. The established Glucose Testing Policy (2007) directed clinical indications for testing, contraindications, operator certification requirements, quality control, specimen collection, infection control guidelines, handling of test strips, methods for charting, and cleaning and troubleshooting the meter (see Appendix G).

CBG testing was routinely performed by nursing assistants assigned to Units C and E. However, other nursing staff (RNs and Licensed Practical Nurses) did perform CBGs as needed. All glucometer operators were certified to perform tests as the glucometer only accepted the identification of a certified operator. To perform a test the operator entered (or scanned) his or her personal number followed by the patient's wristband to record the patient's identification.

Glucometers required quality control testing once every 24 hours using solutions provided by the manufacturer. If the meter did not meet the quality control requirements, the meter locked, preventing any further testing. Glucometers were required to be placed in the download station at least once every four hours to download values to the

electronic patient record and to charge the battery. Meters locked once the four hour limit was reached (Nursing, 2007).

The glucometer utilized the point of care information management system, RALS-Plus[®], which captured user identification, patient identification, download location (nursing unit), date and time of test and test result (Cook et al., 2007). The internal RALS coordinator authorized the ICGT access to the database. Fields in the database were queried by applying location and date range filters. RALS data were exported on a monthly basis using a scripted set of instructions (see Appendix H).

Sample Size Calculation

The dependent variable was glycemic control which was reported as rates of hypo and hyperglycemia at the unit level. The project used all glucose values and patient monitored day to report rates; the more conservative of the two, monitored patient day was selected to estimate the sample size. An alpha value of $p=0.1$ was used to determine significance as the intervention posed minimal risk.

Goldberg et al. (2007) reported glycemic control findings from one month of glucose values on a single acute care medicine unit. This was the only published acute care findings using monitored patient day as the unit of analysis. Goldberg et al. (2007) defined hyperglycemia as glucose greater than 300 mg/dL and hypoglycemia as glucose less than 60 mg/dL. The reported hypoglycemia rate for monitored patient day was 4.5% and 21.8% for hyperglycemia. Estimating that at least a 20% improvement from the benchmark could be attained, the necessary sample to detect a significant difference between the intervention and control groups using an alpha of 0.1 and a power level of 0.8 was 2998 (hypoglycemia) and 513 (hyperglycemia) patient monitored days for each

acute care unit. It was anticipated that an adequate sample size could be obtained within the time constraints of the project to demonstrate significance in all comparison groups expect hypoglycemia. This was due to the low occurrence rate of hypoglycemia in conjunction with a condensed project timeframe.

Analysis

The analysis was performed using a series of binomial tests and descriptive statistics in Stata 9. An alpha value of $p=0.1$ was used to determine significance.

Question 1

A two-sided binomial test was used to examine the difference in hypo and hyperglycemia rates between the; 1) intervention and control groups in the posttest condition, 2) pre and posttest conditions within the intervention and control groups, and 3) posttest conditions and a published benchmark (Cook et al. 2007; Goldberg et al., 2007) as shown in Figure 2. A binomial test is a

Figure 2. Binomial comparisons

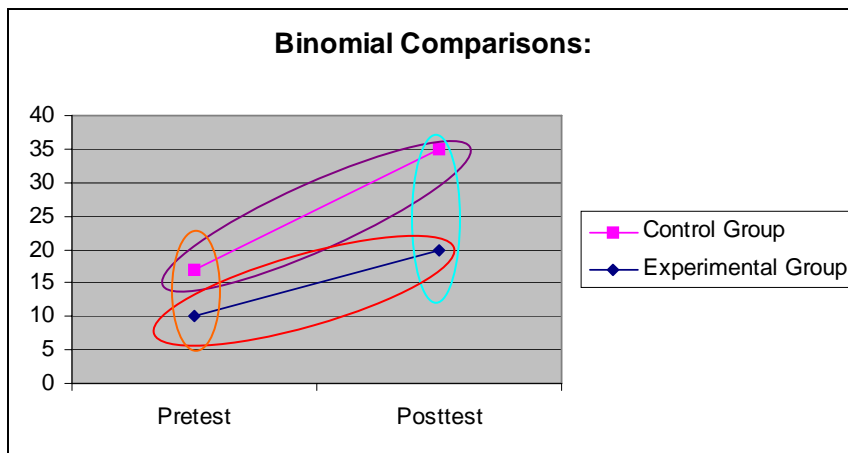


Figure 3. Hypo and hyperglycemia rates

Question 2

Descriptive statistics were used to evaluate responses from the RN perception assessment.

Results

This project was designed to answer two clinical questions:

- 1) Is there a difference in hypoglycemia and hyperglycemia rates between nursing units where CNS facilitation specific to glycemic control was implemented versus usual care?
- 2) What are Registered Nurse perceptions of CNS facilitation?

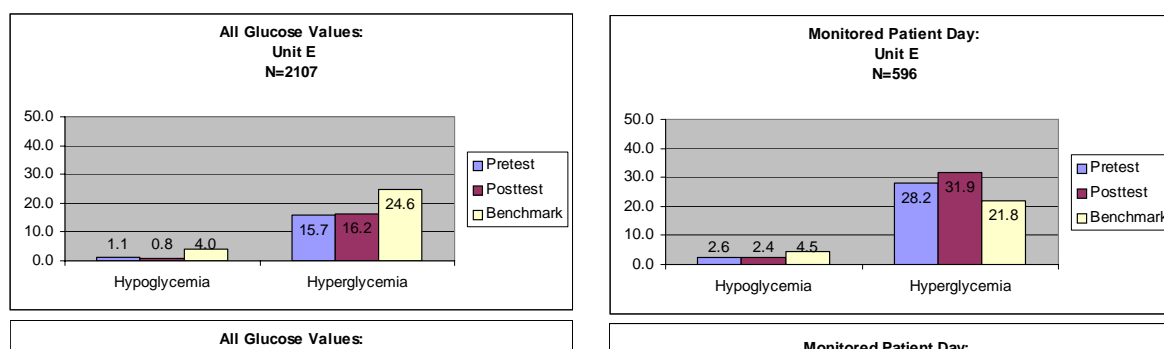
Question 1

Observed rates of hypo and hyperglycemia were determined for Units E and C using both the all glucose values and monitored patient day calculations as shown in Figure 3. The differences in the rates were examined through a series of binomial tests as shown in Table 6. Significant differences were found in two of the hyperglycemia all glucose values comparisons and in three of the hyperglycemia monitored patient day comparisons. Although there were significant differences in five of the hyperglycemia posttest conditions, it was noted that there were similar differences in the rates in the pretest condition as well.

Question 2

Acute Care RNs on Unit E who participated in the intervention were asked to voluntarily complete a 6-item perception assessment. The survey completion rate was 88.6 % (n=31). The responses for items one through five are shown in Table 7 and demonstrate that RNs

Figure 3. Observed rates of hypo and hyperglycemia: Unit E and Unit C



Note. All glucose values benchmark (Cook et al., 2007). Monitored patient day benchmark (Goldberg et al., 2007)

preferred learning at the point of care (67.7%), felt the interruption was worthwhile (96.8%) and thought the information would assist them with improving glycemic control (90.3%). Overall, RNs found the facilitation session to be very effective. When asked how the facilitation session could be improved (item 6), RN comments (N=12) reflected that this type of learning is preferred because the session was individualized (n=3) and short and concise (n=3). One comment suggested that written reference material be provided. Additionally, RNs expressed concerns (n=3) that the potential for being interrupted exists when there is no “dedicated” time for the session.

Discussion

The results of this project demonstrated that RNs found CNS facilitation at the point of care effective, worthwhile and they believed the session provided important information about glycemic control. However, the expected changes in hypo and hyperglycemia rates were not observed suggesting that CNS facilitation does not improve patient outcomes.

Table 6

Unit E and Unit C: Binomial Test Findings

All Glucose Values	Hypoglycemia (CBG < 70)			Hyperglycemia (CBG > 200)		
	z	CI	p	z	CI	p
Unit E posttest versus Unit C posttest	-0.17	-0.05 - 0.04	0.88	-3.15	-0.13 - -0.04	0.002
Unit E pretest versus posttest	0.10	-0.05 - 0.05	0.92	-0.18	-0.05 - 0.04	0.86
Unit E posttest versus benchmark ^a	-0.67	-0.03 - 0.04	0.50	-3.60	0.13 - 0.20	0.0003
Unit C pretest versus posttest	0.17	-0.04 - 0.05	0.87	-1.36	-0.08 - 0.01	0.17
Unit C posttest versus benchmark ^a	-0.78	-0.02 - 0.05	0.44	0.23	0.22 - 0.28	0.82
Monitored Patient Day	Hypoglycemia (CBG < 70)			Hyperglycemia (CBG > 200)		
Unit E posttest versus Unit C posttest	-0.26	-0.11 - 0.08	0.79	-2.38	-0.11 - -0.02	0.02
Unit E pretest versus posttest	0.04	-0.09 - 0.10	0.97	-0.77	-0.12 - 0.04	0.44
Unit E posttest versus benchmark ^b	-0.38	-0.04 - 0.09	0.71	5.97	0.29 - 0.35	<.00001
Unit C pretest versus posttest	0.19	-0.08 - 0.10	0.85	-0.11	-0.08 - 0.07	0.91
Unit C posttest versus benchmark ^b	-0.12	-0.02 - 0.10	0.90	40.95	0.35 - 0.42	<.00001
Note: ^a Benchmark (Cook et al., 2007): Hypoglycemia= CBG < 70mg/dL; Hyperglycemia= CBG>200 mg/dL ^b Benchmark (Goldberg et al., 2007): Hypoglycemia= CBG <60 mg/dL; Hyperglycemia= CBG> 300 mg/dL						

Glucose Outcomes

Evaluating glucose control in the acute care setting is a relatively new concept. As a result, there are limited published data for comparison. The reports that are available for comparison use varying definitions for glucose control. This study used the American Diabetes Association (2008a) definition for hypoglycemia, any random glucose value less than 70 mg/dL and any random glucose value greater than 200 mg/dL (Clements et al., 2004) as the definition of hyperglycemia. Two units of analysis (all glucose values

and patient monitored day) were selected to evaluate rates of hypo and hyperglycemia using the Society of Hospital Medicine (n.d.) recommended calculations.

Table 7

Registered Nurse (RN) Perception Assessment Responses

RN Perception Assessment (N= 31)	n	%
1. How does this type of learning compare with traditional classroom learning?		
Prefer this type	21	67.7%
Prefer classroom	1	3.2%
No preference	9	29.0%
2. Length of session was:		
Too long	0	0.00%
Too short	1	3.2%
Just right	30	96.8%
3. Was the session a worthwhile interruption in your day?		
Yes	30	96.8%
No	1	3.2%
4. Did the session provide you with information to assist with improving glycemic control?		
Yes	28	90.3%
No	3	9.7%
5. What is your perception of the overall effectiveness?		
1= not effective	Mean	Median
3= somewhat effective	4.48	5.0
5= very effective	Range	SD
	3-5	± 0.63

All Glucose Values

The hyperglycemia all glucose values evaluation demonstrated significant differences in two comparison groups, Unit E posttest to Unit C posttest ($p= 0.0016$) and Unit E to the benchmark ($p=0.0003$). The Unit E comparison to the benchmark is noteworthy as Cook et al. (2007) utilized the same hyperglycemia definition used in this project and reports data for an acute care population. It must be noted that in the pretest

condition Unit E's rate was also lower than the benchmark. Even though there was a significant difference between Unit E and C posttest, there was also a similar difference in rates in the pretest condition. The difference is likely explained by patient and unit characteristics. For example, Unit C admits more patients with poorly controlled diabetes (e.g. vascular surgery patients) and has less experienced RNs.

The evaluation of all glucose values showed a reduction in the rate of hypoglycemia on Unit E. However, the reduction was not significant ($p=0.924$). Since hypoglycemia occurred infrequently during the intervention phase ($n=17$) it is likely the sample size was too small to detect a difference. This reduction can be viewed as clinically relevant since hypoglycemia is an important indicator of safety and is recognized as a barrier to implementing practice changes aimed at improving glucose control (American Association, 2007).

It was anticipated that a 20% improvement in glucose outcomes could be attained. The improvements were not achieved. In the case of hypoglycemia, this could be attributed to the overall low rate of occurrence which limited the amount of improvement that could be obtained. For example, the benchmark rate for all glucose values (hypoglycemia) was 4.0% and the pretest rates were determined to be 1.82% (Unit C) and 1.06% (Unit E). Not only would a large sample be needed to detect improvement, but it would be difficult to demonstrate improvement as there was little room to improve.

Monitored Patient Day

The evaluation of glucose outcomes using monitored patient day as the unit of analysis produced three significant hyperglycemia findings. The first was that Unit E was lower than Unit C in the posttest condition ($p=0.017$). Although there was a significant

difference, the difference is likely explained by patient and unit characteristics since the difference was also present in the pretest condition. The second significant difference was that the benchmark was lower than Unit E ($p < 0.0001$). The benchmark (Goldberg et al., 2007) defined hyperglycemia as any glucose value greater than 300 mg/dL. This benchmark was selected as it was the only acute care, monitored patient day comparison available. The difference in definition provides the likely explanation as to why the benchmark hyperglycemia rate is significantly different (lower) than the Unit E rate. Finally, the benchmark was lower than Unit C ($p < .00001$). The same explanation can be applied to this difference.

Power Analysis

According to the *a priori* power analysis with monitored patient day as the unit of analysis, I obtained an adequate sample in the hyperglycemia condition was obtained but was unable to achieve the required sample size for the hypoglycemia condition. To determine if sample size was an issue for the failure to find statistical significance for the current study, a post hoc power analyses based on the observed effect sizes for the experimental unit was conducted. A post hoc power analysis could not be completed within the hyperglycemia condition as the hyperglycemia rates increased posttest, and I hypothesized that they would decrease. The hypoglycemia condition did not attain the expected effect size of a 20% decrease from an expected baseline rate of .054. To detect the observed decrease of 7.7% (pretest = .026, posttest = .024), 54,939 monitored patient days would have been necessary to achieve 80% power at a one-tailed alpha of .10. This sample size would have been virtually impossible to achieve in this research setting.

RN Perception Assessment

The RN perception assessment was designed to evaluate the CNS facilitation sessions. The assessment provided several pieces of useful information for future development and application of facilitation at the point of care. First, RNs rated the length of the session as “just right” (96.8%). Sessions ranged from six to 14 minutes with the average session lasting nine minutes. RNs also reported the intervention as being a worthwhile interruption in their day (96.8%) and that the information presented would assist them with improving glycemic control (90.3%). The combination of these findings suggests that facilitation at the point of care was an effective method and was meaningful to RNs.

Evaluating RN perceptions about facilitation at the point of care was also important because the uptake of evidence at the point of care is central to improving outcomes within the OFKT framework. Finally, providing the facilitation session at the point of care allowed for real-time review of an actual patient (63% of the time it was a patient assigned to the RN), again supporting the constructs of the framework.

OFKT Framework

The OFKT framework was selected for this study because the relationships were adequately defined, logical and fit with personal observations in the clinical setting. The framework was first published by Doran and Sidani (2007) as an adaptation of the PARIHS framework. Since this was an adaptation, the relationship between CNS facilitation and improved patient outcomes required testing. The use of CNS facilitation to promote the uptake of evidence at the point of care to improve patient outcomes was one adaptation. Doran and Sidani (2007) viewed that advanced practice nurse facilitated

outcome review would support continuous improvement and the relationship between uptake of evidence and improved patient outcomes.

The glucose outcomes from this study did not support the relationships conceptualized by Doran and Sidani (2007) as CNS facilitation at the point of care did not improve patient outcomes. This is incongruent with the review conducted by Brown and McCormack (2005) that found the constructs of the framework are beneficial to getting evidence into practice. However, the findings are consistent with a recent Cochrane review where Jamtvedt et al. (2008) evaluated the effectiveness of feedback interventions and found a range of improvement from a 16% decrease to a 70% increase.

Kawamoto, Houlihan, Balas, and Lobach (2005) concluded in a systematic review that 75% of interventions that included decision support systems were successful. Additionally, they reported that incorporating decision support with charting processes increased the likelihood of success. The GMW used in the facilitation intervention provided decision support with real-time outcome feedback at the point of care and was incorporated with RN charting. However, the window only included charting tools for the management of insulin infusion. During the facilitation sessions RNs frequently commented that they thought the GWM was only for managing insulin infusion. This may have contributed to the findings. Even though RNs had access to the GMW on all patients, they had to take additional steps to view the window for non-insulin infusion patients since the window did not include charting tools for subcutaneous management or hypoglycemia management. Because subcutaneous glucose management was the most commonly used treatment regimen, the additional steps to use the GMW may have

influenced RN use and therefore influenced RN decision making regarding glucose management.

Doran and Sidani (2007) define facilitation as a “technique by which one person helps others to understand what they have to change and how they change it to achieve desired outcomes.” This was observed during the facilitation sessions as RNs were able to recognize the level of control and contributing factors. By the end of the facilitation session they were able to reflect on past practice. One example that occurred several times was when a nurse that made a decision to hold a pre-meal insulin dose because the patient’s blood glucose was normal (they were afraid of causing hypoglycemia), re-evaluated their decision and stated they should have administered the dose to prevent post-meal hyperglycemia. Another example that occurred was the re-consideration of the decision to hold a basal (NPH) insulin dose when the morning pre-meal blood glucose was low. Even though the glucose outcomes did not support the relationships between facilitation, uptake of evidence and patient outcomes, the reflection that occurred during the discussion portion of the facilitation sessions and the feedback received on the perception assessments suggested that facilitation was practical and useful which is similar to Kitson’s (2008) conclusion.

This study focused on CNS facilitation at the point of care and providing real-time outcome feedback. The underlying assumption was that facilitation and outcome feedback would influence the uptake of evidence and subsequently the development of nursing interventions to improve patient outcomes. Uptake of evidence and it’s relationship with the development and implementation of nursing interventions were not measured in this study. In order to fully understand the effect of facilitation and outcome

feedback, the evaluation of uptake of evidence and the development and implementation of nursing interventions is suggested.

Limitations

Admittedly there are limitations to this project. First, de-identified, pre and posttest glucose data were analyzed making it impossible to determine patient characteristics. It is possible that the characteristics of the pretest group could have been different from the characteristics of the posttest group. However, the patient population in general was known to be relatively stable. Next, 35 RNs received the intervention during a 9-day timeframe. Because of the condensed intervention period the dose of the intervention may not have been strong enough to effect glucose outcomes.

Glycemic control is a dynamic process that is influenced by multiple variables such as patient characteristics, provider management practices, nutritional intake, and patient activity. This project did not account for these variables as the focus was on testing the relationship between CNS facilitation and the uptake of evidence at the point of care and it's effect on glucose outcomes. This may explain why the intervention did not effect glucose outcomes.

A Veteran population was used for this project and Veterans are known to be predominately older and male when compared to the population at large. Even though Veteran demographics have changed recently to reflect more women and younger patients, the demographics of the population utilized in this project were not likely to have reflected those of a non-Veteran population and therefore generalizability may be limited.

The benchmark selected for comparison of patient monitored days did not utilize the same definitions for hypo and hyperglycemia as used in this project. As a result, a direct comparison could not be made. The benchmark was used because it was the only published study using patient monitored days as the unit of analysis in an acute care setting.

Reiber et al. (2004) evaluated demographics and behavioral and health care status of veterans and non-veterans using the Behavioral Risk Factor Surveillance System and the Veterans Administration (VA) Veteran Health and Benefit databases. The findings demonstrated a higher prevalence of diabetes in the veteran population (16%) than the non-veteran population (6.2%). Organizational data reported during the timeframe of the project showed that 30.2% of all discharged acute care patients had a diagnosis of diabetes. Therefore, the prevalence of diabetes was considerably higher than the nationally reported rates and may limit generalizability.

Finally, pretest comparison rates for this project were determined by averaging the rates of three consecutive months. The posttest data used for comparison was from a single month. Use of only a single month could have biased the sample as it does not reflect normal month to month variation as seen in the pretest data. For example, the monitored patient day hyperglycemia rates for Unit E in the pretest condition ranged from 32.03% to 24.61% and the average was 28.18%.

Conclusions

The glucose outcome findings from this project imply that CNS facilitation does not impact glucose outcomes as expected. However, the RN perception assessment findings imply that CNS facilitation sessions have potential. These findings have several

implications for practice and future research. First, due to time constraints, only one month of posttest data were analyzed. In order to make a reasonable comparison between pretest and posttest data, an equal number of months should be used in the pretest and posttest conditions. This would control for any monthly variation that may bias data. Second, RNs found the facilitation sessions meaningful and effective. It is possible that one exposure to the intervention was not sufficient to influence glycemic outcomes. Future studies are needed to determine if the number of CNS facilitation exposures (dose of the intervention) has an effect on glucose outcomes. Next, at a national level, the development of standardized hypo and hyperglycemia definitions is needed for comparisons and determining acceptable rates of hypo and hyperglycemia. Finally, continued testing of the OFKT framework is necessary. This would include evaluating the impact of facilitation and outcome feedback at the point of care on the uptake of evidence and the subsequent development and implementation of nursing interventions. The RN perception assessment findings clearly demonstrate that RNs find facilitation valuable. Understanding conceptually and operationally how to improve outcomes through facilitation and outcome feedback at the point of care is important for promoting quality nursing care.

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Improving Glycemic Outcomes through Facilitation at the Point of Care

Presented by: Christy Locke, MSN, RN, CNS, CNOR
Date: May 21, 2009

Acknowledgments

- Dr. Debi Eldredge
 - Committee Chair
- Dr. Diana Pope
 - Committee member
- PVAMC staff

Why the DNP program?

Introduction

- Glycemic control
 - Maintaining blood glucose within a predefined target range
 - Outpatient setting
 - Glycosylated hemoglobin
 - Inpatient setting
 - Episodes of hypo and hyperglycemia

Goldberg, et al. (2006). Glucometrics- Assessing the quality of inpatient glucose management. *Diabetes Technology & Therapeutics*, 8(5), 560-569.

Background

- 17.5 million people have diabetes¹
- 22% of the 186 million inpatient days are incurred by those with diabetes¹
- 3rd most common diagnosis for Veterans²
- Diabetes prevalence¹
 - Non-Veteran population= 6.2%
 - Veteran population= 16%

¹American Diabetes Association (2008). Economic costs of diabetes in the US in 2007. *Diabetes Care*, 31(3), 1-20.

²Reiber et al. (2004). Diabetes in nonveterans, veterans, veterans receiving department of veteran's affairs health care. *Diabetes Care*, 27(S2), B3-B9.

Problem

- Lack of national standards and definitions
- Recommended for internal trending, benchmarking and quality improvement^{1,2}
- Glucometerics¹
 - Systematic analysis of blood glucose data
- Recommend 3 units of analysis¹
 - All glucose values, patient day and patient stay

¹Society of Hospital Medicine Glycemic Control Task Force (n.d.). Workbook for improvement: Improving glycemic control preventing hypoglycemia and optimizing care of the inpatient with hyperglycemia and diabetes. Retrieved on January 19, 2007 from <http://www.hospitalmedicine.org>

²Goldberg, et al. (2006). Glucometerics- Assessing the quality of inpatient glucose management. *Diabetes Technology & Therapeutics*, 8(5), 560-569.

Purpose/Questions

- Purpose
 - Test the effect of a CNS facilitation intervention designed to improve glycemic control in the acute care setting
- Questions
 1. Is there a difference in rates between nursing units where CNS facilitation specific to glycemic control was implemented versus usual care?
 2. What are Registered Nurse perceptions of CNS facilitation?

Conceptual Framework

- Outcomes Focused Knowledge Translation (OFKT) framework¹ (see handout)
 - Developed by Doran & Sidani (2007)
 - Patient outcome feedback is needed to continuously inform & improve nursing practice by supporting the uptake of evidence at the point of care
 - No literature to support or refute credibility
 - Framework concepts are well defined, logical and fit with personal observations in the clinical setting

¹Doran, D. M., & Sidani, S. (2007). Outcomes-focused knowledge translation: A framework for knowledge translation and patient outcomes improvement. *Worldviews on Evidence-Based Nursing*, 4(1), 3-13.

²Kitson et al. (2008). Evaluating the successful implementation of evidence into practice using the PARIHS framework: Theoretical and practical challenges. *Implementation Science*, 3(1).

Methods

- Design
 - Two-group pretest-posttest design

Unit E (experimental)	R	O ₁ O ₂ O ₃	X	O ₁
Unit C (control)	R	O ₁ O ₂ O ₃		O ₁
Note. R= randomization; O= observation; X = intervention				

Methods

- Setting
 - VA Medical Center with Magnet designation
 - Typical medical/surgical services
 - Open heart & kidney/renal transplant
 - 2 Acute Care Units
 - Unit E= surgical unit
 - Unit C= mixed medical/surgical unit

Sample

- Glycemic control data
 - N=17,314
 - CBG values
- Registered Nurses
 - N=35
 - Convenience sample

CBG= capillary blood glucose

POC= point of care

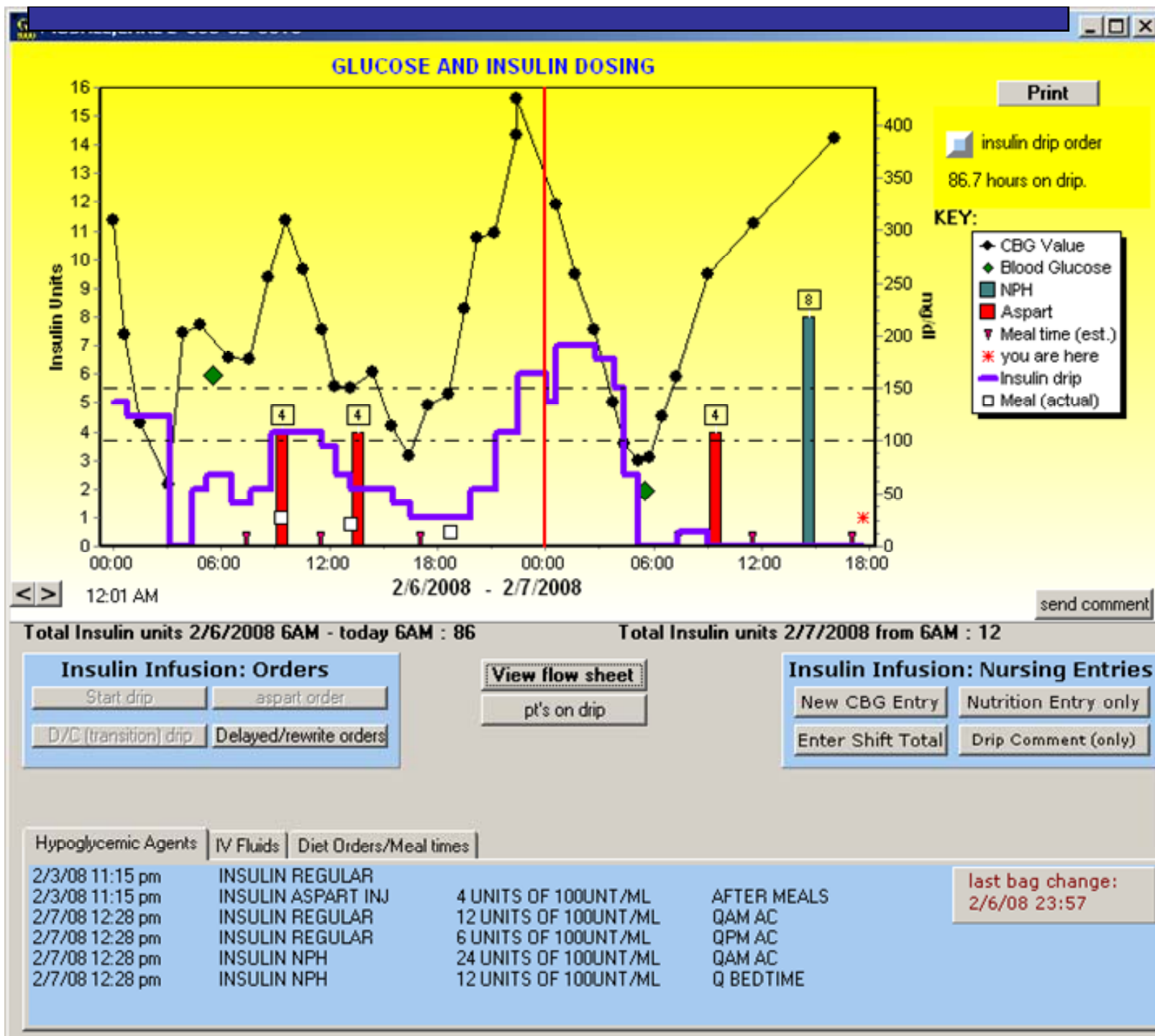
	Unit C	Unit E
N	44	42
Gender	n (%)	n (%)
Female	39 (88.64)	34 (80.95)
Male	5 (11.36)	8 (19.05)
Education level	n (%)	n (%)
Diploma	0 (0.00)	1 (2.38)
Associate's	16 (36.36)	13 (30.95)
Bachelor's	28 (63.64)	28 (66.67)
Certified	n (%)	n (%)
Yes	4 (9.10)	5 (11.90)
No	40 (90.90)	37 (88.10)
Age (years)		
Mean	36	42
Range	23-59	23-61
Years at VA		
Mean	2	9
Median	2	7
Range	<1-20	<1-29

Intervention Phase

- Phase 1
 - Development of structured facilitation intervention
 - Development of RN perception assessment
 - Tested with 5 RNs
- Phase 2
 - Delivery of intervention on Unit E
 - Usual care on Unit C

Phase 1

- Design of CNS facilitation intervention
 - Operationalized concepts from OFKT framework
 - Learner-centered education theory
 - Performed at point of care
 - Integrated into normal RN activities
 - Last 10 minutes so patient care not affected
 - Provide real-time patient feedback using the glycemic monitoring window (GMW)



Phase 1: CNS Facilitation Intervention

- 2 components
 - Introduction
 - Scripted
 - Project information sheet
 - Brief review of glycemic control evidence
 - Discussion & review
 - Scripted open ended questions
 - Assess familiarization with GMW
 - Describe patient's level of control
 - Contributing factors to control

Phase 2

- Unit E
 - Intervention (see algorithm)
 - Visit details were recorded in a journal
- Unit C
 - Usual care
 - Purposeful visits were made to ensure the same amount of CNS attention was received
 - Medication safety
 - 2009 National Patient Safety Goals
 - Occasionally discussion occurred about glycemic control

Shift			
Unit E (experimental)	Day	Night	Total
N	21	14	35
Introduction (minutes)			
Mean	2.14	1.79	2.00
Median	2.00	2.00	2.00
Range	2-3	1-2	1-3
SD	.36	.43	.42
Discussion & review (minutes)			
Mean	9.10	8.93	9.00
Median	8.00	8.00	8.00
Range	6-14	6-14	6-14
SD	2.437	3.00	2.63
Familiar with GMW?	n (%)	n (%)	n (%)
Yes	20 (57)	12 (34)	32 (91)
No	0	0	0
Somewhat	1 (3)	2 (6)	3 (9)
Patient reviewed assigned to RN	n (%)	n (%)	n (%)
Yes	15 (43)	7 (20)	22 (63)
No	6 (17)	7 (20)	13 (37)
Note. CNS= Clinical Nurse Specialist; GMW= glycemic monitoring window; RN= Registered Nurse			

Measures: RN Perception Assessment

- Investigator developed
- 6-items
 - 2 items assessed method of learning
 - 2 items assessed content of session
 - 1 items assessed overall effectiveness
 - 1 open ended item for feedback/comments
- Anonymous

Measures: Glycemic Control

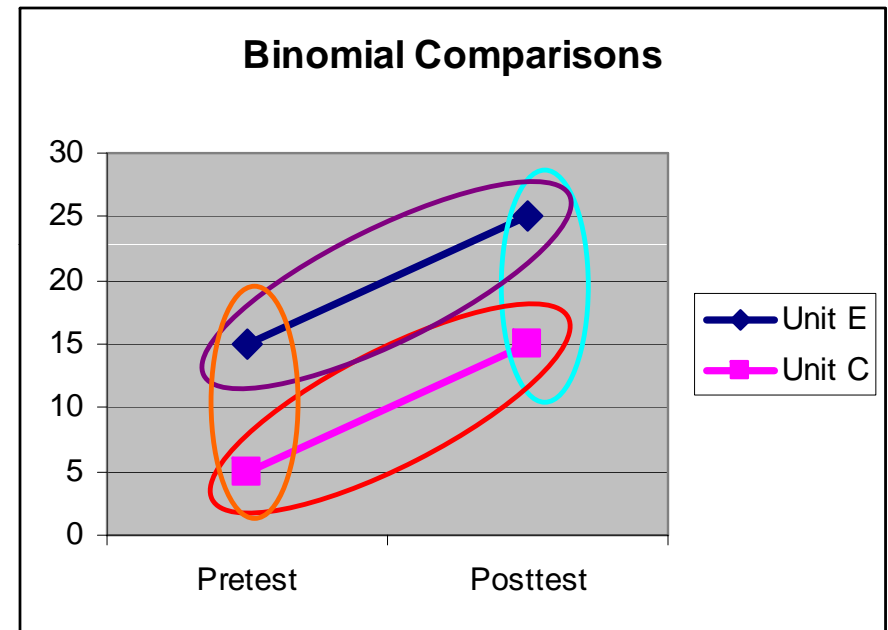
- Hypoglycemia
 - Any random glucose value less than 70mg/dL¹
- Hyperglycemia
 - Any random glucose value greater than 200mg/dL²
- Units of Analysis
 - All glucose values
 - Monitored patient day
 - A calendar day with at least one glucose value

¹American Diabetes Association. (2008). Clinical practice recommendations 2008. *Diabetes Care*, 31(S1)

²Clement et al. (2004). Management of diabetes and hyperglycemia in hospitals. *Diabetes Care*, 27(2), 553-591

Analysis

- Question 1
 - A series of binomial tests to examine differences in hypo and hyperglycemia rates
 - Pretest rate
 - Average of 3 months data (Dec 2008-Feb 2009)
 - Posttest rate
 - Single month (April 2009)
- Question 2
 - Descriptive statistics to evaluate RN perception assessment responses



Results

- Question 1: Is there a difference in hypo and hyperglycemia rates between nursing units where CNS facilitation was implemented versus usual care?
 - 5 statistically significant differences
 - All in the hyperglycemia condition
 - All glucose values = 2
 - Monitored patient day = 3

Results

- Question 2: What are Registered Nurse perceptions of CNS facilitation?
 - Survey completion rate= 88.6% (n=31)
 - RNs preferred learning at the point of care (67.7%)
 - Interruption was worthwhile (96.8%)
 - Information would assist them with improving glycemic control (90.3%)

Discussion

- Key Considerations
 - Evaluating glucose control in the acute care setting is a relatively new concept
 - There is limited published data for comparison
 - Varying definitions for glucose control are used

Discussion: All Glucose Values

- 2 significant differences in the hyperglycemia comparisons
 - Unit E posttest to Unit C posttest ($p=0.0016$)
 - Similar difference in rates in the pretest condition
 - The difference is likely explained by patient & unit characteristics
 - Example: Unit C admits more poorly controlled patients (e.g. vascular patients) & has less experienced RNs
 - Unit E to benchmark¹ ($p=0.0003$)
 - Defined hyperglycemia as glucose > 200mg/dL
 - Data is from the acute care setting
 - Hyperglycemia rate was even lower in pretest condition (15.7% vs. 16.2%)

¹Cook et al. (2007). Inpatient point-of-care bedside glucose testing: Preliminary data on use of connectivity informatics to measure hospital glycemic control. *Diabetes Technology & Therapeutics*, 9(6), 493-500

Discussion: All Glucose Values

- Unit E pretest compared to posttest:
Hypoglycemia
 - Reduction in rate (1.1% to 0.8%)
 - No significant difference ($p= 0.924$)
 - Clinically relevant
 - Hypoglycemia is an important indicator of safety
 - Recognized as a barrier to implementing practice changes aimed at improving glucose control ¹
 - Hypoglycemia occurred infrequently ($n=17$)
 - Likely the sample size was too small to detect a difference

¹American Association of Clinical Endocrinologists. (2007). Medical guidelines for clinical practice for the management of diabetes mellitus. *Endocrine Practice*, 13(S1), 3-68.

Discussion: Monitored Patient Day

- 3 statistically significant differences in the hyperglycemia comparisons
 - Unit E was lower than Unit C in the posttest condition ($p=0.017$)
 - Difference was also present in the pretest condition
 - Difference is likely explained by patient and unit characteristics
 - The benchmark¹ was lower than Unit E in the posttest condition ($p<0.0001$)
 - Benchmark definition= any glucose value greater than 300 mg/dL
 - Only acute care, monitored patient day comparison available
 - Difference in definition is the likely explanation
 - The benchmark¹ was lower than Unit C in the posttest condition ($p<.00001$).
 - Same explanation as above

¹Goldberg, et al. (2006). Glucometrics- Assessing the quality of inpatient glucose management. *Diabetes Technology & Therapeutics*, 8(5), 560-569

Discussion: RN Perception Assessment

Provided useful information for future development and application of facilitation at the point of care

- Length of session rated as “just right” (96.8%)
- Intervention reported as a worthwhile interruption (96.8%)
- Believed the information presented would improve glycemic control (90.3%)
- Suggests that facilitation at the point of care was effective and meaningful to RNs

Discussion: OFKT

- Doran & Sidani (2007) conceptualized advanced practice nurse facilitated outcome review would support:
 - Continuous improvement
 - The relationship between uptake of evidence and improved patient outcomes
- Relationship was an adaptation and required testing

Discussion: OFKT

- CNS facilitation at the point of care did not improve glucose outcomes
 - Inconsistent with Brown & McCormack (2005)¹ review that found the constructs of the framework are beneficial to getting evidence into practice
 - Consistent with 2008 Cochrane review² that evaluated the effectiveness of feedback interventions
 - Found a range of improvement from a 16% decrease to a 70% increase

¹Brown, D., & McCormack, B. (2005). Developing postoperative pain management: Utilising promoting action on research implementation in health services (PARIHS) framework. *Worldviews on Evidence-Based Nursing*, 2(3), 131-141

²Jamtvedt, et al. (2008). Audit and feedback: Effects on professional practice and health care outcomes (review). *The Cochrane Library*, (1), 1-85

Discussion: OFKT

- Observations from the intervention
 - RNs able to recognize the level of control & contributing factors
 - Able to reflect on past practice
 - Example: RN that made a decision to hold pre-meal insulin when the patient's blood glucose was normal (they were afraid of causing hypoglycemia), re-evaluated decision and stated they should have administered the dose to prevent post-meal hyperglycemia
 - Even though glucose outcomes did not support the relationships within the framework, the reflection that occurred suggested that facilitation was practical and useful
 - Similar to conclusions drawn by Kitson (2008)¹

¹Kitson, et al. (2008). Evaluating the successful implementation of evidence into practice using the PARIHS framework: Theoretical and practical challenges. *Implementation Science*, 3(1)

Limitations

- Pretest group characteristics could have differed from posttest group
- Dose of the intervention may not have been strong enough
- Glycemic control is a dynamic process influenced by multiple variables (e.g. pt characteristics, provider practices, nutrition)
 - Not accounted for in the project design
- Benchmark for monitored patient day comparisons used different definitions for hypo and hyperglycemia

Limitations

- Comparison rates
 - Pretest comparison rates were determined by averaging the rates of three consecutive months
 - Posttest comparison rates were derived from a single month of data
 - Use of only a single month could have biased results as normal month to month variation is not reflected
 - Example: monitored patient day hyperglycemia rates for Unit E in the pretest condition ranged from 32.0% to 24.6% with an average rate of 28.2%. The posttest rate was 31.9%.

Conclusions

- Glucose findings imply that CNS facilitation does not impact outcomes as expected
- RN perception assessment findings imply CNS facilitation has potential

Future

- An equal number of posttest months need to be analyzed to control for any monthly variation in the data
- Determine if the dose of the intervention has an effect on glucose outcomes
- Development standardized hypo and hyperglycemia definitions at the national level to support comparisons
- Continued testing of the OFKT framework is needed to understand conceptually and operationally how to improve outcomes through the use of evidence at the point of care

Program Reflection

- **3 program competencies**
 - Facilitated a group of RNs who submitted a manuscript on the development & implementation of an evidence based hypoglycemia protocol
 - Completed a gap analysis to determine areas of improvement in glycemic management within the organization Joint Commission criteria
 - Utilized case reports to complete an in-depth analysis of several aspects of diabetes
 - Completed a policy analysis on staffing legislation and mandatory staffing levels in the acute care setting
 - Led the development of a database to analyze unit level glucose values and developed a user manual to facilitate database use by the VA nationally

Future

- Continue in the acute care CNS role with a new and different perspective

Questions/Comments

Thank you

Registered Nurses

Volunteers needed to participate in a Practice Improvement Project

What is the project? The purpose of the project is improve glycemic control in the acute care setting

9D and 9C will be randomized to receive CNS facilitation or no intervention (usual practice).

Who is eligible to participate? RNs providing patient care on 9C and 9D.

What information will be collected? No identifying information will be collected from RN participants.

How do I volunteer? After a facilitation session, complete the RN perception assessment.

Will I receive anything for my participation? Participants will not be compensated. However, participation can be documented on your annual proficiency.

For more information attend an informational sessions or contact
Christy Locke, CNS (x56177)

Participant Information Sheet

Improving Glycemic Outcomes through Facilitation at the Point of Care

What is the purpose of the study?

The purpose is to improve glycemic control in the acute care setting through Clinical Nurse Specialist (CNS) facilitation.

Acute care units will be randomized to receive CNS facilitation or no intervention (usual practice).

Who can participate?

RNs providing patient care on 9C and 9D.

What should I expect if I participate?

During your duty hours a unit based CNS will provide facilitation on your unit. Facilitation will involve a 5-15 discussion regarding glycemic control. You will be asked to complete an anonymous assessment at the end of each facilitation session.

What are the risks/benefits?

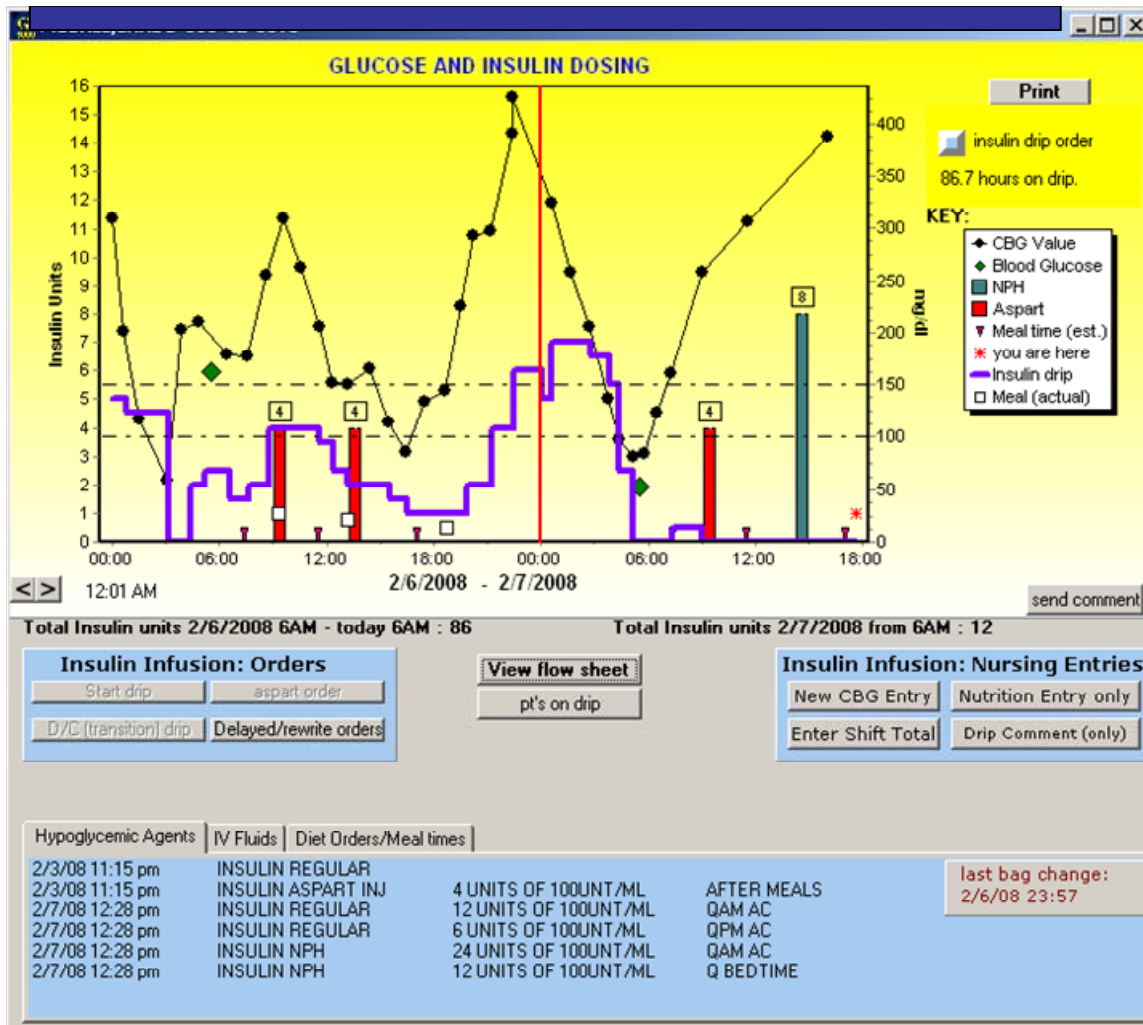
There is minimal risk to you for participating. You will not be compensated. You can include participation on your annual proficiency.

Will my privacy be protected?

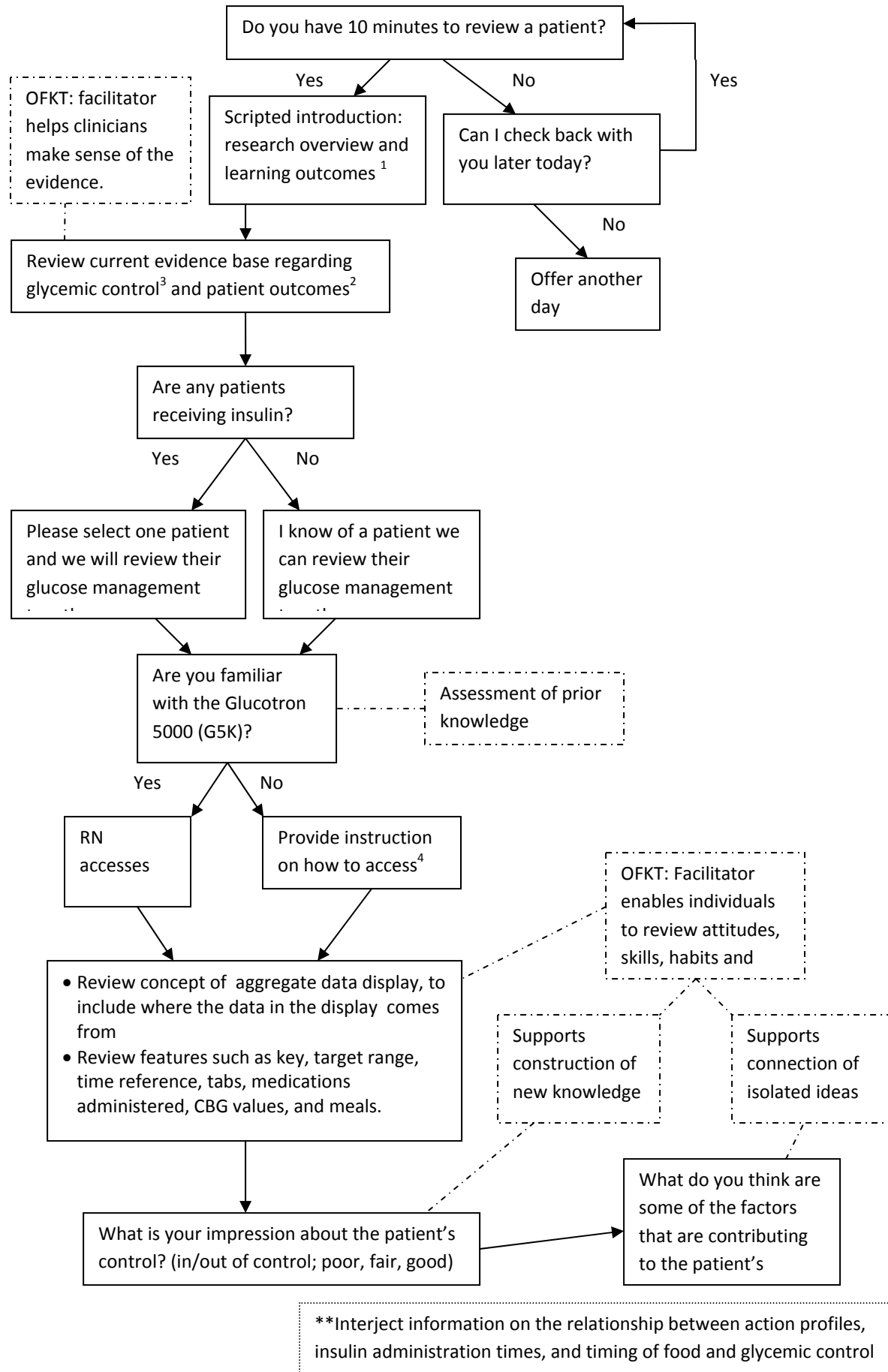
No personal or identifying information will be collected from you. A journal will be kept recording the themes of discussion during the facilitation session.

For more information contact: Christy Locke, CNS 503-220-8262 x56177

Appendix C. Glycemic Monitoring Window



Appendix D. Facilitation Algorithm



Appendix E. Facilitation Script

CNS Facilitation Session Scripts:

1. I would like to review a patient with you as part of a research study. Provide RN with a copy of the IRB approved information sheet and review with RN. Answer questions.
2. There are 4 learning outcomes as part of this facilitation session:
 - a. First, is to understand the current evidence base regarding glycemic control.
 - b. Next, is to understand the key features of the Glucotron 5000.
 - c. Third, it to evaluate the glucose management of one patient and determine the level of control.
 - d. Finally, identify the contributing factors to the patient's level of glucose control.
3. The current evidence around glycemic control demonstrates that glucose control can produce better outcomes in some patient groups. For example, it can decrease surgical site infection and other types of infections in patients and it can decrease length of stay.
4. To access the Glucotron 5000, open a patient record in CPRS, go to the tool bar, about half way down on the menu is the Glucotron 5000. .

Appendix F. Blood Glucose Testing Policy

Blood Glucose Point of Care Testing Using Accu-Chek Inform™ System

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PART I: Portland VAMC Glucose Testing Policies

A. General Policies

1. This document is the official policy and procedure for the use of the Accu-Chek Inform™ System glucose point of care testing throughout the Medical Center.
2. The policies and procedures pertaining to blood glucose monitoring, quality control, and record keeping with the Accu-Chek Inform™ System are reviewed annually by the Ancillary Testing Coordinator and the Glucose Testing (Nursing) Site Coordinator and will be signed by the Laboratory Director.
3. The Accu-Chek Inform™ System is currently the standard of care for point-of-care glucose testing in all areas where nursing staff are assigned, with the exception of the following areas where Accu-Chek Inform™ System is not used: Operating Room, Anesthesia, Home-Based Primary Care, and the Substance Abuse Treatment Program (SATP).
4. For a current list of glucose testing locations, contact the Glucose Testing Nursing Site Coordinator.
5. If the Accu-Chek Inform™ System should fail during any of its tasks, the [Troubleshooting section \(pg 6\)](#) in this procedure or in the User's Manual should be referenced for problem-solving information and patient management.

B. Clinical Indications: Any patient requiring blood glucose levels for the purpose of monitoring and managing diabetes control.

1. The Accu-Chek Inform™ System will provide blood glucose readings in the operating range of 10 – 600 mg/dL, however the upper and lower extremes of the operating range will not produce accurate results. Therefore, only results greater or equal to 30 and less than or equal to 500 will be charted with a numerical value (i.e. the reportable range).
2. Glucose readings should only be used with patients who have hematocrit (HCT) levels in the near normal range (20 – 65%).¹ Glucose results are inaccurate in patients whose HCT levels are outside this range, and only lab glucose results may be used.
3. Values may be falsely low in patients with severe dehydration which can accompany hyperglycemia. Therefore, patients with diabetic ketoacidosis or hyperosmolar nonketotic coma should have periodic laboratory glucose samples drawn when glucose levels remain above 300 mg/dL.
4. Patients with severe edema, impaired circulation, infection, or a mastectomy should have capillary blood samples taken from the earlobe instead of the fingertip.
5. The Accu-Chek Inform meter should **NOT** be used on patients who have received IV immunoglobulin solutions, have taken oral xylose or have been on PD (i.e. peritoneal dialysis solutions that contain icodextrin (e.g. Extraneal) or galactose) within the past 24 hours. If a patient receives products containing maltose, galactose, or oral xylose and is then tested using an Accu-Chek Inform, the glucose reading may be falsely high. Hypoglycemia may go untreated. The Inform meter cannot distinguish the sugars glucose, maltose, galactose, and xylose. Use of the Inform meter may result in cases of inappropriate insulin administration and consequent life-threatening or fatal hypoglycemia because of erroneous blood glucose test results for patients receiving products that may contain or may be metabolized into maltose, galactose, or xylose.
6. Refer to "[Limitations of the Method](#)" section (page 3) or the test strip packaging information for further clinical information.

¹ HCT <20% and glucose >200 mg/dL = falsely elevated glucose result.
HCT >55% and glucose >200 mg/dL = falsely decreased glucose result.

C. Limitations of the Method: Test strips give dependable test results if the following limitations are understood:

1. Do not use during xylose absorption testing.
2. No effect was found at 20% to 65% hematocrit and glucose concentrations up to 200 mg/dL. At glucose concentrations above 200 mg/dL, low hematocrits (below 20%) may cause falsely elevated results and high hematocrits (above 55%) may cause falsely low results versus a whole blood reference.
3. The following compounds, when determined to be in excess of their limitations, may produce elevated glucose results:

Compound	Limitation
Galactose	>10 mg/dL
Maltose	>16 mg/dL
Bilirubin (unconjugated)	>20 mg/dL
Lipemic Samples	>5000 mg/dL
Acetaminophen	>8 mg/dL
Uric Acid:	
Hypoglycemic range	>10 mg/dL
Euglycemic range	>12 mg/dL
Hyperglycemic range	>16 mg/dL

4. In situations of decreased peripheral blood flow, fingerstick blood testing may not be appropriate as it may not reflect the true physiological state. Examples would include but are not limited to: severe dehydration caused by diabetic ketoacidosis or the hyperglycemic hyperosmolar nonketotic state, hypotension, shock, or peripheral vascular disease.

D. Operator Certification/Recertification Policies:

1. Only personnel whose certification and competency can be tracked in the Laboratory glucose database are permitted to perform patient testing independently. Agency nurses may perform CBG testing after obtaining computer access and CBG certification. Student nurses may perform CBG testing under their own access if they have computer (VistA) access and have been certified for CBG testing.
2. Operators must maintain certification to perform glucose testing and be proficient in the use of the Accu-Chek Inform™ System. Employees authorized to perform glucose testing after completing the certification process include: RNs, LPNs, NAs, SNTs, MAs, Student Nurses, NPs, CNSs, MDs, Health Techs, and Clinical Pharmacists.
3. An Accu-Chek Inform™ System Instructors must be certified by the Glucose Testing Nursing Site Coordinator(s) based on demonstrated advanced knowledge of the testing system, CAP standards, and observation of performance as an Accu-Chek Inform™ System trainer.
4. Initial certification and training records will be maintained on the nursing unit. Initial certification is limited to a six-month period, annually thereafter.
5. To become a certified operator of the Accu-Chek Inform™ System, each operator will demonstrate the following:
 - a. Achievement of the knowledge and skills to perform blood glucose testing as defined in this policy/procedure. The operator is required to pass a knowledge test based on the content of this policy/procedure with a score of at least 90%.
 - b. Achieve a PASS on a complete QC routine.
 - c. Be observed by a certified trainer performing a patient test, which includes obtaining the specimen. (Employee testing of self or other employees for training is not acceptable.) Trainees should refer to the step-by-step instructions for obtaining a [patient blood droplet as indicated in this procedure](#).
 - d. Each operator must successfully complete the [attached knowledge and skills checklist to be certified](#) to perform blood glucose testing using this equipment.

- e. A copy of the initial certification checklist must be forwarded to the Glucose Testing Nursing Site Coordinator(s). The original stays in the employee competency folder.
- f. The meter will not allow a new operator access to perform testing until the certification information has been entered into the Lab Information Management System.
6. Recertification requires the following:
 - a. A passing score on the knowledge-based test,
 - b. Observation of testing performance by a Certified Trainer.
 - c. Perform a successful QC routine (both levels of controls) after the first six months of certification and at least annually thereafter. (Ongoing certification is automatically tracked via the Lab Information System, which updates recertification following a successful QC routine).
 - d. Meters will not work for the operator after certification has expired.
7. Each operator will also be assessed for ongoing competency based on
 - a. Monthly unit-based review of quality control and statistical reports,
 - b. Triennial proficiency testing of a randomly selected certified staff member, and
 - c. Individualized findings from ongoing review of flagged results and errors by the Glucose Testing Nursing Site Coordinator(s).

E. Quality Control Testing Policies

Quality control testing validates the integrity of the strips, the correct coding and calibration of the meter, and operator technique. Therefore, it should be done on a routine basis and whenever there is a change in the meter, strips or when there are questionable test results. The meter will alert the user when the QC testing is due. If QC is not performed, the meter will lock-out further patient testing until QC is performed.

1. Low (level 1) and high (level 2) control tests are performed each day the meter will be in use, or, in areas with infrequent use, prior to patient testing, and in the following situations:
 - Each time a new vial of test strips is opened
 - When a vial of strips has been left opened more than 60 seconds
 - If the Accu-Chek Inform™ System has been dropped
 - When test results contradict clinical symptoms
 - After the battery in the Accu-Chek Inform™ System has been replaced, or
 - After the Accu-Chek Inform™ System has been recoded.
2. Patient testing may only proceed when quality control results are within the acceptable control range. This is indicated as PASS or FAIL. If the QC results FAIL, the problem must be corrected before any patient testing.
3. The corrective actions taken to restore failed QC results to acceptable range (PASS) must be recorded using comment codes. Quality control comment codes may be free text or may be chosen from the following:

Quality Control Comment Codes			
Acceptable QC	Will Repeat Test	Ran Wrong Control	Operator Error
New Strip Lot	New Test Strips	New QC Solutions	(Or use free text)

4. If problem persists, call Accu-Chek Customer Care at 1-800-440-3638. This number is available 24 hours per day, 7 days per week..
5. Glucose control solutions must be stored at room temperature. Glucose control solutions are stable for three months after opening or until the expiration date, whichever comes first. The discard date should be written on the vial label.
6. Test strips should remain in the tightly sealed vial. Test strips remain stable for CBG testing for only 30 – 60 seconds after removal from the vial.
7. The Ancillary Testing Coordinator (LAB) will review QC on a weekly basis, prepare monthly QC and error reports for each testing site, and notify the Glucose Testing Nursing Site Coordinator(s) when corrective action is needed for identified problems..

8. Each clinical testing area will designate an individual for oversight of performance quality related to glucose testing. This includes checking dating of control solutions, expiration dates of control solutions, operator certification/recertification, review of QC results and monthly error reports, as well as acting on QC results which identify trends that may indicate potential problems. These trends include acting on the analysis and recommendations for each site in the monthly QC reports.

F. Expected Values

1. The normal fasting blood glucose range for a non-diabetic adult is 70-110 mg/dL.⁴
2. One to two hours after meals, normal blood glucose levels for a non-diabetic adult should be less than 145 mg/dL. The recommended level for a diabetic patient is a peak postprandial glucose less than 180 mg/dL. Peak levels may be somewhat higher sooner and also somewhat higher with older patients.

G. Critical Values

If a whole blood glucose value is **less than 60 mg/dL or greater than 500 mg/dL**, the operator will:

- a. repeat the test with a new strip,
- b. if result is still in critical value range and unexpected, acute care areas must collect a specimen and order a stat glucose to be performed in the laboratory,
- c. notify the provider of a high or low glucose critical value as measured by the glucometer, and
- d. document the event using the glucometer comment code(s).

H. Specimen Collection and Handling *(Refer to the test strip package insert for the most current Information)*

1. Capillary, venous and arterial whole blood specimens may be used for testing on the Accu-Chek Inform™ System with Accu-Chek Comfort Curve test strips. Do not use serum or plasma.
2. The capillary fingertip sample must be tested immediately after collection. Sufficient sample size is required to ensure accurate results.
3. Venous and Arterial specimens: Blood glucose determinations using venous and arterial blood specimens should be performed within 30 minutes of specimen collection to avoid glycolysis. Mix samples thoroughly.
 - For best results with arterial and venous blood, heparin and EDTA are the recommended anticoagulants/preservatives.
 - Serum separator tubes and red-topped tubes are acceptable if blood is used immediately before the clotting process begins.
 - Iodoacetate or fluoride/oxalate should not be used as a preservative.
 - Caution should be taken to clear arterial lines before blood is drawn and dosed on the test strip.

I. Patient Testing Policies

1. Blood glucose tests must be ordered by a provider unless the patient is experiencing symptoms of hypoglycemia or hyperglycemia, and quality care dictates a STAT test. Each test result is uploaded to CPRS from the meter and will be processed by the software as a new “policy” order.
2. The operator must view the patient’s hospital wristband, veterans’ ID card, or drivers license and ask the patient to state his/her name and social security number, and/or compare any photo identification to the patient and his/her CPRS photo, if available.
3. Have patient wash hands with warm water and soap and dry thoroughly. If patient is unable to wash, cleanse the puncture site (the side of the fingertip) with an alcohol swab and allow it to thoroughly dry. Alcohol at the puncture site must be dry or an error code/inaccurate result may occur.
4. A bar code scanner is used to enter patient ID and/or operator ID in the Accu-Chek Inform™ System. Manual input should be used only in situations where scanning is not available or not feasible. Manual entry causes frequent errors and will be tracked.
5. Testing should be performed on patients only. Employee self-testing is not appropriate. Employee testing of other employees, visitors and/or non-patients is also inappropriate, including the use of own blood sample(s) or those of other employees’ as part of glucose testing training. Employees not feeling well should go to Occupational Health or the Emergency **Care Unit** for evaluation instead.
6. Any employee receiving verbal or telephone communication of any testing results, especially critical values, should write down the result and confirm it by reading it back to the person giving the result.
7. For ECU only, an emergency situation may necessitate running a patient test without the patient’s SSN, if not immediately available. The ECU will use patient ID #“00000911” plus the user’s operator ID. Test results including date, time, and operator must be manually documented into the progress notes of the medical record when this occurs, since these results cannot be uploaded to CPRS. ECU will provide patient information on each use of the “911” patient ID to the glucose POC Coordinator(s) for reconciliation.
8. All patient results obtained by non-RN staff will be communicated to the RN. Critical values as well as unexpected results must be reported immediately.

J. Infection Control Guidelines

1. Standard precautions are required during patient testing, for handling blood-contaminated lancets and/or tests strips, and for cleaning the meter. Disposable gloves must be used.
2. The Accu-Chek Inform™ meter must be disinfected if contaminated with blood.
3. Lancet devices will be utilized with disposable tips. Used lancet tips will be discarded in sharps containers. Tips will be changed between patients.
4. The lancet device will be disinfected if it is contaminated with blood.
5. To guard against accidental needlesticks, tips are removed from the lancet device after each use and are not replaced until the next fingerstick is to be performed. This allows anyone, anytime to determine whether the device is loaded with a lancet.
6. Used test strips and gloves used for glucose testing may be discarded in regular trash containers.
7. For patients in Contact isolation, place meter in a sealed biohazard bag or clear plastic bag . Pierce a small hole in the bag for the strip guide area of the meter. After performing testing, remove and dispose of test strip and bag in the room. Outside the room, wipe down the meter (See Cleaning Procedure for the Meter on pg 11) and wash hands.

K. Documentation of Blood Glucose Result

The test results are electronically uploaded to CPRS/VISTA to the Lab results. This is the official documentation of the result. Frequent data uploads are required to maintain current results in the official electronic record. Use comment codes (scan or enter code numbers as needed to document problems, maintenance, clinical status such as fasting state, or other pertinent information to interpret results.

L. Downtime Process for Glucose Testing

In the event of downtime related to network failure or inability to upload data to CPRS/VISTA, glucose testing information may be recalled from each meter for up to 10 days or 4000 tests, whichever occurs first. The procedures to recall tests from meter memory for a group of patients or a single patient are described below:

M. Meter Repair/Troubleshooting

1. Prior to exchanging any meter, the following steps must be taken. Call Roche Tech Support line at 1-800-440-3638 for 24 hour troubleshooting assistance. If the meter will not work at all, or will display a blank screen. In this case, the user should reset the meter as described on page 9 (Error Codes.)
2. If staff are unable to correct a problem with the Accu-Chek Inform™ System, it is removed from service and sent to the Lab for repair/replacement. *The Accu-Chek Inform™ System must be cleaned and disinfected before it is sent out for repair or replacement.*
3. Meters will lock-out if the battery has not been recharged in the cradle within 48 hours.

PART II: Procedures for Use of the Accu-Chek Inform Meter

A. Coding (Calibration/Recalibration)

1. **Calibration:** Coding is always verified by matching the code on the Accu-Chek Inform™ display screen with the code number printed on the side of the vial of test strips. The meter is “calibrated” when the instrument is turned on with the Code Key inserted. It is recommended that the Code Key be changed with each new vial of test strips.
 - a. Remove the Code Key from the test strip box.
 - b. Compare the three-digit number on the Code Key with the number on the test strip vial.
 - c. Remove old Code Key from Accu-Chek Inform™ meter, if necessary and discard.
 - d. Snap the new Code Key (slots facing towards the meter) into the Code Key slot with the printed side facing up.
 - e. Leave the Code Key in the meter.
 - f. With each new vial of test strips, switch to the new Code Key.
2. **Recalibration:** If the test strip code displayed by the Accu-Chek Inform™ System does not match the code of the test strips in use, the meter must be recoded (recalibrated) and the new code information must be entered in the Accu-Chek Inform™ System. This may occur with patient testing or during quality control testing. If this occurs, place the correct code key into the meter according to the Calibration instructions above. In some cases, there could be a new lot of strips released for the meters, and if the meter has not been recently uploaded, this information will not be present. Simply re-dock the meter into the cradle to be certain the meter has the most recent information.

B. Test Strip Storage and Handling (obtain strips from Pharmacy)

1. Test strips must be stored at room temperature. Do not freeze.
2. Test strips are stored in the same tightly capped vial in which they are packaged. The vial cap must be immediately replaced after removal of a test strip. Strips should be used within 30-60 seconds after taking them out of the vial.
3. Test strips may be used until the expiration date on the vial.

C. Patient Preparation

1. The following items should be gathered and taken to the patient’s bedside: *(test strips and control solutions are available from Pharmacy)*
 - Accu-Chek Inform™ System and Accu-Chek Comfort Curve test strips.
 - Glucolet2 automatic lancing device and disposable fingerstick lancet
 - Alcohol swab
 - Cotton ball, tissue, or gauze for wiping finger after stick
 - Disposable gloves

2. Identify the correct patient to be tested using two methods. ([See page 6 Patient Testing policy.](#))
3. Assure that the skin at the site (fingerstick or earlobe) has been cleansed according to policy ([See Clinical Indications page 2, #4.](#))

D. Patient Testing Procedure

1. Standard precautions must be observed. Put on protective gloves.
2. Prepare Glucolet2 automatic lancing device by pressing the clean plastic plunger on a flat surface until a "click" sounds, then load fingerstick lancet onto Glucolet2 and twist off protective lancet cap with a twisting motion.
3. Press power ON button.
4. Scan (or enter) your operator ID. (If operator is not certified or certification has expired, the Operator ID will not work and meter cannot be used.) Press the forward arrow button. If the barcode is not available to scan, enter your assigned operator ID#. Press ENTER. (Note: The operator's DUZ (VISTA user identifier) number is used for this application.
5. Select Patient Test.
6. Scan (or enter) the patient ID. Press the forward arrow button. If patient barcode (wristband or Veterans' ID card) is not available, use full 9 digit SS#. (Be sure to enter the patient ID BEFORE scanning the test strip vial. This is a frequent error.)
7. Verify the correct test strip lot number by scanning the vial or by entering YES/NO response to menu screen. (Code key must match test strip code or meter will not work.) ([See Recalibration on page 3.](#))
8. For a capillary specimen, hang the patient's arm in a dependent position for 30 seconds to increase blood flow to fingertips.
9. When the flashing strip icon appears on the meter display, gently insert test strip with the yellow target area or test strip window facing up. (Insert the end with the silver bars.)
10. Note: Insert test strip BEFORE dosing with blood.
11. When the flashing drop icon appears on the monitor display, obtain a blood sample. You may use a whole blood capillary, venous, or arterial sample.
12. Perform the finger puncture by positioning the loaded Glucolet2 on the side of the patient's fingertip and press the blue release button. (The needle advances, penetrates skin, and instantly retracts.) Gently squeeze until a small drop of blood rests on the patient's finger. (Not a hanging drop.)
 - Touch and hold the drop of blood to the edge of the yellow window and blood will be drawn into the strip. Fill the yellow window completely. Visually inspect to be sure yellow area is covered completely. If any yellow color is seen, more blood may be added within 15 seconds of the first drop.
 - If more than 15 seconds have passed, the test result may be erroneous, and you should discard the test strip and repeat the test.
13. An hourglass will appear on the display while waiting for the result. (Usually about 26 seconds.)
14. Each patient result must include at least one comment code, i.e. OK to Chart, if applicable, as a minimum. Select up to three preprogrammed comments and one custom comment based on results. After selecting comments, press the forward arrow button to record the test result and again to return to the Main Menu screen. Standard comment codes include:

Patient Testing Comment Codes			
OK to Chart	Request Lab Draw	Non-patient Test	Error Do Not Chart
Notify Provider	Will Repeat Test	Fasting	Proficiency Test
Notify RN	Repeated Test	MD Aware of Result	Will give insulin
Asymptomatic	Unexpected Result	Ate within 2 hours	Hypoglycemia Protocol
Symptomatic	Expected Result	Insulin Protocol	(Or use free text)

15. Remove the test strip from the meter and discard it in regular trash.
16. Discard the used lancet in a biohazard sharps container.
17. Press the purple POWER button to turn the Accu-Chek Inform™ System off.
18. Remove gloves and dispose of them in regular trash. Wash hands thoroughly with soap and water.
19. Replace the meter in its cradle (making sure it is OFF) as soon as possible after testing or after using for multiple patients to upload the results to CPRS. This will make the data immediately available to the providers within CPRS.

E. Error Codes/Messages

If the Accu-Chek Inform™ System displays anything other than a numerical blood glucose result, troubleshoot the results using the table below:

Error Code/Message	Interpretation	Operator Action(s)
HI	Test result may be higher than the reading range of the meter.	If result contradicts patient's condition, perform QC (quality control) test with QC solution and a new test strip. If QC is in acceptable range, repeat the patient test with a new test strip. If patient test still HI, report to physician and verify result with a Lab test. If control result is not within acceptable range, do not perform any further patient testing with that meter.
Testing error-133 A glucose overflow error has occurred, type 71	Test result may be extremely high and above the meter's reading range.	(Same as above) If this result contradicts the patient's condition, perform a QC test with QC solution and a new test strip. If the QC is in acceptable range, repeat the patient test with a new test strip. If patient test still HI, report to physician and verify result with a Lab test. If the control result is not within acceptable range, do not perform any further patient testing with that meter.
LO	Test result may be lower than the reading range of the meter.	(Same as above.) If this result contradicts the patient's condition, perform a QC (quality control) test with QC solution and a new test strip. If the QC is in acceptable range, repeat the patient test with a new test strip. If patient test still LO, report to physician and verify result with a Lab test. If the control result is not within acceptable range, do not perform any further patient testing with that meter.
Strip Defect	Test strip may be damaged or the test was not performed correctly.	The test strip should be inserted into the meter prior to applying blood to the test strip. If this display appears <i>before</i> blood is placed on the strip, remove the test strip and reinsert. If the error display remains, repeat the test with a new strip.
Error 88-Bad Dose	Incorrect amount of blood on the strip.	A second drop of blood may be applied to the test strip within 15 seconds of the first drop. If more than 15 seconds have passed, the test result may be erroneous. Discard test strip and repeat the test.
Fatal Alert Memory mgr_e line 4340 Null Handle	Reset the meter.	Reset the Inform meter by pressing the reset button on the lower right side of the back of the meter with the tip of a paperclip. (See reset button on picture at bottom of page 14).
Error-83	Bad strip or extremely low result	The test strips may be defective or the blood glucose result may be extremely low and below the meter's

Error Code/Message	Interpretation	Operator Action(s)
		reading range. Refer to the test strip package insert, perform a QC test using a new test strip, review proper testing procedure, and repeat the patient test or obtain a lab draw.
Meter will not come on (blank screen) when power button is pressed.	Reset the meter.	Reset the Inform meter by pressing the reset button on the lower right side of the back of the meter with the tip of a paperclip. (See reset button on picture at bottom of page 14)

F. Recalling Testing Information From Meter Memory

1. Press power ON button.
2. Press MENU.
3. To review multi-patient results, select REVIEW RESULTS on the Main Menu screen to review the most recent results.
4. Press the up and down arrow keys to display various test results for multiple patients.
5. For a single patient, select PATIENT to specify a single patient whose results you want to see.
6. Scan (or enter) the patient ID for desired patient.
7. Press up and down arrows to review all of that patient's results.
8. Select ALL to return to viewing all patients' results.
9. Select QC to review QC results.

G. Quality Control Procedure

1. Put on disposable gloves.
2. Press power ON button.
3. Scan (or enter) your operator ID, then press the forward arrow button.
4. Select Control Test.
5. Scan the bar code for either one of the control solutions bottles: Level 1 (Low) or Level 2 (High).
6. Scan the test strip vial barcode.
7. Remove a test strip from the vial and replace the vial cap immediately.
8. When the flashing strip icon appears on the meter display, gently insert test strip with the yellow target area or test window facing up. (Insert the end with the silver bars.)
Note: Insert test strip **BEFORE** dosing.
9. Using the Accu-Chek Comfort Curve test strip, touch and hold drop of control solution to the curved edge of the yellow target area. The glucose control solution is drawn into the test strip automatically.
10. An hourglass will be displayed on the Accu-Chek Inform™ meter while waiting for the result.
11. Enter the appropriate comment(s), if needed. Then press the forward arrow button to record the test and then once again to test the second control solution or to proceed to patient testing. For the second control level, repeat steps 5 – 10 above.
12. Remove the used test strip(s) and disposable gloves and discard.

H. Linearity Testing: (Performed by Lab Only) Linearity testing is performed by the Ancillary Testing Coordinator/designee as follows:

- Before a blood glucose meter is put into use
- Anytime the Accu-Chek Inform™ System has been repaired
- Reagent reliability is checked prior to release of a new lot of test strips
- When controls begin to reflect an unusual trend or are consistently out of range
- Calibration verification is performed every 6 months
- The reportable range of each instrument is verified.
- The linear reporting range of each Accu-Chek Inform™ System is 30 mg/dL to 500 mg/dL.

- If a patient test result falls outside of the linear range, it is verified by the laboratory by an alternative method and is reported as less than (<) or greater than (>) the linear limits.
- The linearity results of each Accu-Chek Inform™ System are recorded and retained for meter linearity for the life of the meter and strip linearity records for 2 years.

I. Proficiency Testing

1. Randomly selected operators will be requested to run tests on five unknown samples according to the College of American Pathology (CAP) proficiency testing methodology to verify meter accuracy and operator competency.
2. Proficiency testing is performed three times per year at every testing site by a certified operator.
3. The test sample may be a blood product or derivative, therefore standard precautions, including glove use must be observed.
4. The procedure for proficiency testing is nearly identical to patient testing, except that the operator must go to the Main Menu after scanning in Operator ID, press the ARROW for “MORE OPTIONS” and then select “Proficiency”. (This will permit the user to scan or enter the SAMPLE ID instead of a patient ID.) Press the forward arrow button to return to the “Main Menu 2” screen to run the next sample. A Laboratory person will assist testing sites with proficiency testing meter menus.

J. Transferring Data from the Accu-Chek Inform™ System

1. Data is transferred from an Accu-Chek Inform™ System to a computer with specialized software immediately upon docking the meter in the base unit. Assuring prompt and ongoing data transfer is the responsibility of every certified operator. When not in use, leave the meter in the cradle to recharge.
2. The meter will retain testing data after an upload has been done to permit users to recall patient data from meter memory for 10 days before the data is automatically cleared.
3. To transfer data from an Accu-Chek Inform™ System, replace meter firmly into docking station cradle. Data will automatically upload to CPRS/VISTA. Two-way information exchange from the meter to the Lab occurs every 10 minutes while the meter is docked in the cradle. (Assure that all the wire connections to and from the cradle are properly plugged in and that the green indicator light on the cradle is on.)

K. Cleaning Procedure for the Meter

1. Cleaning is NOT required for meter accuracy, etc. However, the outside surfaces and communication window of the Accu-Chek Inform™ System meter should be cleaned as needed using a soft cloth slightly dampened with 70% isopropyl alcohol. Do NOT get wet or get moisture into the meter test strip guide.
2. Protective gloves are worn when performing preventive maintenance and cleaning on the GTS and blood glucose testing equipment.
3. Cleaning of the meter and battery changes should be documented in the Maintenance section of the meter by comment codes. On the Main Menu, press the ARROW for “MORE OPTIONS” then MAINTENANCE, and choose comments from those listed below. Press the ARROW to record comments, and then press ARROW 3 more times after comment selection to get back to Main Menu.

Comment Codes for Cleaning/Meter Maintenance		
New test strips	Meter cleaned	Meter inspected
New QC solutions	Called Tech Support #	New firmware

REFERENCES:

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 Atkin, S.H.; et al., Fingerstick Glucose Determination in Shock, Annals of Internal Medicine, 114:1020-1024 (1991).
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DVA, VHA Manual M-2 "Clinical Affairs", Part VI "Pathology and Laboratory Medicine Service," Chapter 10, "Ancillary Testing", March 5, 1993.

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Roche Diagnostics, Total Quality Management: Accu-Chek Inform™ System: "Policies and Procedures and In-Service Program", 2001. pp. 1-25.

Sandler, M.; Low-Beer, T., Misleading Capillary Glucose Measurements, Practical Diabetes, 7:210 (1990).

Tietz, N.W., Textbook of Clinical Chemistry, p. 2190 (1994).

United States Food and Drug Administration: Center for Biologics Evaluation and Research: FDA Safety Alert: "Important safety information on interference with blood glucose measurement following use of maltose/galactose/oral xylose-containing products [letter online]". 11/4/2005. Available from Internet: <http://www.fda.gov/cber/safety/maltose110405.htm> and "FDA Reminders for Falsely Elevated Glucose Readings from Use of Inappropriate Test Method" : <http://www.fda.gov/cdrh/oivd/news//glucosefalse.html>.

ATTACHMENTS: ["Accu-Chek Inform™ Operator Certification Checklist"](#)
 [Pictures of Accu-Chek Inform System](#)

DOCUMENT REVIEWED/REVISED BY: Nadine Johnson, MSN, RN, CPHQ and Brent Stevens, BA, RN

APPROVED BY: Clinical Practice Committee/Nursing Professional Council

REVIEW DATE: September 2008

RESCISSION: September 2007, same title

REVIEWED/APPROVED: *(Electronic concurrence(s) and/or signed original are on file in the Office of Nursing Professional Services.)*

Michael Nichols, MD
Chief, Pathology and Laboratory Medicine Services

Kathleen M. Chapman, MSN, RN, CNAA, FACHE
Deputy Director Patient Care Services

Accu-Chek Inform™ System

OPERATOR CERTIFICATION CHECKLIST

Unit: _____

Certified Trainer: Complete one Checklist for each operator-trainee. The student must meet objectives below.

Trainee has read **PART I** of the PVAMC (Nursing) procedure on CBG testing. _____

Trainee Signature

1. KNOWLEDGE-BASED TEST

- ☐ Passed test with score of at least 90%
- ☐ Retake test for score below 90%

2. TRAINEE IS ABLE TO:

a. Accu-Chek Inform™ System

- ☐ Identify Meter Features - (QC Mode, Testing Mode, Forward button, Backlight, On/Off, RESET

button)

- ☐ Demonstrate calibrating or recoding the meter.

b. Test Strips (bar codes)

- ☐ Identify the lot # code on vial
- ☐ Verbalizes strip vial storage: closed container, length of time stable outside vial, and expiration

date

4. DEMONSTRATES A COMPLETE QC ROUTINE WITH PASS RESULTS

a. Quality Control Testing

- ☐ QC solutions, open date, expiration date (barcodes) Obtain from Pharmacy
- ☐ Bar code scan.
- ☐ Scans Operator ID
- ☐ Using Level 1 and 2 solution testing demonstration
- ☐ Glucose Control test skill demonstration by operator-trainee to preceptor, including comment

codes

- ☐ Verbalizes policy on PRN and routine frequency of QC testing

- ☐ Employee has a working Operator ID barcode

QC Results

Low

High

Within expected range? ☐ YES ☐ No

5. DEMONSTRATES PATIENT TESTING PROCEDURE

☐ Demonstrates patient finger preparation for the test. (Preferably soap and water wash, or alcohol wipe, dried.)

- ☐ Demonstrate scanning operator ID

☐ Demonstrates scanning barcode of actual patient or "Ttest Patient" ID (Use Ttest, Andy, Ttest, Richard, etc.)

- ☐ Demonstrates scanning or Yes/No entry for correct strip lot verification

- ☐ Demonstrates use of correct location of fingertip for test. If actual patient or simulated test.

- ☐ Demonstrates correct application of blood to strip. Uses visual verification of correct dosing.

- ☐ Verbalizes policy for confirmation of results <60 or >500 mg/dl. for acute care and non-acute care.

- ☐ Demonstrates use of appropriate comment codes, notifications of MD/RN, and patient

management

considerations for critical results.

☐ Demonstrates cradling meter for data uploading

Actual or Simulated Patient Results _____ Skills demonstrated satisfactorily? ☐ YES

☐ No

5. VERBALIZES KNOWLEDGE OF CRITICAL CBG TESTING INFORMATION:

a. ☐ How/where to find the "Blood Glucose Point of Care Testing Using Accu-Chek Inform™ System" procedure.

b. Knowledge of PVAMC Nursing Procedure

☐ Test Range (10 - 600mg/dl) Understands implications of accuracy limitations of results at both extremes.

☐ Infection Control Procedure (Lancets, used strips, isolation, cleaning meters)

☐ Resetting meter. Procedure for meter malfunction and exchange/battery replacement

☐ Labeling discard date QC Solution policy (expiration 3 months after open date)

☐ Call Accu-Chek Customer Care at 1-800-440-3638 for help troubleshooting (available 24/7)

☐ NO _____ Operator Certified ☐ YES

Instructor Name

Date

Operator-Trainee Name

*Notify Nadine Johnson, Yen Trieu or Brent Stevens of new certifications by e-mail. Include name, date and unit.

**Unit is responsible to enter education into TEMPO. Maintain completed form in competency folder, copy/fax to Yen Trieu
P2NPS

ACCU-CHEK INFORM SYSTEM



Comfort Curve strip
doses from side and pulls
the sample into the strip.
Use the yellow pad as a
visual for adequate
sample. You can re-dose
strip within 15 seconds.

TEST STRIP PORT



TOUCH SCREEN

Use this area to enter data,
answer prompts and
observe results from a test
or control.

MENU BUTTON

Use this to go to the
Main menu screen at
any time.

FORWARD ARROW

Use this button to move to the
next screen.

BACK LIGHT

Turn on or off.

POWER ON/OFF

Turn meter off prior to
returning to base unit.

When removing from

CODE KEY

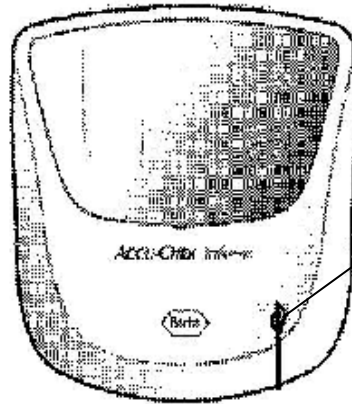
BASE UNIT

Meter home to
charge and

**BAR CODE
SCANNER**

RESET
Push to reset
meter when
necessary.

**POWER
INDICATOR**
Green light on.



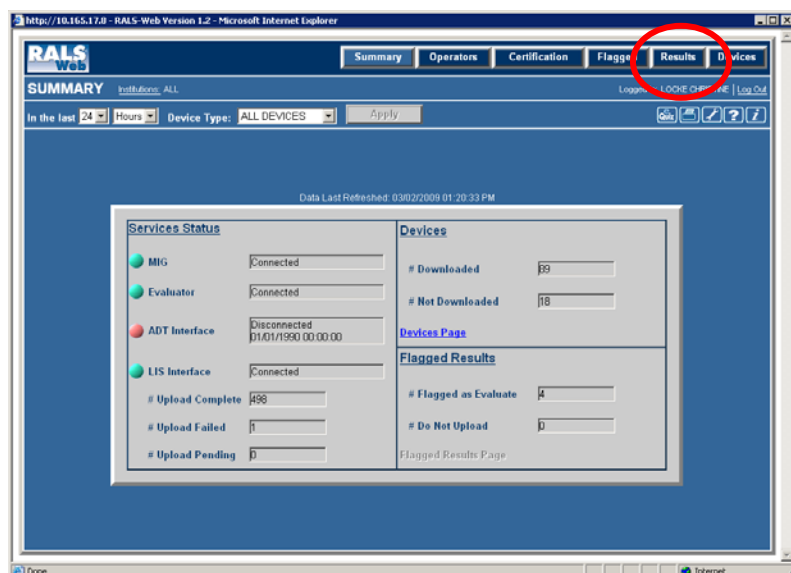
Appendix G. RALS Data Extraction Instructions

REMOTE AUTOMATED LABORATORY SYSTEM (RALS)

DATA

How to export RALS data into Excel file- *NOTE:* Data will be extracted no earlier than 14 days after the last day of the month (e.g. March data will not be extracted any earlier than April 15). This allows for evaluation of all values in the error trap.

1. Go to the Intranet/web browser
2. Type **10.165.17.8** into the browser
3. Type in Operator ID and Password (this is obtained from your RALS manager)
4. Click Log In
5. Click on RESULTS



6. Select dates (usually one month)
7. Fill in the following;
DEVICE TYPE: Accu-chek inform

RESULT RANGE: All Values

REASON FOR FAILURE: All

SAMPLE TYPE: Patient

DEVICE ID: All

LOCATION: As required. *NOTE:* if more than one unit (not ALL) is being extracted (e.g. 5D, 6D, 9D, and 9C) then the extraction process must be completed separately for each unit.

OPERATOR: All

8. Select APPLY
9. Select PRINTER ICON

RESULTS

From: 12/01/2008 To: 12/31/2008 Reason for Failure: ALL Location: 5D Sample Type: Patient Device Type: Accu-Chek Inform Device ID: ALL Operator: ALL

Apply

Review Details

Date and Time	Patient ID/Lot #	Sample Type	Location	Device ID	Operator	Result	Comment
12/01/2008 00:33:19	221301658	Patient	5D	JU48013368	DIAZ MAGALY	232 mg/dL	Notify RN
12/01/2008 02:06:16	138382070	Patient	5D	JU48013368	GOETTELMAN-SHEA HAILEY H	178 mg/dL	Notify RN

1591 records

10. Select “Copy to Clipboard” and “All records on all pages”

Print/Copy/Email Grid Data -- Web Page Dialog

☐ Print ☒ Copy to Clipboard ☐ Email

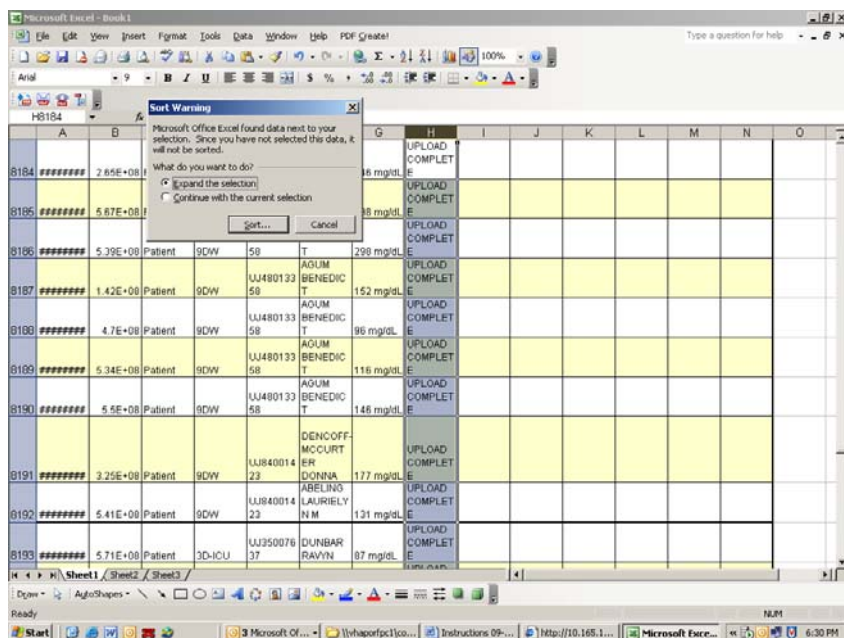
☐ Only selected records
☐ All records on this page
☒ All records on all pages

OK Cancel

http://10.165.17.8/RALS Internet

Note: Screen will FLASH---don't worry

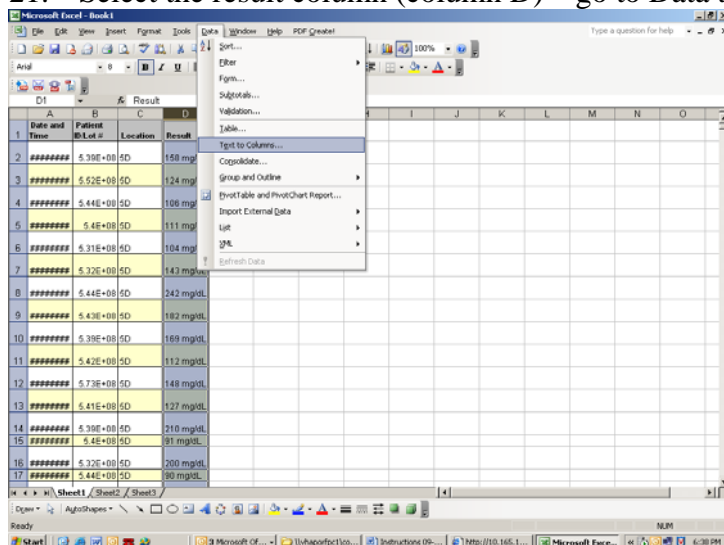
11. Open Excel sheet and PASTE
12. Complete steps 7-11 until data for all units have pasted in the Excel spreadsheet. **NOTE:** When a new unit is added, scroll to the bottom of the data and paste at the new data at the bottom. **NOTE:** Delete the header rows after each unit is pasted in the worksheet.
13. Select Sample Status column (column H)
14. Go to DATA and select SORT
15. Ensure “Expand Selection” is selected—Click Sort



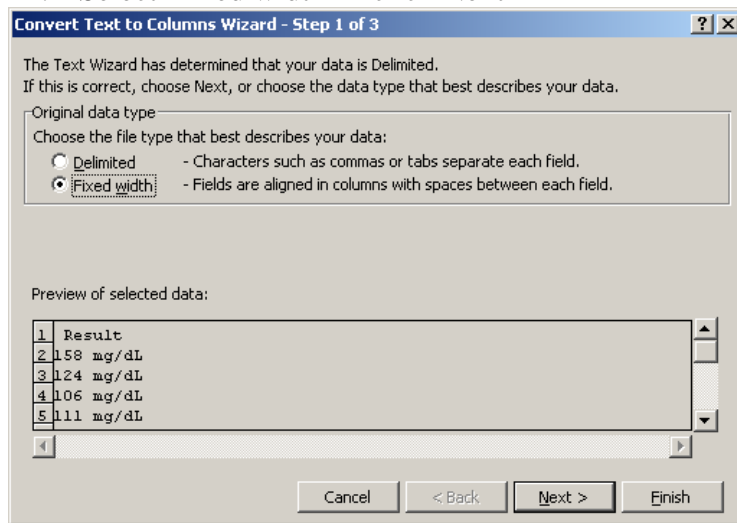
16. Sort by Sample Status-- Ascending—click OK
17. Delete all rows with "evaluate," "upload failed," "upload incomplete" in sample status column (column H)
18. DELETE the following columns
Sample Type; Device ID; Operator; Sample Status; and columns E through K
19. There should be 4 columns remaining

Date and Time	Patient ID/Lot #	Location	Result
---------------	------------------	----------	--------

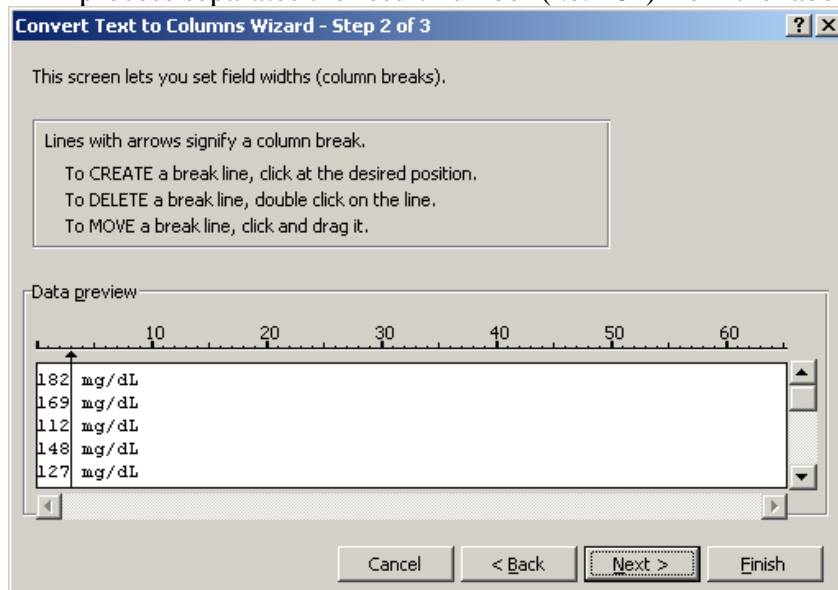
20. Change the 4 column names to read: "Date", "SSN", "Unit", and "CBG"
21. Select the result column (column D)—go to Data then select text to columns



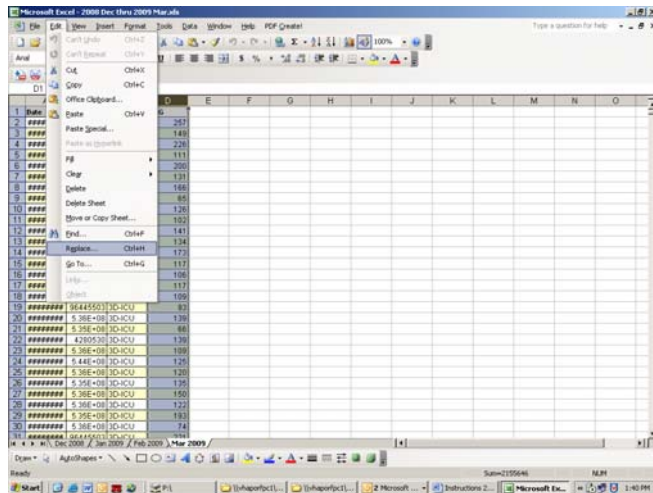
22. Select “fixed width”—click Next



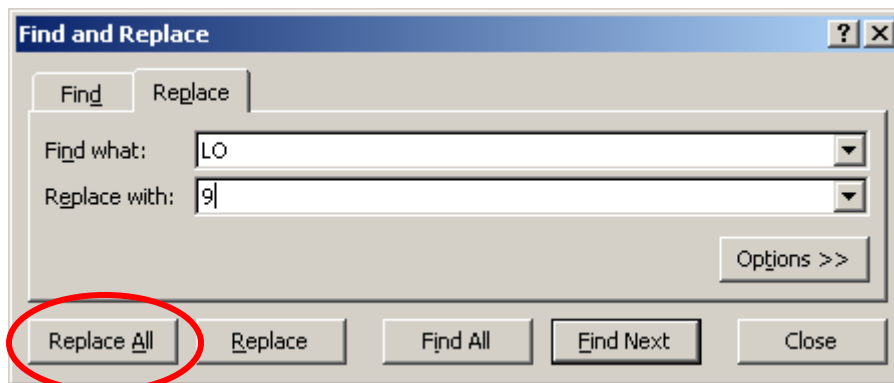
23. Click in the white box just to the right of the result number (i.e. 182). Drag the Break Line (line with the arrow) as close to numbers as possible—select Next, then select Finish. This process separates the result number (i.e. 182) from the label (mg/dL).



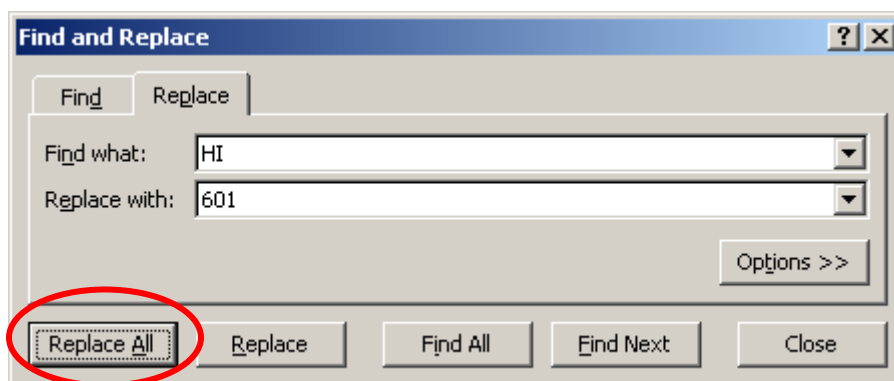
24. Select column E (column with mg/dL) and delete
25. Select column D (CBG)
26. Click “Edit” and select “Replace”



27. In Find what field type "LO"
In Replace with field type "9" → click replace all



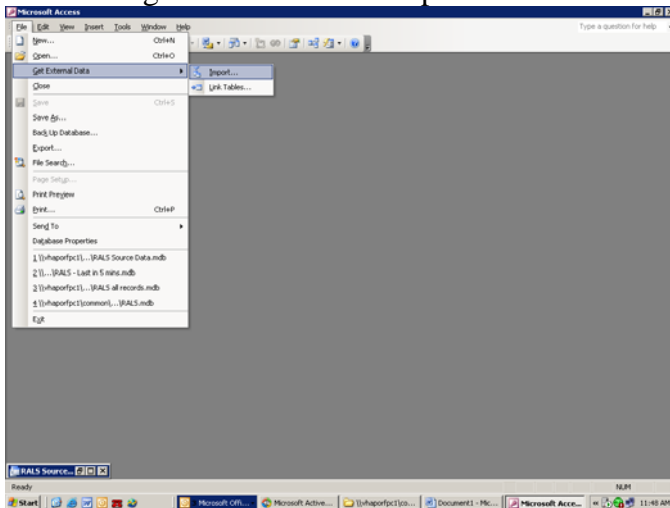
28. In Find what field type "HI"
In Replace with field type "601" → click replace all



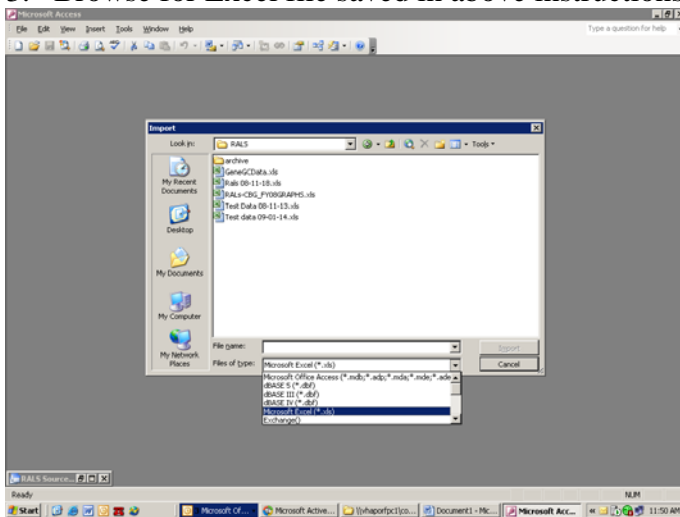
29. S A V E Excel file to the location of your choice

How to import RALS data from Excel to Access

1. Open RALS Source Data (Access file)
2. File→ get external data→Import



3. Browse for Excel file saved in above instructions. Change file type to “Excel”



4. Double click on file to import
5. Select show worksheets

Import Spreadsheet Wizard

Your spreadsheet file contains more than one worksheet or range. Which worksheet or range would you like?

☒ Show Worksheets
☐ Show Named Ranges

Sheet1
Sheet2
Sheet3

Sample data for worksheet 'Sheet1'.

	Date and Time	Patient ID	Location	Result- CB
1	10/19/2008 12:42	5.62762e+008	SD	11
2	10/19/2008 12:45	5.62762e+008	SD	11
3	10/3/2008 11:03	5.65745e+008	9DE	12
4	10/14/2008 3:15	5.37441e+008	SD	16
5	10/29/2008 3:39	5.62762e+008	9C	17
6	10/29/2008 6:30	2.28747e+008	9DW	18

Cancel < Back Next > Finish

6. Select “First Row...” if there are headings. De-select if there are no headings

Import Spreadsheet Wizard

Microsoft Access can use your column headings as field names for your table. Does the first row specified contain column headings?

☒ First Row Contains Column Headings

	Date and Time	Patient ID	Location	Result- CB
1	10/19/2008 12:42	5.62762e+008	SD	11
2	10/19/2008 12:45	5.62762e+008	SD	11
3	10/3/2008 11:03	5.65745e+008	9DE	12
4	10/14/2008 3:15	5.37441e+008	SD	16
5	10/29/2008 3:39	5.62762e+008	9C	17
6	10/29/2008 6:30	2.28747e+008	9DW	18

Cancel < Back Next > Finish

7. Select “In a new table”

Import Spreadsheet Wizard

You can store your data in a new table or in an existing table.

Where would you like to store your data?

☒ In a New Table
☐ In an Existing Table:

	Date and Time	Patient ID	Location	Result- CB
1	10/19/2008 12:42	5.62762e+008	SD	11
2	10/19/2008 12:45	5.62762e+008	SD	11
3	10/3/2008 11:03	5.65745e+008	9DE	12
4	10/14/2008 3:15	5.37441e+008	SD	16
5	10/29/2008 3:39	5.62762e+008	9C	17
6	10/29/2008 6:30	2.28747e+008	9DW	18

Cancel < Back Next > Finish

8. Select field 1 and name field, select field 2 and name field. Continue until all fields are named as shown below

You can specify information about each of the fields you are importing. Select fields in the area below. You can then modify field information in the 'Field Options' area.

Field Options

Field Name: Data Type:

Indexed: ☐ Do not import field (Skip)

	Date and Time	Patient ID	Location	Result	CE
1	10/19/2008 12:42	5.62762e+008	SD	11	
2	10/19/2008 12:45	5.62762e+008	SD	11	
3	10/3/2008 11:03	5.65745e+008	9DE	12	
4	10/14/2008 3:15	5.37441e+008	SD	16	
5	10/29/2008 3:39	5.62762e+008	9C	17	
6	10/29/2008 6:30	2.28747e+008	9DW	18	

Cancel < Back Next > Finish

9. Select “let Access add primary key”

Microsoft Access recommends that you define a primary key for your new table. A primary key is used to uniquely identify each record in your table. It allows you to retrieve data more quickly.

☒ Let Access add primary key.

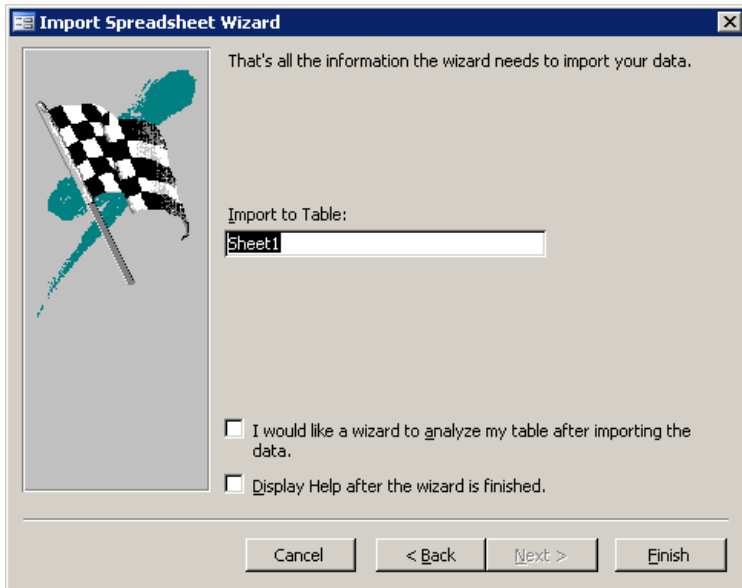
☐ Choose my own primary key.

☐ No primary key.

	ID	Date and Time	Patient ID	Location	Result
1	1	10/19/2008 12:42	5.62762e+008	SD	11
2	2	10/19/2008 12:45	5.62762e+008	SD	11
3	3	10/3/2008 11:03	5.65745e+008	9DE	12
4	4	10/14/2008 3:15	5.37441e+008	SD	16
5	5	10/29/2008 3:39	5.62762e+008	9C	17
6	6	10/29/2008 6:30	2.28747e+008	9DW	18

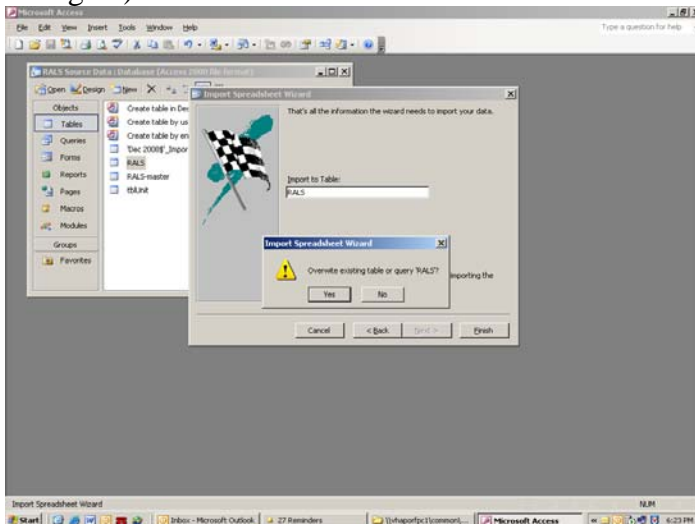
Cancel < Back Next > Finish

10. In the “Import to table” field, type RALS



11. Click Finish

12. Select “YES” when asked “overwrite existing...” (this step overwrites previous data put on the RALS table. If you don’t overwrite you will put the old data into the master table again).



13. Click on Tables. Select “RALS.” Click on Design View.

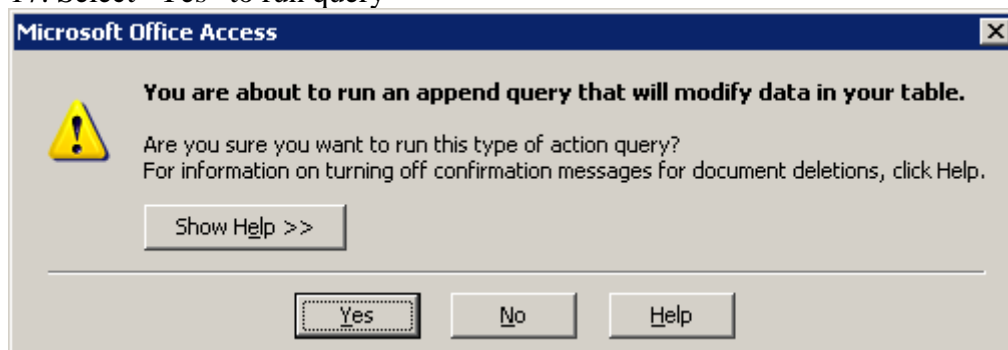
14. Delete any extra fields that are not named.

How to run queries (calculations)- *NOTE*: Run only one month at a time (the data base is too large to run more than one month in a reasonable time frame). *NOTE*: to capture a full month of data use the following dates: 1/1/2009 – 2/1/2009. If you use the last day of the month (i.e. 1/31/2009) you will not capture data for the last day.

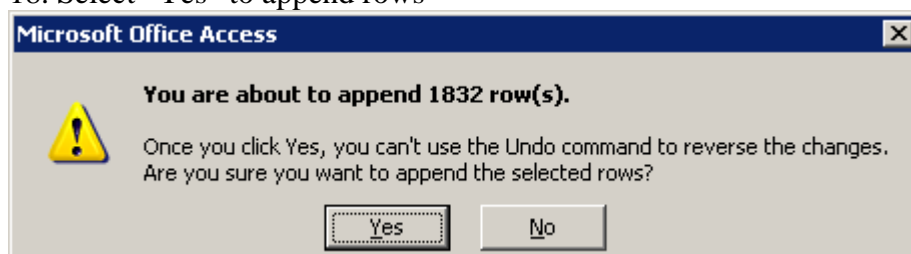
1. Open FinalRALS-singleDB. *NOTE*: queries that have denominator in the title reflect all the data. Queries without denominator in the title have records 5 minutes or less apart removed. Subtract the number of records in each query to determine how many records were removed).
 2. Unit Hypoglycemia rate= qryTotalHypoPerUnit divided by qry TotalCBGsPerUnit
 3. Unit Hyperglycemia rate= qryTotalHyperPerUnit divided by qry TotalCBGsPerUnit
 4. Unit Hypoglycemia rate per patient monitored day= qryTotalPtDayHypoPerUnit divided by qryTotalPtDay
 5. Unit Hyperglycemia rate per patient monitored day= qryTotalPtDayHyperPerUnit divided by qryTotalPtDay
 6. Manually calculate the rates per month
- NOTE*: It takes several minutes to run each query on the network. To speed up the query process place a copy of the database on your desktop using the following steps:
- a. Copy Final RALS-single DB, paste on desktop, run queries and delete copy of database from desktop.

Appending Data to Master Table

15. The RALS table must be moved to the RALS MASTER table. The following steps are needed to move the table.
16. Click on Queries. Double click on “qryAppend2RALSMaster” to run query.
17. Select “Yes” to run query



18. Select “Yes” to append rows



Running head: POLICY ANALYSIS NURSE STAFFING

Policy Analysis: Nurse Staffing Levels

Christy Locke

Oregon Health & Science University

School of Nursing

Context

The United States (U.S.) Census Bureau on January 1, 2008 estimated the U.S. population to be 303.1 million. This is an increase of 0.9 % from January 1, 2007 (U.S. Census, 2007). Approximately 78.2 million are considered “baby boomers” and projections are that by 2020 57.8 million of these baby boomers will be between 56 and 74 years old (U.S. Census, 2006).

Health care reform, defined as a major policy change which influences the delivery of health care, was actively debated at the national level in the 1990s and in the end defeated (Health, n.d.). Since then, health care reform has only been attempted at the state level (Rovner, 2008). As the 2008 Presidential election approaches, health care reform once again has gained national attention and is a major focus of both the Democratic and Republican parties. The key components addressed by health care reform are expansion of the population covered by health insurance and the providers to choose from, improved access to health care, improved quality, and reduction in costs (Health, n.d.).

Measures of health status demonstrate the population to be relatively healthy with a life expectancy of 77.8 years (a record high) and infant mortality at 6.8 infant deaths per 1,000 live births (National, 2007). When evaluating these global measures of health, Americans appear to be at their peak of health. However, when evaluating the health care provided to Americans, there is debate about the safety and quality of care. In 1999 the Institute of Medicine (IOM) released the report “To Err is Human: Building a Safer Health System” which claims 44,000-98,000 lives are lost each year due to medical errors (Institute of Medicine, 1999). This

landmark report brought attention to medical errors and started the patient safety and quality movement that continues today.

The IOM report called for a 50 % reduction in errors over five years. As of 2007 this goal had not been achieved (To Err, n.d.). In 2001, The IOM released a second report, “Crossing the Quality Chasm: A New Health System for the 21st Century.” This report claims consistent, high quality health care has not been provided. The report attributes this to the rapid changes in health care and the inability to translate knowledge into the practice environment as well as incorporate new technologies in a safe manner (Institute of Medicine, 2001). Six aims to improve care and foster innovation are presented in the report. These aims focus on health care institutions and professionals providing safe, effective, patient-centered, timely, efficient, and equitable care.

Another step in the national movement for improvement in quality and safety was the development of the Institute for Health Care Improvement (IHI). This non-profit organization was founded in 1991 and aims to close the quality gap described in the 2001 IOM report (Institute for Healthcare, n.d.). The six aims set forth in the 2001 IOM report were embraced by IHI and in 2004 the 100,000 Lives Campaign was launched. This campaign, as of 2006, claims to have saved 124,000 lives in an 18 month period by implementing patient safety initiatives in more than 3,000 hospitals (To Error, n.d.). Based on the success of the campaign, the IHI expanded the initiative to five million lives in 2006. The Five Million Lives Campaign aims to protect five million patients from harm in a two year period. Since initiation in December 2006, over 3,700 hospitals have enrolled to participant (Institute for Healthcare, 2007).

The Robert Wood Johnson Foundation (RWJF) is also recognized as a national leader in the quest to improve the quality and safety of health care. The foundation seeks to

“improve the health and health care for all Americans” (Robert Wood, n.d.). To accomplish this goal, the foundation uses a framework consisting of four portfolios. Within each portfolio there are specific objectives which guide funding decisions. RWJF achieves success by bringing together evidence, expertise, new ideas, key players, commitment, and advocates (Robert Wood, n.d.).

The Health Resources and Services Administration (2004) reports an integral part of supporting the national movement towards quality health care is an adequate supply of Registered Nurses (RNs). Currently RNs make up the largest group of health care providers in the U.S. (Congress, 2007a). In this same report (Health, 2004), the Health Resources and Services Administration (HRSA) predict there will be a 41% increase in the demand for Registered Nurses from 2000 to 2020 and by 2020 this will result in a shortage of 1,016,900 RNs.

In addition to the national quality and safety movement there have been recent health care policy changes in reimbursement to support quality care. Prior to these changes hospitals were not rewarded for quality care. In fact, hospitals received the same payment regardless of the quality of care (Spetz, 2005). The Center for Medicare and Medicaid Services (CMS), as mandated in the Deficit Reduction Act of 2005, is taking the first steps to change this type of model. Beginning in 2008, CMS will no longer reimburse for preventable hospital acquired conditions. This new rule rewards hospitals (through payment) for preventing conditions such as pressure ulcers and catheter associated urinary tract infections (U.S. Department, 2007). It is anticipated that insurance companies will follow suit as they do not want to pay for preventable

conditions either. In this new care model, hospitals will have to absorb the cost if a specified preventable condition occurs.

During the past three congressional sessions attempts have been made to improve the quality of care by addressing the adequacy of the RN work force through establishing minimum staffing levels, improving RN working conditions to prevent burnout, and education more RNs. In 2004, during the 108th congress, the Nurse Staffing Standards for Patient Safety and Quality Care Act of 2004 was introduced. This act required hospitals to implement staffing plans that outline minimum RN ratios by unit. The act was dead at the end of the session. It was reintroduced during the 109th Congress and again dead at the end of the session (GovTrack.US.H.R. 4316, 2007). In 2005, further legislation was introduced to the 109th Congress to establish staffing systems to ensure a minimum number of RNs are on a unit each shift (Registered Nurse Safe Staffing Act of 2005) as a method of improving the quality of health care. In addition a companion bill titled Nursing Education and Quality of Health Care Act of 2005 was introduced. The companion act was geared towards expanding the work force through educational efforts. Both acts were dead at the end of the session and are being re-introduced during the 110th Congress (GovTrack.US. H.R. 4138, 2007).

In addition to the attempts at the national level to regulate staffing levels, several states have introduced legislation. As of 2005, 18 states had introduced staffing ratio proposals to state legislative sessions. This does not include Maine, as they passed legislation and then later waived it (White, 2006). In 2005 alone, three states enacted new legislation. Prior to 2005, eight states had enacted legislation related to staffing ratios (White, 2006). The State of California, in 1999

was the first state to pass a bill mandating nurse to patient ratios. Initially, ratios were set at 1:6 in acute care areas. In 2008 ratios are set to drop to 1:5 (Ward, 2005).

Problem

During the past decade there has been an increasing national focus on patient safety and quality care. There have been several attempts at establishing national level legislation to regulate staffing levels. Additionally, there have been several legislative attempts at the state level. As of 2008, eight states plus the District of Columbia have successfully enacted nurse staffing policy (American, 2007). The lack of nationally mandated staffing levels facilitates inconsistent and often unsafe RN to patient staffing ratios in the states who do not have active mandates. The rationale for high staffing ratios is often due to costs or a lack of RN availability (shortage). High staffing ratios put patients at risk for harm and reduce the overall quality of care. The purpose of this policy analysis is to review legislation introduced to the 110th Congress related to RN staffing requirements, evaluate the evidence, present alternative policy options, and make a recommendation about minimum RN staffing requirements in the acute care environment.

Evidence

In a study of 168 acute care hospitals and 10,184 RNs in Pennsylvania, Aiken, Clarke, Sloane, Sochalski, and Silber (2002) demonstrated a significant effect on mortality ($p < .001$) and failure to rescue ($p < .001$) rates within three surgical specialties. The study reports the odds of patient mortality increases 7% for every patient increase in the RN staffing ratio. To illustrate the severity of this Aiken et al. (2002) provides the following example. The difference in risk of

mortality increases 14% when the staffing ratio increases from four to six patients per RN and 31% when the staffing ratio increases from four to eight patients per RN (Aiken et al., 2002).

A study of 60 RNs conducted as part of the Royal College of Nursing quality program revealed that inadequate staffing levels were a major factor in preventable adverse events. RNs reported unsafe, low staffing levels up to 90 % of the time. RNs claimed that without minimum staffing guidelines they have no recourse when staffing ratios become too high or unsafe (Agnew, 2004).

In 2004, Lang, Hodge, and Olson published a systematic review focusing on the effects of RN staffing levels on patient outcomes in acute care settings. The appraisal examined 43 peer reviewed articles published from 1980-2003. The findings suggest a relationship exists between RN staffing levels and patient outcomes in the following areas; 1) failure to rescue (surgical patients), 2) mortality, and 3) length of stay (statistically significant). A relationship could not be confirmed or denied in the following areas; 1) pneumonia, 2) urinary tract infection (UTI), and 3) pressure ulcer (Lang et al., 2004).

One study performed a cost-effectiveness analysis (using 2003 US dollars) by comparing RN ratios of 8:1 to RN ratios of 4:1. A ratio of 8:1 is associated with the lowest RN wage cost but has the highest mortality rate (Rothberg, Abraham, Lindenauer, & Rose, 2005). Rothberg et al. (2005) also reports that incrementally as the RN to patient ratio decreases the mortality rate decreases. Additionally, the study demonstrates that the cost of saving one life is 46,000 dollars if the RN ratio decreases from eight to seven. The cost of saving one life is 142,000 dollars if the ratio decreases from five to four. These figures do not include the cost savings associated with

the decrease in length of stay that is associated with lower patient to RN ratios (Rothberg et al., 2005).

Needlemen, Buerhau, Stewart, and Mattke (2006) report study findings that demonstrate an increase in RN staff levels (lower RN to patient ratios) benefits both the hospital (business case) and patients (societal case). The study involved 799 acute care hospitals in 11 states. Findings suggest that when hospitals in the less than 75th percentile for RN staffing increase their staffing level to the 75th percentile outcomes improve. Improved outcomes include reduction in failure to rescue incidents (n=354), UTI (n=40,770), and hospital acquired pneumonia (n=11,761) leading to 1,507,493 hospital days avoided. Additionally, there were 4,997 avoided deaths. The reduction in hospital days alone generates 90 % of the cost savings. The costs savings, after factoring in the increased cost for RN wages, was 0.5 % of total hospital expenses (Needlemen et al., 2006).

In 2003 the Agency for Health Care Research and Quality (AHRQ) released a systematic literature review focused on identifying the effects of the work environment on patient safety. The report reviewed 115 articles obtained from 1980 to 2002. The evidence collected from the review was sufficient enough for AHRQ to recommend that strategies to increase RN staffing levels in acute care settings will likely lead to improved patient outcomes (Hickam, Severance, & Feldstein, 2003).

Since 2003, AHRQ has funded several projects to analyze the impact of RN staffing and quality of care. In 2004, AHRQ released a paper summarizing the findings of several AHRQ funded projects. The conclusions presented state that RN staffing levels impact pneumonia, UTI, failure to rescue rates, length of stay, and 30-day mortality. Additionally, the findings suggest

there is no evidence to support what the minimum RN staffing ratio should be as the relationship is described as complex (Stanton & Rutherford, 2004).

In 2007, AHRQ published a second systematic review focusing on RN staffing and quality of care. This evaluation reviewed 94 articles from 1990-2006. The final conclusion presented is there appears to be a consistent statistically and clinically significant association between RN staffing levels and mortality, failure to rescue, and “other” patient outcomes. Based on the findings the review concludes that the relationship can not be described as causal and therefore a recommendation related to specific RN to patient staffing ratio can not be made (Kane, Shamliyan, Mueller, Duval, & Wilt, 2007).

Policy Options

The contextual features and evidence support the consideration of three policy options related to RN staffing levels in order to provide safe, quality care in the acute care environment. These include; 1) fixed RN to patient ratios, 2) use of a staffing system to determine minimum RN staffing requirements, and 3) development and implementation of an organization specific staffing plan.

The first option for consideration is policy that supports a fixed RN to patient staffing ratio based on the unit type. This type of model is similar to Assembly Bill 394 (AB 394) passed in California in 1999. In California’s model, an acute care, non-telemetry setting is mandated a minimum ratio is one RN per five patients. In a telemetry unit, the mandated minimum ratio is one RN per four patients (Spetz, 2004).

The second policy option for consideration is development of legislation that directs use of a staffing system to determine minimum RN staffing requirements. The staffing system relies on several factors to determine the ratio. The system includes factors such as RN competency, skill mix, and patient acuity. The Nurse Safe Staffing Act of 2007 (S.73) which has been introduced to the 110th Congress includes stipulations that support this policy alternative. It must be noted that this act went before the 108th and 109th Congresses and was dead at the end of both sessions (Congress, 2007b). S.73 achieves the desired staffing ratio through the use of a patient classification or staffing system. The act does not implicitly state what system will be used. However, it does state the system used within an organization will have input from direct care RN staff as well as nurse executives. Additionally, S.73 states the system will account for number of patients, level of care required, consideration of the number of admissions and discharges per shift, geography of the unit, level of RN preparation and experience, and skill mix (110th Congress, 2007).

This policy approach includes recommendations made by several national organizations. For example, the Joint Commission (JC) supports staffing criteria that are characteristic of magnet hospitals and include ratios based on RN competence, skill mix, patient mix, and patient acuity. Additionally the Institute of Medicine has called for the involvement of direct care RNs in the development of staffing levels (Stanton & Rutherford, 2004).

The final policy option involves implementation of a nurse staffing plan. This option provides the most flexibility for health care organizations as it allows plans to be developed based on characteristics such as size, location, and patient type (Peterson, 2007). The Nurse Staffing Standards for Patient Safety and Quality Care Act of 2007 (H.R. 2123) is legislation that

supports staffing plans. This legislation would require organizations to set ratios for each unit after seeking input from RN staff. Oversight would be through Health and Human Services (HHS). HHS could set levels for hospitals that do not submit plans and could alter plans to ensure public safety (GovTrack.US.H.R. 2123, 2007). Similar legislation went before both the 108th and 109th Congresses and was not enacted. Four states have successfully adopted staffing plan legislation. The first was Texas in 2002 and the most recent Illinois in 2007 (American, 2007).

Additionally, this type of policy is supported by the American Nurses Association (ANA) as the ANA promotes the development of staffing plans and encourages the incorporation of the ANAs nurse staffing principles (American Nurse, 2007). The ANA (2007) recognizes that staffing solutions should not be a “one size fits all” approach and that hospitals need flexibility in order to meet the needs of their organization and patients served.

Project the Outcomes

Each policy option presented has the potential to effectively address the identified problem and effect outcomes related to cost, quality/safety, the RN shortage, and access to care. The distinction between each option is not made by the individual outcomes but rather by the degree in which each option impacts the same outcome.

Cost is an important outcome to health care organizations as well as the health care system. The RN workforce makes up the largest group of healthcare providers in the U.S. and RNs impose a significant cost to organizations (Congress, 2007a). Establishing legislation that dictates the number of RNs to provide safe care will require organizations to employ more RNs. When California implemented fixed ratios it was predicted that implementation in 400 acute care

hospitals would cost about 87 million dollars (Coffman, Seago, & Spetz, 2002). Establishing fixed minimum ratios will require the greatest number of RNs. Use of a staffing system or staffing plan will allow organizations to include skill mix in the calculation of RN ratios and thereby reduce RN requirements and associated costs.

The evidence suggests that if RN to patient ratios are lowered, safety and quality will improve. Hospitals are likely to experience a significant amount of cost savings through reduced length of stays and adverse events. This savings will become more apparent in October 2008 when the Center for Medicare and Medicaid Services discontinues reimbursement for hospital acquired preventable conditions and as the system moves towards a pay for performance culture. Since the relationship between improved quality and RN staffing levels is not causal, the specific staffing level to achieve improved outcomes is unknown. Therefore, a determination as to which policy option will produce the best improvements in quality outcomes is unknown.

As previously stated, all three policy options would increase the requirement for more RNs nationwide. This would add considerable burden to the already burdensome nursing shortage. In California, after the passage of AB 394, two studies predicted that the implementation of fixed staffing ratios would require a 50 % increase in the number of Medical-Surgical RNs within the state. This increase would produce a statewide need of about 7,230 additional Medical-Surgical RNs. (Spetz, 2004). In 2003, Seago et al. surveyed 410 acute care hospitals in California, (28 % (n=115) response rate). Results revealed that medical-surgical units would have to increase RN staff in rural settings by 66.7 % and 28.6 % in non-rural settings to achieve a 6:1 RN to patient ratio. In order to achieve a 4:1 ratio in the acute care setting, hospitals would need to increase RN staffing by 80 % (rural) and 81.7 % (non-rural).

Implementation of a staffing system or staffing plan would also place a burden on the nursing shortage; however the burden could be minimized by the use of other health care professionals in the skill mix and by promoting and retaining experienced RN staff.

Finally, policy to mandate RN staffing has the potential to influence access to care. If organizations must adhere to specific staffing levels during a nationwide nursing shortage, health care facilities may be forced to close beds, thus decreasing overall access to care. This outcome will be greatest in areas significantly impacted by the nursing shortage. As an example, in California, 60 hospitals applied for rural waivers of exemption to the fixed RN to patient ratios, 23 hospitals were granted waivers (Spetz, 2004). Victoria, Australia offers another example as they have mandated fixed staffing levels. In 2004 it was reported one in four hospitals had to close beds and one in four elective surgeries had to be cancelled as a result of the fixed ratios and shortage of RN staff (Spetz, 2004).

Evaluation

In order to evaluate each policy option, Collins (2005) recommends using five criteria to measure projected outcomes. These criteria include; 1) relevance, 2) progress, 3) efficiency, 4) effectiveness, and 5) impact.

Fixed Ratio

Establishing fixed RN to patient ratios is relevant as it provides an undisputable mechanism to ensure adequate staffing as fixed ratios are easily and clearly communicated within organizations and to the general public (Coffman et al., 2002). However, this option would require a dramatic increase in the number of RNs required nationwide and this is not

consistent with the national priority of reducing the RN shortage. From an efficiency standpoint, fixed ratios place a large financial burden on institutions. When California implemented fixed ratios it was predicted that implementation in 400 acute care hospitals would cost about 87 million dollars (Coffman et al., 2002). Fixed ratios are expected to impact the overall quality and safety of care received in the acute care setting. However, the exact degree of impact can not be predicted as the relationship between staffing and patient outcomes is not causal (Kane et al., 2007). Additionally fixed ratios may impact access to care; particularly in areas with limited nursing supplies. In Australia, fixed ratios in combination with an inadequate RN workforce have resulted in one in four hospitals closing beds and one in four elective surgeries being cancelled (Spetz, 2004).

Staffing System

Use of a staffing system is also relevant as it provides a standardized mechanism to determine an appropriate RN to patient ratio. However, since the ratio is not static, there is no easy way to communicate compliance internally or to the public (Coffman et al., 2002). This policy option would likely require an increase in the nationwide supply of RNs, thus causing conflict with national priorities to reduce the nursing shortage. There are no projections in the literature as to the cost or the number of RNs required to meet the demands of this option. Utilization of a staffing system to determine the RN to patient ratio is anticipated to achieve outcomes related to quality of care. As previously noted, there is a described association between staffing and outcomes but no causal relationship (Kane et al., 2007). As with fixed ratios, access to care may be compromised, again conflicting with national priorities to improve access, specifically in rural and underserved areas.

Staffing Plan

Implementation of staffing plan legislation has the potential of addressing the quality of care issues highlighted at a national level. Since many states are in the early phases of implementing state mandated staffing plans, there is no appreciable evidence to draw conclusions from about effectiveness or the actual impact on the nursing shortage or access to care. Although, conceptually, staffing plans provide the greatest flexibility to health care organizations and may require fewer RNs nationwide as each health care facility will be able to develop a plan that accounts for the unique needs of their specific organization. With this flexibility, faculties can try to maximize RN resources and strive for maintaining access levels and an acceptable budget.

Weigh the Outcomes

There are four key outcomes associated with RN staffing legislation. The outcomes all have components which link them together and can therefore make it challenging to weigh each outcome independently. The following discussion is aimed at weighing the impact of each outcome to assist with determination of the final policy option recommendation. The key outcomes associated with each of the policy options presented are related to the RN shortage, access to care, cost, and quality/safety.

RN Shortage

Several predictions at the national level have been made regarding the nursing shortage. Organizations like American Association of Colleges of Nursing (2005) claim this shortage is unprecedented and they anticipate it will persist as the demand for health care is expected to

increase as baby boomers approach retirement age. HRSA projects the nursing shortage will double by 2010, triple by 2015 and reach 29 % by 2020 as a result of a 40 % increase in demand. The demand results from population growth, an increase in the number of elderly (baby boomers), and advances in medical care (U.S. Department, 2002).

This projection significantly impacts the decision to enact legislation which regulates RN to patient ratios. Legislation which requires a fixed ratio becomes impractical in this scenario as there just will not be enough RNs to meet the mandate. Research conducted in California demonstrates suboptimal compliance due to RN shortages. In a survey of 111 hospitals, 59 % were reported (n=66) as in compliance with fixed ratio legislation and several hospitals were reported as severely out of compliance (Spetz, 2004). Another survey of 300 hospitals reported 89 % (n=266) were out of compliance sometimes. Hospitals stated the nursing shortage makes it impossible to comply at all times. If they were to comply at all times, access would have to be denied (Spetz, 2004).

Access

Access to care is directly linked to RN staffing level legislation and the nursing shortage. If strict legislation is enacted, such as fixed ratios, then organizations will be forced to limit access to meet the fixed ratio requirements. Selection of the most flexible option, staffing plans, will have the least significant impact on access to care as opposed to fixed ratios which will have the most significant impact. Due to the recent rejuvenation of the health care reform movement as part of the 2008 Presidential election, more national level emphasis is placed on access to health care.

Cost

The weighing of cost as an outcome must include the discussion of at least two variables; 1) cost of additional RN staff, and 2) cost savings generated by improved outcomes. Needleman et al. (2006) reported findings from 799 hospitals that demonstrate increasing RN staff to the 75th percentile costs a hospital on average 0.5 % of the total hospital expenses. This finding includes the cost of RN wages and accounts for savings generated from a reduction in adverse events and deaths, and decreased hospital stays. As previously described, in October 2008 hospitals will be required to absorb costs related to preventable hospital acquired conditions as outlined by CMS. As a result, greater consideration must be given to the cost outcome; particularly focusing on the relationship between the cost of RNs and cost savings generated by improved care.

Quality of Care

The evidence clearly indicates an association between RN staffing levels and improved patient outcomes. The extent of the national movement to provide quality, safe care supports the value placed on quality care and gives quality as an outcome significant weight. Unfortunately, there is a paucity of evidence from states that have implemented staffing legislation describing the quality experience (Massachusetts, 2007). This is ill-timed as it would add significant strength to the quality argument.

Recommendation

The purpose of this policy analysis was to review legislation introduced to the 110th Congress related to RN staffing requirements in the acute care environment, evaluate the evidence, present alternative policy options, and conclude with a recommendation. Based on the information provided, it is concluded that implementing legislation such as the Nurse Staffing Standards for Patient Safety and Quality Care Act of 2007 (H.R. 2123) which mandates

organization specific staffing plans is the best option at this time. This option is the least restrictive as it accounts for the current RN shortage and supports continued access to care. Until the nursing shortage is resolved, it is difficult to consider implementing policy that would require a maximum supply of RNs during a time when the demand for health care is on the rise due to an aging population (baby boomers). Furthermore, implementing staffing plans is a unified step towards supporting the national movement to provide quality safe health care. Currently, some states have legislation and others do not. Those with staffing legislation all have different variations and none have released any data related to quality and safety. National staffing legislation supports attainment of quality and safety at the national level as all organizations strive to achieve the same standard. As part of the legislation, it is imperative that data be collected to determine the effects of staffing plans on cost, quality/safety, RN supply, and access to care as future policy setting depends on it.

References

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Running head: A FEEDBACK INTERVENTION TO IMPROVE OUTCOMES

Development and Implementation of a
Feedback Intervention to Improve Patient Outcomes

Christy Locke

Oregon Health and Science University

School of Nursing

Introduction

Description and Significance

Achieving quality and excellence is not a new concept to healthcare. In 1999, the Institute of Medicine (IOM) released the landmark report “To Err is Human: Building a Safer Health System” that launched the national patient safety and quality movement that continues today (Institute of Medicine of the National Academies, 1999). In 2001, the IOM released a second report, “Crossing the Quality Chasm: A New Health System for the 21st Century” citing the inability to translate knowledge into the practice environment as a substantial reason why quality health care has not been achieved (Institute of Medicine of the National Academies, 2001). In 2003 a third report “Keeping Patients Safe: Transforming the Work Environment of Nurses,” was released. This report recommends several patient safeguards to make the workplace more conducive to patient safety. One of several recommendations is to provide Registered Nurses (RNs) with decision support at the point of care (Institute of Medicine of the National Academies, 2003).

Another attempt at the national level to improve the quality of health care is the Deficit Reduction Act (DRA) of 2005. The DRA stipulates that the Centers for Medicare and Medicaid Services (CMS) implement the Hospital-Acquired Conditions and Present on Admission Indicator Reporting program (U.S. Department of Health and Human Services, 2007). This program requires CMS select several conditions which they deem preventable and then reduce payments for these conditions if presence on admission is not documented (Patel, n.d.). The effective date is October 1, 2008 and will initially reduce payments for eight hospital acquired conditions (U.S. Department of Health and Human Services, 2007).

Evidence based practice (EBP) is one approach to provide high quality patient care (Melynk & Fineout-Overhold, 2005). EBP is defined as “the conscientious use of the current best evidence in making decisions about patient care” (Melynk & Fineout-Overhold, 2005, pg 6). The EBP movement which became active in the mid-1990s continues to gain momentum because it has been demonstrated that evidence based care leads to better outcomes than traditional care (Melynk, Fineout-Overhold, Stetler, & Allan, 2005; Stetler, 2004). Nonetheless, barriers to the implementation of EBP techniques within nursing continue to interfere with the achievement of desired health outcomes (Melynk et al., 2005).

Specific barriers to the implementation of EBP are well documented within nursing literature (Hutchinson & Johnston, 2006; Karkos & Peters, 2006). Similar barriers are anecdotally reported within the Portland Veteran’s Administration Medical Center (PVAMC) by acute care RNs. Direct observation and discussion with RNs demonstrates that one barrier is the lack of a consistent, meaningful method to provide outcomes feedback to RNs at the point of care.

Outcomes feedback is one identified aspect of EBP (Rycroft-Malone et al., 2002). In a systematic review of the literature, outcomes feedback is identified as a strategy to improve professional practice through reflection; however the review acknowledges that the effects of feedback varies from negative to largely positive (Jamtvedt, Young, Kristoffersen, O'Brien, & Oxman, 2008). This wide variation in feedback effect makes it difficult to develop interventions aimed at reducing barriers to EBP.

EBP is essential to achieve quality care and nursing excellence. Clinical Nurse Specialists play a pivotal role in the promotion of EBP through mentorship and facilitation of change. The

focus of this clinical inquiry is to enhance the use of EBP through the development of an intervention which facilitates the use of outcomes feedback at the point of care. This will be tested by providing acute care RNs with catheter associated urinary tract infection (CAUTI) outcome feedback. When RNs Acknowledge, integrate, and act upon outcomes feedback at the point of care it is expected to improve patient care outcomes.

This clinical inquiry will be conducted with RNs who currently provide care to patients on four medical-surgical units of a Magnet® designated VA acute care hospital. RNs in the orientation phase of employment will be excluded.

The purpose of this clinical inquiry is to determine if providing acute care RNs with CAUTI outcome feedback at the point of care using a preferred method will improve CAUTI outcomes. This study will focus on CAUTI as the outcome due to recent CMS reimbursement changes, the incidence of CAUTI, and because the outcome is responsive to nursing intervention.

This inquiry is designed to answer the following questions:

- 1) What method of CAUTI outcomes feedback do acute care RNs prefer at the point of care?
- 2) What barriers prevent the use of CAUTI outcomes feedback by acute care RNs at the point of care?
- 3) Will acute care RNs acknowledge, integrate, and take action on CAUTI outcome feedback at the point of care when feedback is delivered in a preferable format?
- 4) What effect does CNS facilitation have on CAUTI outcomes?

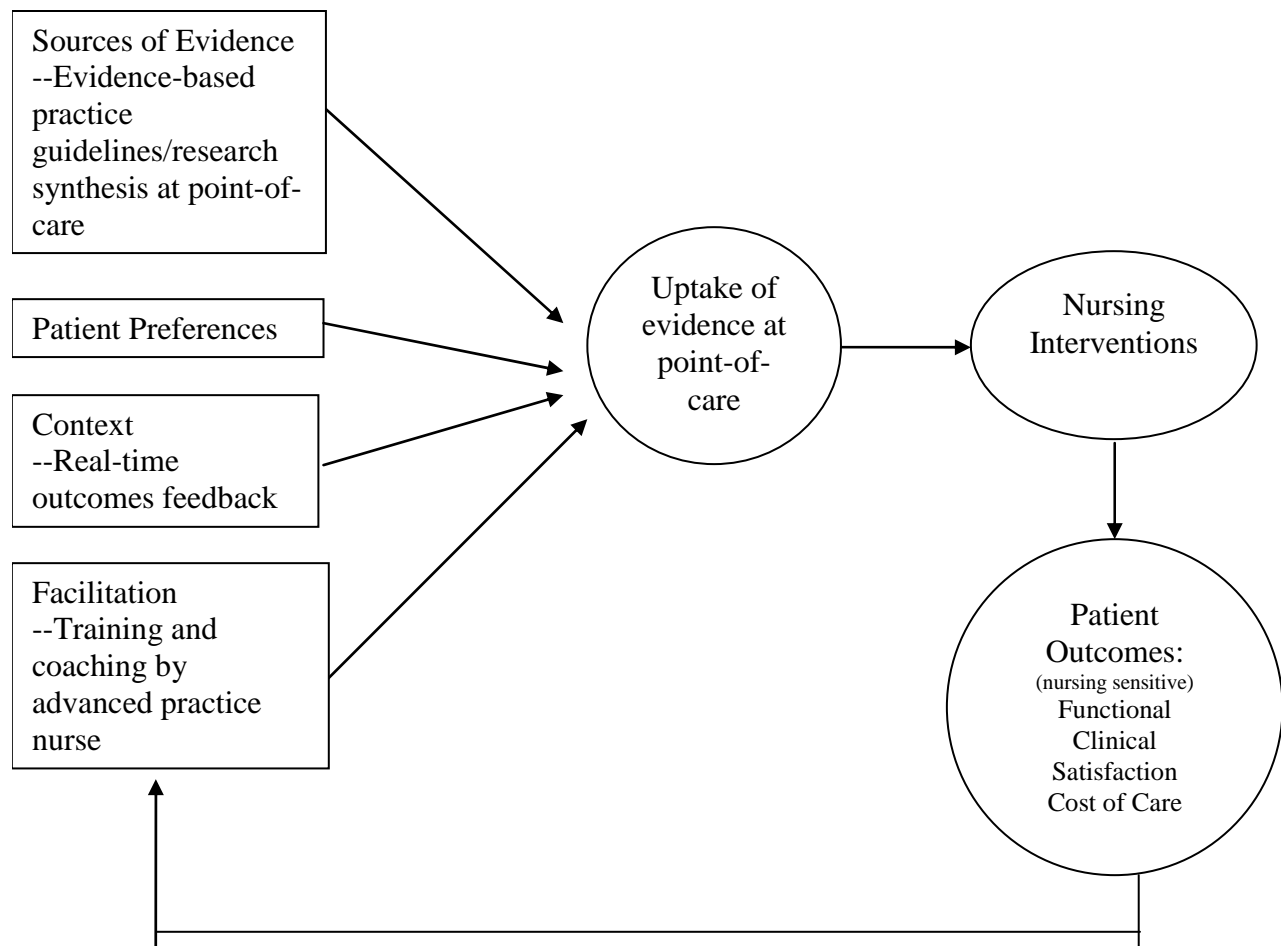
Conceptual Framework

In 1998, Kitson, Harvey, and McCormack conceptualized the Promoting Action on Research Implementation in Health Services (PARIHS) framework. This conceptual framework describes the interplay and interdependence of three factors which influence the use of evidence in practice. These factors include: (a) nature of evidence, (b) context in which changes will occur, and (c) mechanisms of facilitation (Rycroft-Malone et al., 2002). In 2002, Rycroft-Malone et al. reformulated the PARIHS framework to expand the description of the nature of evidence to include research information, clinical expertise, and patient preference. Ultimately acknowledging that there are different types of evidence needed in clinical situations besides randomized controlled trials (Doran & Sidani, 2007).

In 2007, Doran and Sidani proposed the Outcomes-Focused Knowledge Translation (OFKT) framework (see Figure 1). The OFKT framework is an adaptation of the PARIHS framework and will be utilized in this clinical inquiry. The framework was developed on the premise that patient outcomes feedback is needed to continuously inform and improve nursing practice by supporting the uptake of evidence at the point of care. Uptake of evidence, defined as acknowledging, integrating, and taking action on feedback data, using practice guidelines, and other patient outcome specific evidence, is expected to improve when outcomes feedback is incorporated into the EBP process (Doran & Sidani, 2007). Knowledge translation is within the framework is defined as deliberately using information to develop an intervention strategy to ensure that information is being utilized in current practice to reach a specified outcome in a target population (Doran & Sidani, 2007).

Doran and Sidani (2007) proposed this adaptation because they identified two gaps in the PARIHS framework. First, the framework did not define what indicators should be used for

Figure 1: Outcomes-focused knowledge translation framework.



evaluating patient outcomes and second the framework did not suggest how feedback should be used to design and evaluate practice. In order to address the gaps, Doran and Sidani (2007) applied quality improvement methodology to the framework. In quality improvement, individuals review and modify work processes in an effort to improve performance, reduce cost, and optimize patient outcomes. This application of quality improvement resulted in the development of four patient outcome categories to address the identified gap related to outcome indicators. These include: (a) functional, (b) clinical, (c) satisfaction, and (d) cost of care. Quality improvement methodology also contains a feedback mechanism to support continuous

improvement. The feedback concept was applied to the reformulated conceptual framework to address the gap related to the use of feedback to design and evaluate practice (Doran & Sidani, 2007).

Doran and Sidani (2007) apply the framework specifically to nursing by incorporating nursing interventions and nursing sensitive patient outcomes. Nursing interventions are defined as any treatment, based on clinical judgment and knowledge, which a RN performs to enhance patient outcomes and nursing sensitive patient outcomes are defined as changes in patient outcomes that are responsive to nursing interventions (Doran & Sidani, 2007).

Review of Literature

Barriers to using evidence in the clinical setting are well documented and interfere with achieving desired patient outcomes (Hutchinson & Johnston, 2006; Karkos & Peters, 2006; Melynk et al., 2005). The use of outcomes feedback to support the uptake of evidence at the point of care is the primary focus of this clinical inquiry. The relationship between outcomes feedback and uptake of evidence to improve care outcomes will be explored first to determine RN preferences and then tested.

OFKT framework.

The Outcomes-Focused Knowledge Translation framework was introduced in 2007. As a result, there is no published literature to evaluate it. The framework is considered by Doran and Sidani (2007) to be an operationalization of the PARIHS framework elements. The PARIHS framework has undergone some initial testing which led Kitson et al. (2008) to conclude that the framework is practical and useful. However, Kitson (2008) in a paper summarizing the framework's conceptual and theoretical phases of development acknowledges that the

framework has not been sufficiently tested to develop a strong evidence base. Brown and McCormack (2005) in a review of the literature utilize the PARIHS framework to examine the framework's relevance to post operative pain assessment and management. The review consisted of 58 articles evaluating the three key constructs of the framework. Brown and McCormack (2005) concluded that it appears the constructs are beneficial to getting evidence into practice which is consistent with Kitson (2008).

Feedback.

In the OFKT framework, outcomes feedback is one component of supporting the uptake of evidence at the point of care. Outcomes feedback is defined as “any summary of clinical performance of health care over a specified period of time” (Jamtvedt et al., 2008). This broad definition of feedback can be operationally applied as written, verbal or electronic outcomes feedback related to any quality indicator. Feedback, as part of the EBP process, is expected to provide RNs with the necessary knowledge to reflect on nursing practice and to demonstrate improvements in performance over time to reinforce EBP care (Doran & Sidani, 2007).

In a recent Cochrane review, Jamtvedt et al. (2008) examines the effectiveness of feedback. The 118 studies included underwent a quality assessment with twenty-four studies rated as high quality and most receiving a moderate quality rating. Three studies were conducted with nurses. The findings demonstrate the adjusted risk difference ranged from -0.16 to 0.70. This translates to a 16% decrease in improvement in intervention compliance between the control and intervention groups to a 70% increase in improvement in intervention compliance between the two groups. The authors conclude that implementation of a feedback intervention can be a useful strategy in improving care outcomes.

The review by Jamtvedt et al. (2008) provided insight about the effectiveness of feedback as an intervention; however it did not provide any evidence regarding the structure of the feedback intervention or any specific detail about the effects specifically with nurses. As a result the three nursing studies included in the review were independently examined. One study evaluated a quality indicator report developed and field tested by the research team and found no significant differences between the control and intervention groups when feedback was provided to nursing staff on a quarterly basis (Rantz et al., 2001). The quality indicator report was paper based and consisted of a graph with trend line and table display of the data. Moongtui, Gauthier, and Turner (2000) reported significant findings between the control and intervention group when the intervention group received paper based feedback on hand hygiene at an undefined interval. The feedback which was numeric and descriptive was posted on a bulletin board in the nurse's unit. The results however were not sustainable in the post intervention phase. Jones et al., (1996) randomized nurses to intervention and control groups. The intervention group received quarterly feedback regarding capillary blood glucose (CBG) accuracy. At 12 months post intervention, the groups were significantly different with the intervention group demonstrating improved CBG accuracy. The findings related to nursing interventions demonstrate a wide variation in the effect of feedback as an intervention and are consistent with the overall findings of Jamtvedt et al. (2008). Additionally, the examination demonstrates a variation in the structure of the interventions themselves. For example, two interventions (Jones et al., 1996; Rantz et al., 2001) used quarterly, paper based feedback while one intervention used undefined intervals (Moongtui et al., 2000). One intervention consisted of graphs with a trend line (Rantz et al., 2001) and another used numbers and descriptors (Moongtui et al., 2000).

Uptake of evidence.

The OFKT framework suggests that there are four sources of information that influence the uptake of evidence at the point of care. These sources are: (a) evidence, (b) patient preferences, (c) outcomes feedback, and (d) facilitation. For each source Doran and Sidani (2007) present a hypothesis demonstrating its role in the uptake of evidence at the point of care which ultimately leads to improved patient outcomes. The hypotheses are: (a) timely access to preprocessed resources (e.g. national guidelines) will improve uptake, (b) if patients are engaged in decision making by presentation of alternative evidence-based treatment options this will increase uptake of evidence, (c) providing nurses with patient outcomes feedback will motivate nurses to reflect on their practice and seek evidence to fill in knowledge gaps, and (d) advanced practice nurses can facilitate outcomes review and the use of evidence in decision making.

A systematic review of the literature by Kawamoto, Houlihan, Balas, and Lobach (2005) provides good evidence regarding decision support system characteristics that support the uptake of evidence at the point of care. The most notable finding is that 75% of the interventions were successful when the decision support system provided automatic feedback versus having to seek feedback from within the system. Additionally, systems that were incorporated with charting processes were more likely to succeed by 37% and those that were computer based were more effective.

Literature gaps.

The OFKT framework was first published in 2008, as a result there is no available literature to support or refute its credibility. The framework is an adaptation of the PARIHS framework, therefore an evaluation of the PARIHS framework was included. Unfortunately, the evaluation revealed there has been minimal testing of the PARIHS framework. The few

investigators who have tested the PARIHS framework report it is practical and useful. Even though there has been minimal testing, the OFKT framework does have some merit as the concepts and relationships are adequately defined, logical and fit with personal observations from the clinical setting. These characteristics make it reasonable to apply and test the framework.

Doran and Sidani (2007) identified a gap in the PARIHS framework related to feedback. The framework does not suggest how feedback should be used to design and evaluate practice. The OFKT framework addresses this shortfall by including a feedback mechanism. Since this is a modification to the PARIHS framework and it is untested, the relationship between feedback and the uptake of evidence using a feedback mechanism requires testing.

Jamtvedt et al. (2008) suggest that feedback interventions can be useful in improving care outcomes but the significant variation in the effect of feedback interventions is concerning. Evaluation of the studies specific to nursing did offer adequate insight about the characteristics needed to develop an effective intervention (Jones et al., 1996; Moongtui et al., 2000; Rantz et al., 2001). The intervention characteristics varied significantly and in each study the intervention was compared only to a control group receiving no intervention. In an attempt to develop an intervention that produces maximal effect, an exploration of RN preferences is necessary to determine the preferred feedback method followed by testing of intervention effects.

Summary

The evidence reviewed for this clinical inquiry implies that a practice change related to the use of outcomes feedback has the potential to improve patient care and reduce barriers to the use of EBP. However, since the OFKT framework has not been adequately tested, specifically

the relationship between feedback and the uptake of evidence, a clinical inquiry which tests the relationship is proposed. Furthermore, since there is a wide variation in results with feedback as an intervention and there is little evidence supporting the intervention structure, it is necessary to first determine RN preferences related to outcomes feedback structure. This clinical inquiry will be conducted in two phases. Phase one will consist of progressive focus groups and an assessment of barriers that prevent the use of outcomes feedback to develop a preferable method of feedback (intervention). Phase two will test the intervention with and without the presence of CNS facilitation. Each medical-surgical unit will be randomly assigned to receive the intervention with or without CNS facilitation or standard practice with or without CNS facilitation. CAUTI will be the outcome measure used with both the intervention and standard practice groups. Standard practice currently consists of placing outcomes feedback graphically on a pre-designated bulletin board. This experimental approach will address the identified gaps in the literature through development of a feedback intervention based on RN preferences and testing of the intervention to determine its effects. Developing a preferred feedback method is expected to reduce barriers associated with the use of EBP and ultimately improve patient outcomes by supporting the uptake of evidence at the point of care.

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Running head: CASE STUDY OBTAINING PRIVILEGES

Case Study: Obtaining Privileges for Clinical Nurse Specialist

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

Nursing Professional Services at the Portland VA Medical Center (PVAMC) utilizes a shared governance model. Within this structure there is an Advanced Practice Nursing (APN) Committee that reports to Nursing Professional Council. The council is chaired by the Chief Nurse Executive. The APN committee is co-chaired by a Nurse Practitioner (NP) and Clinical Nurse Specialist (CNS). The APN committee has a Clinical Nurse Specialist subcommittee. In December 2006 I assumed the APN committee co-chair role and the CNS subcommittee chair role.

The purpose of the CNS subcommittee is to enhance CNS level initiatives, promote CNS collegiality, professional development, and advancement (Nursing, n.d.). The chair role is determined using a consensus model within the subcommittee. The decision is then sent to the Chief Nurse Executive for final approval. The chair assumes the position for two years at which time they become the past chair and mentor the new chair. During my two year position, the leadership role encompassed many projects. I have selected to highlight the credentialing and privileging process as a demonstration of leadership in this case study as this case exemplifies the leadership competencies outlined in the American Association of Critical Care Nurses (AACN) Framework for Governance Leadership Positions

Case

In January 2006, one year prior to assuming the chair role, the Oregon State Board of Nursing (OSBN) rules and regulations for prescriptive authority for CNSs and NPs became the same (Oregon, n.d.). This was a significant event for CNSs at PVAMC for two reasons. First, in 2005, CNSs initiated discussions with nursing leadership about approaching Medical Staff Counsel to become credentialed and privileged members of the medical staff. CNSs were

seeking recognition as licensed independent practitioners (LIPs). The decision was made to seek credentialing only and wait to pursue privileging. This was due to the fact that legislation regarding CNS prescriptive authority had been introduced and it made sense to seek privileging once prescriptive authority was granted. When the rules and regulations were written by the OSBN in 2007, the CNS subcommittee began drafting a plan to re-initiate discussions regarding privileging and recognition of LIP status. Our plan this time however needed to include prescriptive authority.

By November 2007, the CNS subcommittee was ready to initiate dialogue with nursing leadership about becoming privileged members of the medical staff. This would eliminate the scope of practice document historically used and granting LIP status. This change would also support CNSs who wanted to seek prescriptive authority. Nursing leaders were exceptionally supportive and an action plan was developed that started the 2 year journey for CNSs to become credentialed and privileged members of PVAMCs medical staff.

Context

In my leadership role, I facilitated several key decisions as part of the CNS privileging process. First, the CNS subcommittee needed to determine who would seek prescriptive authority. There were three CNS's whose practice would benefit and eight who felt their practices would not benefit. The major focus of the discussion was around the CNS role. The role had expanded significantly in the previous three years within the organization and we all knew there was confusion about the CNS role. The question under discussion was, should all CNSs seek prescriptive authority in order reduce role confusion? In the end the group reached consensus that only the CNSs whose practices would benefit should seek prescriptive authority. The rationale behind the decision was mainly driven by the fact that we knew prescriptive

authority would be a “hot” topic in our request to become privileged. The group felt strongly that we could justify why the three CNSs who maintained outpatient clinics would benefit. Even though Division 56 (Nursing, n.d.) provides CNSs with the authority to prescribe, we knew we could not provide a strong clinical justification for the other CNS roles. We accepted our decision may cause additional role confusion however; we did not want to hinder our chances of becoming privileged providers.

Prescriptive authority was a two step decision making process. First, the CNSs had to internally decide about who would seek prescriptive authority. Next, buy-in from key stakeholders was essential. The stakeholders included the Service Chiefs and the Chief of Staff. The Service Chiefs were very supportive as they fully understood the clinical need and had been keeping abreast of the issue since its introduction to the Oregon legislature. The Chief of Staff, who also serves as the Chair of Pharmacy and Therapeutics, had several reservations. His concerns were not directly related to CNS practice but rather to his global perceptions about prescriptive authority. He felt every clinician’s practice should be evaluated for formulary needs and then based on their needs certain formulary restrictions should be applied. He viewed our request as an opportunity to open dialogue about the need for formulary restriction. What I learned in the process was that he just needed someone to listen and give credence to his ideas. This took three separate one hour meetings and multiple emails. In the end, through patience, open dialogue, and active listening, we were able to gain his support.

The final decision point was with Medical Staff Council (MSC) as they were the official voting body that would reject or accept our proposal. The CNS subcommittee used two strategies to ensure that MSC had sufficient information for an informed vote. First, we obtained the membership list for MSC. Two weeks prior to the MSC meeting, each voting member was

contacted by a CNS. They were provided with a brief summary of the issue and asked if they had any concerns they would like to discuss with a CNS before the meeting. Each CNS then reported the details of the encounter back to the group to get a sense of what issues may arise during the formal MSC meeting. The CNS subcommittee developed the presentation that would be seen by MSC. However, it was decided jointly by the subcommittee and nursing leadership that the presentation would be made by the CNE. The CNE is a strong member of MSC and she viewed our request as a formality since we were just trying to bring the organization in line with the OSBN. She basically was not going to take no for an answer and felt our presence would allow for too much dialogue on the topic.

Outcomes and Implications

This case study illustrates the potential of the DNP within an organization. The project started with a vision and then grew to a reality. On May 12, 2008 the PVAMC credentialing and privileging Medical Center Memorandum was approved to include CNSs as credentialed and privileged members of the medical staff (VA Medical, 2008). Within the privileging document, prescriptive authority is listed as a specialized competency and can be requested by any CNS who meets the legal requirements to prescribe. Currently two CNSs are prescribing and all CNSs are credentialed and privileged.

Obtaining clinical privileges has several implications. First, the process allowed CNSs to bring clarity to their role. Prior to this many clinicians did not fully understand the role or the value of the role. Next, we were able to build internal relationships with key stakeholders. These relationships will serve each CNS in the future as we strive to make improvements within the organization. Finally, we have laid the foundation for CNSs in our network (region) and CNSs nationally within the VA system. An example of this can be seen in a

recent presentation to our network leadership (Chief Executive Officer, Chief Nursing Officer, Chief Financial Officer and Chief of Staff from eight medical centers). The CNS subcommittee, in a 30-minute presentation, shared with the group one outcome achieved by each CNS (11 CNSs) during the past year. The presentation was powerful and the network director asked how we can do this at the other seven medical centers. The discussion that followed was about PVAMCs recognition and support of CNS practice. The support started with the CNE and spread to the Service Chiefs, to the Chief of Staff and ultimately the entire medical staff.

Evaluation of Leadership Role

The American Association of Critical Care Nurses (2008) offers a framework for evaluating leadership competencies. Using this framework as a guide the case study presented provides some insight into successes and future areas for improvement as a leader. The first competency within the framework is self-leadership which focuses on optimizing relationships and adding value to the organization. The process of obtaining clinical privileges was dependant on this. The relationships formed with nursing leadership as well as executive leadership were the core to success. As the lead in the process I was able to meet with leaders that I do not interact with on a regular basis. These interactions were uncomfortable in the beginning because I did not know what to expect. Over time I was able to build positive relationships where we could openly discuss the issues. This open communication allowed for us to resolve all issues and reach mutual agreement that privileging CNSs would add value to the organization.

The next AACN competency relates to global thinking. The project was intimately connected with the release of Division 56 and since many of the key stakeholders were

physicians they were not familiar with the nurse practice act or Division 56. This required that I remain global in my initial conversations to ensure the stakeholders fully understood the foundation from which we were building our proposal. Visioning, the next framework competency, is described as creating a clear view of the future result. Prior to initiating conversations with stakeholders I facilitated discussion with the CNS group to determine what we envisioned as the end result. As part of the visioning process I was able to provide the group with details about the experience of the most recent group of healthcare professionals that requested privileges. We were then able to learn from their experience and better position ourselves to achieve our vision.

Another competency is consensus building. I used consensus exclusively within the CNS subcommittee to make decisions. There were times when it would have been easier to vote but in the end consensus made our team stronger. I believe voting would have divided us, particularly between those wanting prescriptive authority and those not wanting it. The fifth AACN framework competency is delivering an effective message. Email was utilized as the primary form of communication throughout the process. There were many instances where I would have to respond to questions put forth by the Chief of Staff or a Service Chief. In an effort to ensure my communication was clear and reflective of the group I would draft my response and then send it out for review by CNS members. I did this for a couple of reasons. One I wanted the group to feel as if they were part of the process and that I was adequately representing them. Next, I wanted feedback to ensure I was communicating clearly and concisely. I received a lot of positive feedback from the CNS subcommittee for using this technique. It also provided me with some meaningful feedback about how I could better construct a written response.

The final AACN competency is knowing and committing and relates to knowledge of and commitment to the mission, vision, and values of the organization. The CNS subcommittee believed that organizational recognition of the CNS role directly supported the mission and vision of the organization as CNSs are committed to providing evidence based, quality, cost-effective care. This proved to be successful as I was able to demonstrate over and over again the role and value of a CNS throughout the process.

The AACN framework is a useful tool that delineates the competencies required of a successful leader. The framework however does not address leadership style. Leadership style refers to the way that a leader influences those that are being lead (McCrimmon, n.d.). Although I believe in general I use a variety of leadership styles, the style predominately utilized with this project was participative leadership. Participative leadership delegates the decision making process to the group (Clark, 2008). The benefit of this style is that the leader is not expected to know everything, therefore leaving the group to actively provide the information needed to make a decision (Clark, 2008).

This style has worked well for me as I have never been comfortable being the sole decision maker. I am also a firm believer that ideas produced by more than one person are stronger ideas. Where the leadership role comes into play is directing the discussion, summarizing ideas and leading the group through the consensus process to actually make a decision. If the leader is not equipped to do this then a decision may never happen.

Self-reflection

I found the AACN framework useful in evaluating the competencies required to successfully lead the project. However, I believe leadership style was extremely important in this situation due to the complexity of the situation and because it involved multiple

stakeholders. No one had to do this, we could have continued status quo. It was through discussion and decision making that everyone was able to see the benefits. This resulted in a win-win situation. I must admit that I was not thinking of leadership style when I launched into the project. In the end, reflecting back, I can see that participative leadership was right for the situation.

I have received a lot of positive feedback from my colleagues and leaders for my leadership role in obtaining CNS privileges. As I reflect on this I am ask myself, would I have received the same level of feedback if the vote was no? My answer is I hope so. This is one project when I look back, everything went right. Even the hard discussions were not that hard because they were handled professionally. I never once thought I would do that differently if I had the chance. This may seem too much like utopia but truly it was a wonderful experience and I am thankful that I had the opportunity to be a part of this.

As a leader this experience has provided me with the opportunity for growth. There were many times I had to step out of my comfort zone. When I knew in advance I was going into something uncomfortable I utilized my peers to help prepare. As a junior CNS in the organization I have a tremendous resource pool to draw from. I am fortunate. After this experience I now have people coming to me asking for advice on how to handle situations. I have also grown professionally as I now have this experience to draw from in future situations. Not only do I have the experience, I also have the professional relationships that were fostered during the process to draw from.

This type of experience is essential to my growth as a DNP. Since the experience was occurring during my course work, many of the courses contributed to my frame of reference. As I stated earlier, the successes from this project will just continue to grow. I believe it built

a strong foundation for me as a professional in the organization. Leaders see me differently now. I believe this will influence my future as a DNP.

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Running head: USE OF A BAR CODE MEDICATION

Case Study: Use of a Bar Code Medication Administration
System to Reduce Medication Errors

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

In 2003 the Joint Commission released six National Patient Safety Goals. Improving the safety of medication use was included in the first set of goals and continues to be a goal in 2009 (The Joint, 2009). In 2004, the Food and Drug Administration (FDA) issued a regulation requiring a barcode on most prescription medications and commonly used over the counter medications in an effort to improve safety. The FDA estimated that the regulation would prevent 500,000 adverse events and save 93 billion dollars over a 20 year period (U.S. Food, 2004). Recently, the Centers for Medicare and Medicaid Services solicited the Institute of Medicine (IOM) to study medication errors. The solicitation resulted in the 2006 IOM report, *Preventing Medication Errors*. The report describes medication errors as common and estimates that a hospitalized patient can expect to have at least one medication error per day. Medication errors are thought to conservatively cost the nation more than 3.5 billion dollars annually (Institute, 2006). Even though, medication errors are recognized as harmful and costly, they continue to occur.

One recommendation to reduce medication errors is the more widespread use of information technologies (Institute, 2006). The Agency for Healthcare Research and Quality (AHRQ) in their publication *Mistake-Proofing the Design of Health Care Processes* (2007) describes bar coding as an effective method to mistake-proof medication delivery. The Veterans Administration (VA) began using a bar code medication delivery system (BCMA) in 2000. In 2004, the VA published 15 best practice recommendations based on experiences encountered during the first four years of BCMA employment (Patterson, Rogers, & Render, 2004). Even though the VA has over eight years of experience using the BCMA system and formulated best practice recommendations, medication errors continue to exist. The purpose of this paper is to

describe the experience of one VA medical center and recommend strategies to reduce medication errors in the inpatient setting.

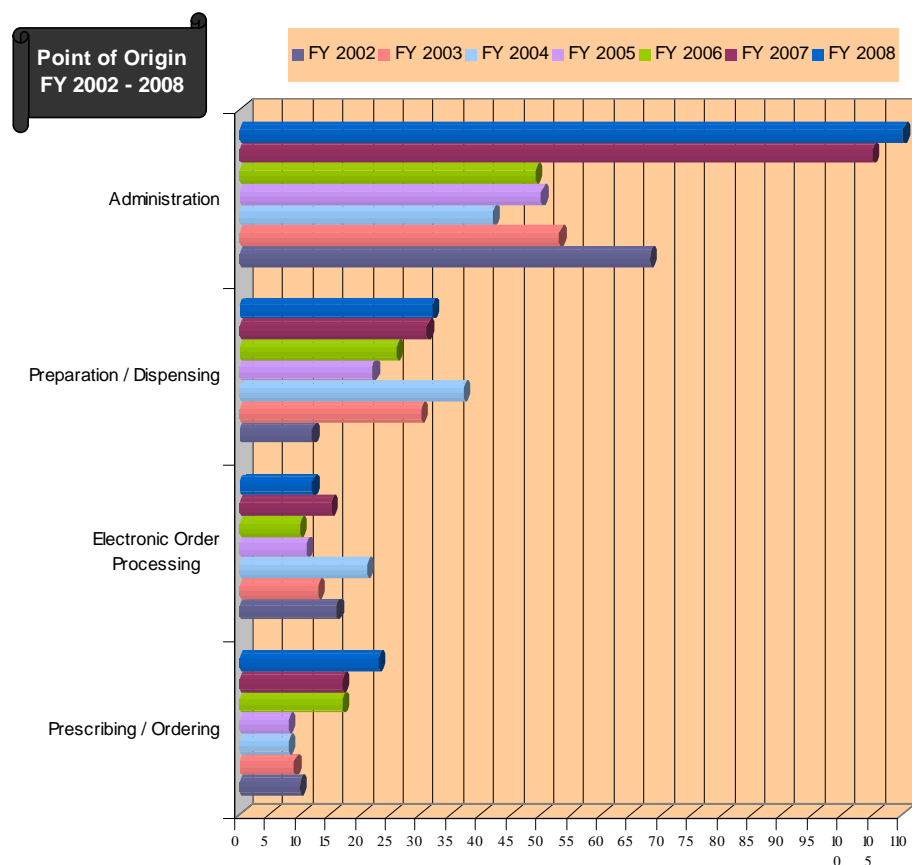
Case

In August 2008 the Adverse Drug Event committee was tasked by Pharmacy and Therapeutics to assemble a workgroup to evaluate medication errors related to administration (a workgroup that evaluates dispensing errors already existed). The workgroup was charged with reviewing medication error data related to medication administration and providing key stakeholders with recommendations for decreasing medication errors associated with administration. The workgroup consists of the BCMA coordinator, an acute care nurse, a Clinical Manager, a Pharmacist, a Clinical Nurse Specialist, a Nursing Professional Services representative, and the Patient Safety Officer.

During the first meeting the workgroup reviewed historical medication error data (see Figure 1). The data revealed that administration errors doubled from FY2006 to FY2007 and continued to rise in FY2008. The workgroup also reviewed administration errors related specifically to bypass of the BCMA system (see Figure 2). This data revealed BCMA bypass errors were on the rise as well and accounted for nearly half of the administration errors. As a result the workgroup decided to focus initially on BCMA bypass errors.

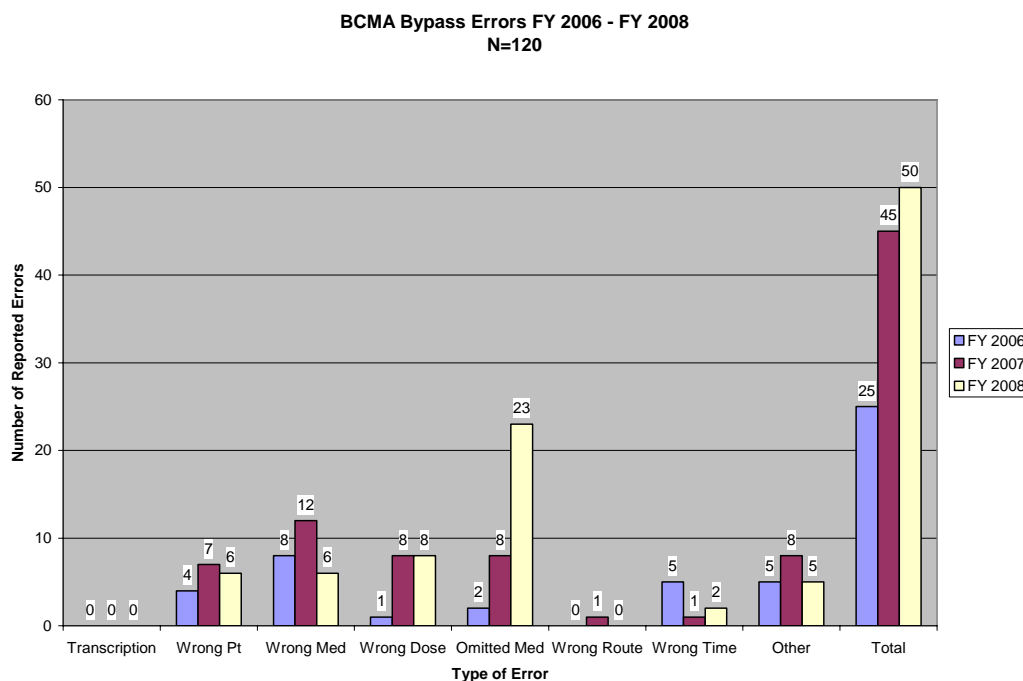
During discussions related to BCMA bypass errors it became apparent to the workgroup that the types of bypass errors needed to be classified and defined. A brainstorming session produced six major categories of bypass and the associated error (see Table 1). The group then focused on how to capture data so that it could be classified using the developed categories and definitions.

Figure 1. Administration medication errors.



A few months prior to the workgroup forming, the medical center implemented an electronic medical incident reporting system that included fields for medication errors. The fields were evaluated to determine if the data collected would satisfy the needs of the workgroup. Since errors can be reported by anyone, the workgroup felt the information collected was not complete enough to make decisions based on the definitions that had been created. As a result the group developed a separate form (see Appendix A) that captures the detail needed to classify bypass errors. The Medication Error Detailed Report was integrated into the existing medical incident reporting system. Each time there is a medication error reported via the electronic system,

Figure 2. BCMA bypass medication errors.



it triggers an automatic email to the clinical manager of the unit where the error occurred. The report is attached to the email and includes an explanation of the importance for completing the form. The form was pilot tested in critical care then implemented in all care areas. In April 2009 the workgroup will evaluate first quarter data using the new data collection tool and bypass classifications.

Analysis

Prior to forming the workgroup, medication errors associated with BCMA bypass were evaluated by the Adverse Drug Event (ADE) committee quarterly and filed for annual comparisons. The results were not widely disseminated and no group was formally dedicated to reducing medication errors. The interdisciplinary workgroup tasked to evaluate medication errors related to administration has committed to bi-monthly meetings in order to identify the issues and make recommendations to reduce medication errors. One difficulty the group has faced is

Table 1. Types of bypass errors

Type of bypass	Type of error	Definition
Wristband not scanned	Wrong patient	Wristband scanned while on patient.
Medication not scanned	Wrong medication, dose, time, or route, medication not ordered but given, and wrong labeling	Barcode on medication scanned.
Break in medication delivery process	Wrong patient	Any error that occurs as a result of an interruption in the medication delivery process. Includes errors that occur when the delivery of a medication is not conducted as a single step at the patient bedside (e.g. scan patient then leave patient room to scan the medications, then return to a patient room and administer medication to the wrong patient).
Missed medication report not accomplished	Omission, wrong time	Per policy, missed medication reports are run at the end of each major medication pass and at the end of shift. Any timing error that is less than one hour (inpatient) or 1.5 hours (nursing skilled care) will be excluded.
Combination of errors	Multiple errors	Any error that results from a medication not being charted (e.g. unable to determine if medication was administered may assume it was given if it is a controlled substance and count reflects a missing dose of medication). Any error that results from wrong packaging (e.g. medication package contains two pills instead of just one).
Other		Any error not accounted for in other types

setting an attainable error rate goal and measure of success. The main question under debate is, should the goal be zero? The measure of success is also problematic since medication error data are reliant on the incident reporting system. If the organization reduces barriers associated with reporting (e.g. implementation of an electronic system), then more reports are likely to be generated.

In addition to setting an acceptable threshold for medication errors and developing measures of success the workgroup plans to make recommendations to key stakeholders to reduce the number of errors associated with bypass. The collection of reliable, valid data is the first step. Grout (2007) reminds BCMA users that the system is only effective if it is monitored for compliance. Evaluating bypass errors by categories, versus collectively as bypass errors, will allow the group to provide recommendations that target specific behaviors and/or system issues.

Recommended Strategies

The workgroup is in an early stage of development. There are several strategies that can be implemented that will build on the existing foundation and support sustainability of the group. First, the workgroup must continue to gather data. As previously mentioned, determining the areas of non-compliance are key to reducing errors (Grout, 2007). The data the workgroup are currently collecting via the incident reporting system and the medication error detailed report are a starting point. The group may be better served by considering other data collection mechanisms. These could include an observational study or an RN survey about perceived barriers with BCMA use. One example is the work of Van Onzenoort, VanDe Plas, Kessles, Veldhorst-Janssen, Van Der Kuy and Neef (2008). They evaluated nursing use of a BCMA system and reported that only 55.3% of all medications were scanned prior to administration. Subsequent interviews with nurses revealed five major reasons for not using the system. These included: 1) difficulty scanning the bar code, 2) lack of awareness about the bar code, 3) delays in response from the bar code system, 4) lack of time, and 5) administration required before order entered. They also determined that an increase in the number of nurses working on a unit resulted in a statistically significant increase in the number of medications scanned. This report

provides a good example of collecting data that can be used to make specific improvement recommendations that support BCMA compliance.

The second recommendation is for the workgroup to review the 15 best practice recommendations made by the Veterans Health Administration (Patterson, Rogers, & Render, 2004). The recommendations acknowledge that a successful BCMA program requires maintenance. For example, the formation of an interdisciplinary team is the first recommendation. There has been no interdisciplinary team in place to address BCMA issues. Had there been a team, the organization may not be experiencing the current number of bypass errors. Based on the workgroup's findings, they may be able to make recommendations to leadership that will create a sustainable process to reduce medication errors by enhancing BCMA infrastructure.

Finally, the workgroup utilized the current the Medication Administration Policy (Nursing, 2004) which was last reviewed in 2004 to develop bypass types and definitions. As the group evaluates the errors and formulates recommendations for improvement, the policy will need to be re-evaluated to determine if the recommendations are congruent with the policy or if the policy needs revision.

Impact

For the past two years, approximately 50% of the organization's medication errors classified as administration errors have been linked to BCMA bypass. Understanding BCMA bypass through standardized definitions and classification of errors has the potential to reduce the number of annual medication errors significantly. This directly impacts the quality and safety of patient care and represents a potential cost savings. There is also an impact on nurses as

making a medication error is distressing. Creating an environment that reduces stress impacts retention and nurse satisfaction.

A project of this nature can be impacted by DNP involvement. The DNP possess the skills necessary to take a systems level approach that will achieve maximal effect and can demonstrate sustainable improvements over time. Since the workgroup will be making recommendations to stakeholders regarding improvement actions, it will take a change agent that can advocate for practice and culture change. These types of changes are rarely easy and will require a healthy professional relationship with leadership and management to support and sustain change.

Reflection

In order to fully realize the impact of this project it requires multiple skills such as systems thinker and change agent. I think the most difficult challenge will be changing the culture around medication administration practices and the use of BCMA. When the processes associated with BCMA become time consuming for the bedside nurse they create workarounds. The BCMA coordinator is famous for saying “BCMA is a patient safety tool, not a time saving tool.” It is when these workarounds are used that many of the medication errors occur. We can inform nurses and ask leadership and management to implement changes in practice but if nurses continue to feel the need to create shortcuts we will not make any progress.

I recently received some feedback from another VA medical center where managers are required to formally counsel nurses who make a medication error as a result of bypassing BCMA. At the national level bypass has also become a “hot topic.” In the next version of BCMA nurses will have to document from a standardized list why the system was bypassed. The BCMA coordinator and Quality and Performance will have the ability to run reports and review

bypasses. Personally and professionally I can see both sides of the issue and I do not know the correct answer. Implementing a system that is punitive can negatively impact morale and satisfaction but on the other hand not taking action sends the message that it is alright to bypass the system. Working with leadership, management and nursing staff to develop the right course of action in this situation will be a challenge. Facilitating a change in culture will provide me the opportunity to grow professionally through exploration of different approaches.

Medication Error Detailed Report

This report is to be completed by the manager (or designee) from the area in which a medication error occurred. The purpose of this form is to capture detailed information about how the error occurred. The information will be used to improve the medication administration process.

Thank you for supporting safer medication administration.

1. Is BCMA used in your area? Yes ☐ No ☐

If **NO** stop here and return this form to Sender

If **YES**, complete the area(s) below that are pertinent to the medication error (multiple areas may be completed) and return to Sender

2. Wrong Patient Error

Was the wristband scanned successfully by the nurse? Yes ☐ No ☐

If **NO**, a detailed comment is required (example, number of attempts made to scan, no wristband, equipment malfunction, etc.) What was the reason?

3. Wrong Medication, Wrong Route, or Wrong Dose Error

Was the medication scanned successfully by the nurse? Yes ☐ No ☐

If **NO**, a detailed comment is required (example, number of attempts made to scan, no barcode, equipment malfunction, etc.) What was the reason?

4. Wrong Time or Omission Error

Did the nurse run a missed medication report? Yes ☐ No ☐

If **YES**, how long before the error occurred did s/he run the report? _____ hours

If **NO**, a detailed comment is required explaining why a report was not run.

What was the reason?

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Running head: HIGH FIDELITY SIMULATION

High Fidelity Simulation

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

Survival to discharge from in-hospital cardiopulmonary arrest in the acute care setting has remained at or below 17% for several years (Peberdy, Kaye & Ornato, 2003). It is reported that 66% to 84% of patients exhibit signs of deterioration six to eight hours prior to arrest (Franklin & Mathew, 1994; Schein, 1990). Early identification and intervention for patients experiencing deterioration can prevent arrest and decrease associated mortality (Bellomo, 2003; Buist, Moore, & Bernard, 2002; Kerridge, & Saul, 2003). When the system and/or team fail to identify clinical deterioration and the patient arrests, this episode is defined as “failure to rescue” (Institute, 2004).

The purpose of this paper is to describe the development of a program aimed at reducing failure to rescue (FTR) incidence in the acute care setting of a tertiary care teaching hospital. One component of the program, Registered Nurse (RN) education using a high-fidelity manikin, will be analyzed and strategies for improvement will be offered.

Case

In 2004, the Portland VA Medical Center (PVAMC) evaluated the incidence of FTR and found the respiratory system to be the leading body system involved in clinical deterioration and episodes of FTR. This is consistent with reported findings (Franklin & Mathew, 1994; Schein, 1990; Hillman, Bristow, & Chey, 2001). The initial incidence of FTR ranged from six to eight cases a month from a total of 90 acute care beds. An assessment of the causative factors revealed that lack of early recognition of patient decompensation was a factor in 40% of the cases, and failure to obtain resources for the decompensating patient was a factor in the remaining 60% of cases.

The assessment completed in 2004 suggested that the pivotal team member in early recognition and intervention was the acute care bedside RN as they provide direct care and surveillance 24 hours a day. It was determined that the RN's ability to assess, identify, and communicate changes, as well as to intervene and obtain resources, was fundamental to FTR prevention. As a result several interventions were developed and implemented. This was the start of a formal FTR prevention program.

One intervention consisted of an educational program for acute care RNs. The education provided didactic content related to early signs of decompensation in the veteran. Another intervention was aimed at re-designing assessment standards to aid the RN in early recognition (e.g. the requirement to perform a head to toe assessment every 12 hours). These interventions initially resulted in a significant reduction of FTR incidence. However, the results were not sustainable, as the incidence began to increase after eight months. As the FTR prevention program evolved and the organization strived for zero FTR occurrences, multiple other interventions were implemented. These included implementation of a rapid response team and a high fidelity simulation (HFS) program.

The HFS program was developed to provide education to acute care RNs. Multiple resources were allocated to develop the program and include a dedicated full-time program coordinator, the use of an acute care patient room to accommodate the high fidelity manikin and a dedicated classroom for didactic education, viewing simulation sessions, and debriefing. The program offers simulation to RNs one month each quarter. Times are scheduled to meet the needs of both day and night shift. The focus is determined from real patient scenario(s) that occurred during the previous quarter. The objective of all sessions is to promote early

recognition and intervention to prevent decompensation of the patient. Because it is a learning environment all simulation sessions are designed to end with a positive outcome.

Analysis

The HFS program is resource intensive as it requires space and dedicated FTE but also requires the bedside RN to be away from patient care for 90 minutes to participate. As a result, it is important that as the organization strives to decrease the incidence of FTR through HFS education that there is sufficient evidence to guide decisions around how HFS is utilized.

Simulation Literature

In the post-academic setting there are multiple studies describing the use of low fidelity simulation as a teaching modality. These studies predominantly focus on task training (e.g. how to perform cardiopulmonary resuscitation, how to start an IV). When focusing on HFS as a teaching modality in the post-academic setting there is a limited amount of published research. The published studies that are available report that HFS simulation improves knowledge and is found to be a realistic learning modality (Byrne & Greaves, 2001; Devitt, Kurrek, Cohen, & Cleave-Hogg, 2001; Schwid et al, 2002). It must be noted that after an educational intervention an increase in knowledge is the expected outcome. Historically, simulation has been used as a teaching modality to improve human performance in a multitude of industries including space and aviation, military, and health care. Therefore, the findings reported in other settings and industries should be considered when developing strategies aimed at improving early recognition and intervention in the acute care setting.

In the academic setting reported findings demonstrate improvements in self-efficacy, knowledge and performance after an HFS intervention (Bearnson, & Wiker, 2005; Bremner, Aduddell, Bennett, & VanGeest, 2006; Goldenberg, Andrusyszyn, & Iwasiw, 2005). Although

this could be considered justification to use HFS as an educational modality the evidence does not describe the required “dose” of the intervention to improve early recognition and intervention (performance). For instance, to achieve and sustain zero FTR episodes, how often does a RN need to participate in HFS and what should be the focus of the simulation session?

Understanding the required “dose” is important in the post academic setting due to the intense resources requirements to implement and sustain a HFS program.

HFS Program

The primary outcome being evaluated by the current HFS program is the number of FTR episodes. This was selected because the program was “born” from the FTR prevention program, there is an established organizational goal, and FTR data is readily available. Since FTR occurs infrequently and there are other FTR prevention interventions occurring simultaneously, it is difficult to determine the actual impact of HFS education. Fully understanding the effect of HFS education on RN patterns of recognition and intervention is critical. Within any organization there are always competing demands for resources and any resource intensive program must expect to justify it’s existence through the establishment and attainment of outcomes.

Strategies

Based on the analysis several strategies for improvement will be offered to assist with justifying the program from a fiscal perspective but also to broaden the scope of the program to support evaluation of more than just FTR outcomes. The first strategy would be to consider the use of a framework to add structure to the program. One model to consider is the clinical judgment model developed by Tanner (2006). The model is applicable to FTR situations but can also be applied to any other situation with components that are rapidly changing and requires continuous appraisal and response by the nurse (Tanner, 2006). The addition of the model would

serve as a mechanism to broaden the program outcomes beyond FTR. Clinical judgment applies to all acute care nursing situations. Additionally, the use of a broader framework to guide the program would provide the program with the flexibility to adapt outcome measures based on national trends. For example, the HFS program would be positioned to easily adapt to changes in national patient safety efforts or new Institute of Healthcare Improvement initiatives.

The next strategy for improvement would be to identify questions and measurable outcomes. FTR can continue to be monitored but the addition of other outcome measures would add strength to the program. Selecting a variety of outcomes would demonstrate the program is diverse. Outcomes could include items such as RN satisfaction or RN performance. Another measure for consideration would be determining the necessary “dose” of HFS simulation needed. This would assist with answering questions such as: 1) is quarterly simulation enough or too much?, 2) do all levels of expertise benefit?, or 3) do new graduates benefit from monthly simulation during the first year of employment? Exploring these types of questions would enhance the program by ensuring that RNs are removed from patient care only when necessary.

The final improvement strategy for consideration would be to implement the framework and develop outcome measures with the ultimate goal of publication. This would address the gaps noted in the literature and contribute to the development HFS programs nationally.

A well developed HFS program has the capacity to influence many aspects of an organization. The development and implementation of these recommended strategies can be accomplished through collaboration with a Clinical Nurse Specialist (CNS). CNSs are skilled in staff education, outcomes measures, and working within systems to achieve change. An active partnership would position the program for long term success.

Impact

Developing and implementing strategies to broaden the HFS program beyond a mechanism to reduce the incidence of FTR supports sustainability of the program. The actual impact that a HFS program can have on outcomes is not fully known. Therefore, developing a program that is grounded and has well defined outcomes measures yet is flexible to grow with changing demands has immense potential.

Establishing outcome measures that address aspects that are important to the organization will demonstrate the value of HFS education. This can ultimately impact who receives HFS education and how it is delivered. Currently the program focuses on acute care RN education, in the future other disciplines or other care areas may find applicability. There is also the possibility of developing interdisciplinary applications.

The development of a program that can serve as a benchmark within the health system has the potential to impact the future of post-academic nursing education. Current RN education typically consists of in-services, workshops, and conferences, all didactic in nature. HFS education is interactive and engages learners.

Self-reflection

Will this be easy? The answer is no. I think the strategies for improved presented are feasible yet difficult to achieve. It will require innovation and persistence to develop the outcome measures. I do however think it is worthwhile. Patients continue to become more and more complex. The academic setting is making changes, specifically in Oregon, to provide a stronger foundational education. Education can not stop after graduation. RNs need to continue to build their skills. We currently “build their skills” by sending them to a 30 minute in-service where we download a bunch of information while they are running through a list in their head of what they need to accomplish before the shift ends. We then expect

them to incorporate everything we taught and improve outcomes. In my opinion, this has been demonstrated over and over again to be ineffective. From the manager's perspective it is difficult to send RNs to HFS education since the session takes 90 minutes. Managers have to schedule additional staff to cover patient care (unlike the 30 minute in-services). To achieve continued support from managers, the HFS program must demonstrate value. I think if you ask anyone they will tell you simulation makes sense but because it is resource intensive we must prove that it makes sense.

This project will be a professional challenge. I believe a key component of success will be bringing the right people together to start formulating the plan. This is one of my professional strengths. A second key component will be keeping people engaged over time as I expect this will take years to accomplish. This is a skill that I would like to work on as I have seen many projects (some my own) "fizzle" because key people became disengaged. Developing long term buy in will be necessary early on in the process.

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Running head: JOINT COMMISSION

Joint Commission:
Inpatient Diabetes Disease Specific Certification

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

The American Diabetes Association (2008) estimates that 17.5 million people have diabetes and that there are 6.9 million undiagnosed cases. This represents a growth rate of about one million people per year since 2002. In 2004, Reiber, Koespell, Maynard, Haas, and Boyko evaluated demographics and the behavioral and health care status of veterans and non-veterans using the Behavioral Risk Factor Surveillance System and the Veterans Administration (VA) Veteran Health and Benefit databases. The findings demonstrate there is a higher prevalence of diabetes in the veteran population (16%) compared to the non-veteran population (6.2%).

In 2007 there were a total of 186 million inpatient hospital days of care and 22% were estimated to be incurred by people with diabetes (American Diabetes, 2008). In general, diabetes puts patients at risk for neurological events, peripheral vascular disease, cardiovascular disease, renal complications and ophthalmic complications (American Diabetes, 2008). Nationally, increased attention has been placed on glycemic management in response to the rising prevalence of diabetes and the associated economic burden. Even with the growing national attention, adequate glycemic control often is not achieved.

The Joint Commission (JC), in collaboration with the American Diabetes Association (ADA), has developed a disease specific certification for inpatient diabetes care. Organizations are evaluated against a set of standards which fall into five categories (see Table 1). The certification is awarded for a one year period to organizations who demonstrate exceptional efforts to improve glycemic care and outcomes in the inpatient setting. An off-site review is conducted in the second year with re-certification happening every two years thereafter (Joint Commission, 2009c). Initial certification costs the organization \$9685 (Joint Commission, 2007). The JC believes that developing a glycemic program that meet certification requirements will

assist organizations to “achieve long-term success in improving outcomes” and demonstrate the organization is committed to providing quality care (The Joint, 2009a).

The demonstration of quality, evidence based care is evaluated in the performance measurement and improvement standard category. The standard has two stages. During stage one, four evidence based, valid, and reliable performance measures are developed by the organization. Data is collected and analyzed for trends. Two of the four measures must be clinical process or outcome focused. A description of all performance measures must be submitted with the certification application. During stage two, standardized measures developed by the JC are implemented by the organization. Organizations are required to collect and submit data monthly to the JC (The Joint, 2009b). As of March 2009, no standardized performance measures have been developed for inpatient diabetes (The Joint, 2009b).

Table 1. Joint Commission Disease Specific Certification Standards Categories

Program management	Delivering or facilitating clinical care
Clinical information management	Performance measurement and improvement
Supporting patient/participant self-management	

The purpose of this case study is to describe the events that prompted the Inpatient Glycemic Control Team (IGCT) to seek JC certification. Included is a gap analysis to identify areas of focus as the team develops a plan to gain executive buy-in. This is followed by strategies for achieving buy-in and the anticipated impact.

Case

In May 2008, a representative from the JC provided an overview of the Advanced Certification in Inpatient Diabetes to the Portland Glycemic Collaborative. Two members of the Portland Veterans Administration Medical Center (PVMAC) IGCT attended the presentation.

The team members followed up by summarizing the presentation at an ICGT meeting. This initiated discussions among team members about the benefits of certification.

Discussion regarding certification continued over the next four months. The focus of the conversations centered on the perceived benefits. The team believed certification would provide focus and gives them something to strive for, however it seemed expensive. In the end, the team reached consensus that if leadership supported certification this would translate into organizational support for the team. Organizational support would provide the team with a stronger foundation, provide recognition for the program that had been developing over the previous four years, and allow the team to address several outstanding glycemic control issues. As a result, achieving organizational buy-in to seek JC certification was set as a team goal for 2009.

In September 2008 a meeting was requested with the Chief of Staff (COS) and the Director of Quality and Performance (Q & P) to introduce the idea of JC certification. A presentation was made in October 2008 by one of the IGCT leaders and was well received. The COS viewed this pursuit as an example of a project that requires buy-in from three discrete budget silos (patient care services, medicine services, and administrative services) with no one silo taking ownership. The recommendation was for the IGCT to present the case to executive leadership. The Q & P Director offered data support to help the team prepare for the presentation (IGCT Minutes, October 15, 2008).

Shortly after the COS and Q & P Director discussion, the Medical Center Director was detailed for a six month project outside of the medical center. As a result the presentation to executive leadership was stalled. The IGCT currently has a 30-minute presentation scheduled for June 10, 2009. The team co-chairs will make the presentation. Prior to the presentation an

executive decision memo must be submitted. This allows the executive team to prepare for the presentation and potentially make a decision at the time of the presentation.

Analysis

A gap analysis (see Appendix A) to compare actual performance (PVAMC glycemic program) to the expected performance (JC certification program requirements) was necessary. The analysis revealed three major gaps. First, development of a subcutaneous insulin protocol is needed. This will address major gaps as well as strengthen other areas of the program. Next, a method to ensure a current (within 60 days) glycosolated hemoglobin is available for every patient admission must be established. Finally, the patient's comprehension of the diabetes self-management program must be evaluated and documented. The electronic medical record utilized at PVAMC will be a key component in working towards resolution of all gaps.

In addition to the program requirements evaluated in the gap analysis, the JC requires the organization to develop four outcome measures. The IGCT currently has one outcome measure developed related to the use of insulin infusion in the acute care setting. They are currently developing outcome measures related to hypo/hyperglycemia in all inpatient areas using the Society of Hospital Medicine glucometric definitions (Society, n.d.). The team has been working with a data analyst to determine the availability of data regarding the use of sliding scale insulin. If this data can be retrieved the team will have four outcome measures.

Strategies

The executive decision memo and presentation to executive leadership requires thoughtful preparation as the goal is to achieve executive buy-in. The gap analysis is an important tool for preparation as it provides the foundation to determine what is necessary to achieve optimal performance (Gap, 2009). The next step is to outline the plan and required

resources to meet certification requirements. The plan should include specifics about required fiscal resources and contain a feasible timeline for achieving compliance with JC program requirements.

In order to develop an adequate plan one strategy that can be employed is to benchmark with the organizations who have obtained certification. One organization is the Cleveland Veterans Administration (VA) Medical Center. This is the only VA with the diabetes certification. Formulating benchmark questions such as: 1) what outcomes have you achieved? 2) what costs have you incurred? 3) describe the model used by your program, and 4) describe your journey to certification to include successes and failures. Benchmarking is expected to provide the team with guidance as the plan is developed. Additionally, benchmarking can provide information that may be requested by the executives, especially in describing another organization's experiences (Active Strategy, n.d.).

Another recommended strategy is to investigate what the current "burning issues" are for the organization and organizational priorities (Active Strategy, n.d.). Determining if there are performance measures, patient safety initiatives or other high visibility issues (i.e. Center for Medicare and Medicaid no pay changes) that can benefit from JC certification. These should be highlighted in the presentation.

Consideration of these strategies in the development of the executive presentation will support achieving the goal of executive buy-in. Buy-in will result in the provision of needed resources for the existing glycemic program to meet the JC program requirements within the established timeline.

Impact

Achieving executive buy-in will have two main areas of impact. First, as noted during the meeting with the COS and Q & P director this request is an example of a project that requires financial support from three discrete budget silos. Decisions at the executive level of how costs will be shared without direct oversight (ownership) will benefit the IGCT as well as other organizational committees (e.g. Pain Committee). Healthcare today requires an interdisciplinary team approach to develop strong programs of care that can provide for care across the continuum. This can challenge organizations such as PVAMC that have discrete budgets and no process for sharing of costs.

The second area of impact will be on patient outcomes. Achieving executive buy-in will support the IGCT to address outstanding glycemic control issues such as developing a subcutaneous insulin protocol and elimination of sliding scale insulin only as a treatment option. Anticipated patient outcomes range from a reduction in surgical site infection to shorter length of stays to improved education about diabetes self-management.

The more global impact will be on veterans in general since veterans have a higher prevalence of diabetes than non-veterans. If PVAMC can successfully demonstrate obtaining JC certification the resulting glycemic program can then be shared within the VA system; thus supporting improvement in veteran outcomes at the national level.

The final area of impact is related to the development of performance measures. The JC is striving to develop standardized performance measures so that all certified organizations can submit data for evaluation and comparison. The development of performance measures as part of the PVAMC program may prove useful to the JC as they currently do not have any standardized measures developed for the inpatient diabetes certification. Development of

standardized measures and the ability to compare outcomes will in turn support ongoing improvements in the area of glycemic management.

The implementation of the strategies aimed at achieving executive buy-in has several implications for Clinical Nurse Specialist (CNS) practice. The CNS is a valuable team member because they bring advanced clinical skills and are educated in working with system level issues. Obtaining executive buy-in and the subsequent implementation of the developed plan requires systems thinking. Next, CNSs have skills that support the development of performance measures and processes for collecting and analyzing data. Finally, the program once developed and implemented, requires mechanisms to ensure sustainability. The CNS can facilitate building non-person dependant processes that support long-term sustainability of the program.

Self Reflection

I have been actively involved with the IGCT since it's inception and have been the co-chair for over three years. This is the first time we have directly asked for support from the organization. If needed, I believe we can address the needs identified in the analysis utilizing existing resources. However, we do need \$10,000 to cover the cost of the certification review.

The part I am uncertain about is developing a program that is sustainable. Some of the programs in the community we have learned about through the Portland collaborative have a full-time, inpatient Certified Diabetes Educator (CDE). With a CDE, the program could be viewed as sustainable. It also promotes a proactive program. For example, the CDE can run a daily report of glucose values and approach patient care teams to offer assistance versus functioning as a consult service. This type of program sounds appealing yet it can lead to dependence on the full-time resource. Dependence on a single resource does not support long

term sustainability and providers can become less skilled in glucose management. I think the team should strive for developing a program that offers the right balance to ensure that patient outcomes are optimal and provider skills are developed.

I am eager to complete the benchmarking as I think there is a lot to learn. I also think it will help our team make some decisions about the direction and structure of our program. This is important so that we know what financial resources to request (e.g. a full time CDE).

In terms of my professional growth, I have never written an executive decision memo or requested to make a formal presentation to executive leadership. I am planning to do a dry run of the presentation with some nursing leaders in order to obtain feedback. I view this as a wonderful growth opportunity and I am looking forward to the presentation regardless of the result.

Appendix A

Gap Analysis

Major Element	Joint Commission Expectation	Gap
General Recommendations	<p>Patients with diabetes are identified as having diabetes in the medical record, at admission and at discharge. Documentation reflects the individual's:</p> <ul style="list-style-type: none"> •type of diabetes (if possible to determine) •preadmission medications for the control of diabetes including dosages as stated by the patient. •nutritional screening results •nutrition management plan •degree of control prior to admission and severity of hyperglycemia on admission •current weight •current and anticipated nutritional status (e.g. NPO, etc) •level of comprehension and competence related to diabetes self management activities 	<p>Nutritional screening is accomplished on admission. A nutritional management plan is not specifically documented. Degree of control and severity of hyperglycemia is not documented on all patients consistently.</p> <p>Comprehension and competence related to self management is not consistently documented.</p>
Blood Glucose Targets	<p>An A1C is drawn at the time of admission unless the results of the patient's A1C drawn within the last 60 days are known or the patient has a medical condition or has received therapy that would confound the results.</p>	<p>Results of historical lab values are available in the electronic record. No mechanisms to ensure a new test is ordered if previous test greater than 60 days old.</p>
Preventing	<p>Plans for the treatment of hypoglycemia and hyperglycemia are established</p>	<p>Plan for treatment of</p>

Major Element	Joint Commission Expectation	Gap
Hypoglycemia	for each patient. A plan for coordinating administration of insulin and delivery of meals is implemented. Episodes of hypoglycemia are identified and contributing reasons for these are captured. Contributing reasons for episodes of hypoglycemia are evaluated for systemic trends (e.g. difficulty having food trays delivered, improper ordering or timing of insulin or antidiabetic medications, drug interactions etc.) Written protocols are developed for the management of patients on intravenous insulin infusions.	hyperglycemia is not present for all patients. Episodes of hypoglycemia are captured but not currently reviewed systematically for trends.
Diabetes Care Providers	The following groups working with patients with diabetes have had education specific to the management of diabetes: •dietitians, and others involved in medical nutrition therapy •staff involved in point of care testing •medical staff •nursing staff including APNs •pharmacists and •physician assistants A multidisciplinary program team is identified with a designated team leader.	All disciplines identified are not routinely targeted for education-Pharmacy and Nutritional Services
Diabetes Self-Management Education	Patients with newly diagnosed diabetes or educational deficits have at least the following educational components reflected in the plan of care: •medication management, including how to administer insulin (when appropriate) and potential medication interactions •nutritional management, including the role of carbohydrate intake in blood glucose management	Newly diagnosed diabetics are provided education, however all components of self management are not documented in the medical record.

Major Element	Joint Commission Expectation	Gap
	<ul style="list-style-type: none"> •exercise •signs, symptoms, and treatment of hyperglycemia and hypoglycemia •treatment of hyperglycemia and hypoglycemia •importance of blood glucose monitoring and how to obtain a blood glucose meter. Instruction on use of blood glucose meter if available •sick day guidelines •information for who to contact in case of emergency or for more information •plan for post-discharge education or self-management support 	
Medical Nutrition Therapy	Nutritional assessments are conducted for patients not consistently reaching glucose targets.	Not consistently conducted.
Blood Glucose Monitoring	<p>Written blood glucose monitoring protocols for patients with known diabetes are developed and include, at a minimum, the following:</p> <ul style="list-style-type: none"> •measuring blood glucose upon admission •a plan for subsequent monitoring based on the patient's: <ul style="list-style-type: none"> o type of diabetes o desired level of control o current treatment(s) (e.g. use of steroids, TPN, etc.) o co morbidities and medical illnesses o dietary status including patients who are NPO 	No subcutaneous protocol.

Major Element	Joint Commission Expectation	Gap
	<p>Results of glucose monitoring are available to all health care team members.</p> <p>The patient and the practitioner managing his or her diabetes care after discharge are informed about the patient's A1C results and any unresolved issues related to glucose management.</p>	<p>All practitioners can view A1C results in electronic record. No method to communicate unresolved issues.</p>

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Running head: ENVIRONMENTAL CASE STUDY: FALLS

Environmental Case Study: Falls in the Acute Care Setting

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

The prevention of patient falls has been gaining national attention over the past decade. In 1998, The American Nurses Association (ANA) included falls prevalence as one of six nursing sensitive indicators in the development of the National Database of Nursing Quality Indicators (NDNQI) (Montalvo & Dunton, 2007). In 2005, the Joint Commission (n.d.) added reducing risk of harm from patient falls as a national patient safety goal. Most recently the Centers for Medicare and Medicaid Services (CMS) included hospital acquired injury resulting from a fall to the list of non-reimbursable conditions under the Hospital Acquired Condition and Present on Admission program (Centers for Medicare, 2008).

Falls are characterized as intrinsic (physiological) or extrinsic (environmental) and can be broadly defined as an unintentional change in body position that results in the patient landing on the floor (National Center, n.d.; Texas Department, 2003). NDNQI defines a fall as any “unplanned descent to the floor (or extension of the floor, e.g., trash can or other equipment) with or without injury to the patient” (Montalvo & Dunton, 2007, pg. 29). NDNQI’s definition includes assisted falls (someone helps the patient descend).

There are multiple environmental risks in the acute care setting that put patients at risk for falling. These risks include an unfamiliar environment, poor lighting, excess furniture, height of bed and chairs, and a bed with side rails (Resnick, 2003). The purpose of this paper is to make recommendations to reduce environmentally related falls the Portland VA Medical Center (PVAMC) by first reviewing the epidemiology of falls, then briefly discussing the psychological, economic, and legal impact associated with a fall and concluding with recommendations. It is recognized that the medical condition and treatment regimen(s) often exacerbate environmental

risks (e.g. frequent urination, cognitive changes, and/or functional impairment); however this is beyond the scope of this paper.

Epidemiology

In the United States more than one third of adults age 65 and older fall each year (Centers for Disease, 2008). In 2005 nearly 16,000 people over age 65 died from unintentional fall related injuries and approximately 1.8 million were treated in emergency departments for fall injuries (Centers for Disease, 2008). The risk of falling increases with age with men more likely to die from a fall than women (Centers for Disease, 2008).

Falling poses an immediate safety risk as well as a long term risk. When a fall occurs it can create a fear of falling (Centers for Disease, 2008). This fear then creates a self-imposed activity restriction. Deshpande et al. (2008) in the InCHIANTI study reported that in the community setting 52% (n=440) of study participants disclosed a fear of falling and of these, 65% reported some activity restriction as a result. The fear of falling followed by the self-imposed activity restriction contributes to the need for long term assisted care. It is reported that persons age 75 and older who suffer a fall are four to five times more likely to have a long term care admission of one year or longer (Centers for Disease, 2008).

PVAMC

PVAMC is a tertiary care medical center with four medical-surgical units (112 beds). In addition to typical medical-surgical services, post-operative open heart, liver and renal transplant, spinal cord injury, and seizure monitored patients are cared for. The majority of patients are male Vietnam and World War II Veterans. PVAMC is a Magnet® organization and submits falls prevalence data to NDNQI quarterly. The organization currently has a fall prevention program which includes an education module for staff (Nursing Professional, 2007).

Patient rooms range from single rooms to four-bed patient rooms. All rooms have a minimum, standardized amount of furniture to include a bed, over-the-bed table, night stand, trash can, hazardous waste can, chair, IV pole, and linen hamper. Rooms can have additional furniture (e.g. cardiac chair) and equipment (e.g. bedside commode, infusion pumps) depending on the patient's condition. Single rooms have a private bathroom while all other rooms have shared bathrooms. In addition to a toilet, sink and shower, bathrooms may have items required to meet patient needs (e.g. bedpan). Large items such as personal wheel chairs may be stored in the bathroom. Each room has a single locker style cabinet to store personal belongings. Rooms have overhead florescent lighting and an over-the-bed light. Computerized charting and medication administration is utilized so a computer on wheels may be in the room.

During fiscal year 2007 (FY 07) PVAMC fall rates per 1000 patient days were consistently above the lower national limit as reported by NDNQI. Additionally, throughout FY 07 rates in the acute care setting were trending upward with the highest reported rates during the fourth quarter. In 2007, 123 inpatient falls were reported with 31% (n=38) resulting in an injury (Portland VA, 2007). Table 1 provides information about the location and time of day of falls. Table 2 summarizes the common causative factors associated with a fall.

Discussion

Current national guidelines recommend fall prevention through modification of the environment (Resnick, 2003; National Center, n.d.). Since 20-30 percent of falls in older adults result in severe injury such as a hip fracture or traumatic brain injury it is imperative that a fall prevention program which includes environmental modification exists (Centers for Disease, 2008). Development of a fall prevention program aimed at reducing environmental risk not only

Table 1

Location and time of day of patient falls

	n	%
Location (N=123)		
Patient's room	79	64
Patient's bathroom	25	20
Other	19	16
Time of day (N=123)		
Day	41	33
Evening	31	25
Night	51	42

Table 2

Common causes of patient falls

	n	%
Most common causes (N=123)		
Getting out of bed	16	13
Slipping	15	12
Loss of balance	14	11
Walking to toilet	10	8

serves to reduce fall rates but has the potential to reduce the psychological, economic, and legal impact associated with a fall.

Mechanisms to eliminate environmental fall risks are pivotal to avoiding the psychological impact experienced by patients after a fall. As previously described, many patients who fall develop a fear of falling again. This fear causes a self-imposed activity restriction which interferes with the mobility needed to recover and can necessitate assisted care after discharge. Interventions aimed at reducing the psychological impact also have an economic impact as they can reduce the need for assisted care. Additionally, patients who fall can require medical therapy ranging from treatment of minor bruises to repair of a hip fracture. Beginning October 1, 2008 costs associated with a fall injury will no longer be eligible for reimbursement by CMS and some

secondary insurance companies (Centers for Medicare, 2008). Lastly is the legal impact an environmentally related fall can have on an organization. Falls that are considered preventable may present a higher degree of liability.

Recommendations

Preventing falls in the acute care setting requires an organizational commitment from leadership to housekeeping to nursing staff. The following recommendations are aimed at reducing the environmental risks associated with falls in the acute care setting at PVAMC:

1. Expand the existing prevention program to include: (a) an environmental risk assessment, (b) requirement to place bed in low position with wheels locked, (c) use of a night light or under the bed lighting, (d) removal of furniture that is not intended for sitting, (e) removal of furniture that when the patient is sitting their feet do not touch the floor and (f) a requirement to keep room free of clutter (Resnick, 2003; National Center, n.d.).
2. Eliminate the practice of having standard furniture in each patient room and institute a practice of customizing the furniture to meet patient need.
3. Select a room and bed that allows the patient to exit the bed on their strong side (National Center, n.d.).

Incorporation of these recommendations into the existing fall prevention program will create a program that is consistent with national recommendations as well as provide the foundation for avoiding the consequences associated with an environmentally related fall.

Self Reflection

Currently at PVAMC an organizational level falls prevention committee exists and is chaired by the Patient Safety Officer. The committee has complete oversight of the Falls Prevention Program. Falls are monitored within the committee through the electronic

incident reporting system. Fall related data is communicated to nurses through the Nursing Quality of Care Committee twice a year. Fall data is not reported to any other discipline specific group (e.g. provider groups or housekeeping).

Using the evidence based practice process to identify and implement best practices is a key component of the DNP role. The recommendations presented to reduce environmentally related falls at PVAMC reflect best practice. The next logical step is to implement the recommendations by advocating for a multidisciplinary approach to environmental fall prevention. Many disciplines ranging from health care professionals to food service to maintenance personnel are in the patient environment and should therefore be educated about environmental fall risks (more than just spills and basic tripping hazards). Since traditionally nursing professionals have been associated with fall prevention, this would be a significant change in practice and would require buy-in at an organizational level. The change would include an empowerment component as all personnel may not feel comfortable taking the initiative to address an environmental hazard. There is also the chance that some disciplines may feel it is not their responsibility (again this has been traditionally owned by nursing personnel) to assess for and correct an environmental hazard.

In the DNP role I will need to grow my skills related to organizational buy-in and multidisciplinary buy-in to change the culture. Additional skills are needed to empower people to take action as this is necessary for the Falls Prevention Program to truly have an effective environmental fall prevention component.

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Running head: ETHICAL DILEMMA CASE STUDY

N731 Ethical Dilemma Case Study

Christy Locke

Oregon Health & Science University School of Nursing

Case

Mr. P is a 43-year-old male who fractured his right heel in 2004 and underwent an open reduction with internal fixation. Since his injury he has had multiple Emergency Department visits related to heel pain and drainage. He has completed several courses of oral antibiotic therapy over the past three years for the chronic drainage. He was recently admitted for osteomyelitis of the right heel. During this visit Mr. P consented to an incision and drainage and removal of hardware.

Mr. P lives with his long-term significant other (SO). Six months ago they lost their apartment due to financial difficulties and they have been living together in a tent ever since. Their combined monthly income is less than \$700.00. Prior to this admission they had actively been seeking help through community resources to find low-income housing. During Mr. P's preoperative visit, social work provided Mr. P and his SO with a list of potential housing options. The social worker stated at this time that they must obtain housing prior to surgery so that Mr. P would have a place to recover. During this visit Mr. P clearly stated that the only housing option he would consider is one that would allow his SO to live with him. At the time of admission Mr. P and his SO had not been able to secure housing. After admission they continued to actively collaborate with social work to find an adequate place for Mr. P to recover.

Postoperatively Mr. P was found to have Methicillin-resistant *Staphylococcus aureus* (MRSA). The recommended treatment option was long-term intravenous (IV) antibiotic therapy. He consented to placement of a peripheral central catheter for the antibiotic therapy. After the diagnosis of MRSA was made, Mr. P was notified that there were limited housing options available to MRSA patients. Additionally, he was informed that none of the options available would allow his SO to live with him. Mr. P again stated that he would not agree to being

separated from his SO. When asked if they could afford a hotel they reported having only \$65.00 and stated they could not afford a hotel. The health care team communicated to Mr. P the importance of living in a consistent and sanitary environment while undergoing long-term antibiotic therapy via a peripheral central catheter.

Dilemma

Should the patient be treated with long-term intravenous antibiotic therapy or with oral antibiotic therapy?

Review of Topics

Medical Indications

Mr. P has chronic osteomyelitis that has been unsuccessfully treated by multiple courses of oral antibiotic therapy over the past three years. Tissue cultures obtained during the hardware removal were MRSA positive. The recommended first line of treatment is a four to six week course of IV antibiotics followed by a four to six week course of oral antibiotics. Completion of this treatment regimen is anticipated to fully resolve the osteomyelitis. A treatment plan of oral antibiotic therapy only (as previously used) is considered a suboptimal option and would not be expected to fully resolve the osteomyelitis. Inadequate treatment could lead to the need for amputation in the future or could potentially promote further development of antibiotic resistance.

Patient Preferences

Mr. P is considered mentally competent and fully capable of making self-care decisions. He agreed with the long-term IV antibiotic treatment recommendation and consented to placement of a peripheral central catheter. As part of the treatment regimen it was communicated to Mr. P that a consistent and sanitary place to live must be secured prior to discharge. He was in

agreement with this and worked collaboratively with social work to locate an acceptable place to live throughout his therapy.

Since the time of admission, Mr. P openly acknowledged to all staff involved in his care that he and his SO are homeless and live together in a tent (she resided at the hospital with him during his stay). He also clearly communicated that he would not agree to any living situation that separated him from his SO. As his anticipated discharge date approached, it was determined that the only living option available (due to MRSA status) was a housing unit that could not accommodate his significant other. Mr. P again conveyed that he would not agree to any living situation that separated him from his SO.

Quality of Life

For the past three years, Mr. P has lived with an extremely painful, draining heel wound. This has resulted in several visits to the Emergency Department for pain medication and oral antibiotic therapy. The current recommended treatment, IV antibiotics followed by oral antibiotics, is the first line treatment. The second line treatment, which is considered suboptimal, is another course of oral antibiotics alone. Opting for the second line of treatment would put Mr. P at risk for continued infections that could lead to the need for an amputation and/or development of further antibiotic resistance.

In order for the first line treatment option to be successful two conditions related to Mr. P's homeless situation must be resolved. First, a living arrangement that is conducive (sanitary and consistent) to long-term IV antibiotic therapy via a peripheral central line must be located. Second, a living arrangement that permits Mr. P and his SO to continue living together is required. Procurement of a living situation that meets both of these criteria directly impacts the

success of Mr. P's treatment regimen and ultimately his quality of life both short-term and long-term.

Contextual Features

Since the time of admission, social work, Mr. P, and his SO have worked collaboratively to find a resolution to their homeless status. Several options were explored to include the possibility of living with family and friends during the four to six week course of IV antibiotic therapy. Neither Mr. P nor his SO had any immediate family or friends that could support them through this health care episode. Additionally, it was determined that many community options were no longer available to Mr. P once his MRSA diagnosis was made.

At this time Mr. P is not employable, however Mr. P's SO is fully employable and desires to seek employment. Unfortunately, she lost her identification and cannot seek employment until she has obtained identification. She is currently working with social work to resolve this issue. Once she is able to find stable employment they expect their combined income to be sufficient enough to find and maintain suitable housing.

At the time Mr. P consented to IV antibiotic treatment he was fully aware of the expectation to discharge to a consistent and sanitary living environment. Concomitantly, the healthcare team was fully aware that Mr. P would not agree to any living situation that would require him to separate from his SO. It was not until after the peripheral central catheter had been placed, and the IV antibiotic therapy initiated that it was determined there was no place for Mr. P to discharge to that would accommodate his SO.

Mr. P is entitled to full care in a government institution and he has no other form of health care entitlements. Since government institutions operate with a limited budget, resource availability and judicious use of resources are a consideration in patient care.

Analysis and Recommendations

Analysis

The analysis of this ethical dilemma requires a review and consideration of ethical principles as well as healthcare policy to fully analyze the situation.

Principles. The bioethics principles of autonomy, beneficence, and justice apply to this ethical discussion. However, since Mr. P receives his health care from a governmental institution that is responsible for the care and well being of a defined population, the ethical dilemma needs to be evaluated from the public health perspective in addition to the traditional bioethics perspective.

From the bioethics standpoint, the principle of autonomy was valued in this case as the patient was viewed to be a competent decision maker and his views were respected as well as incorporated into his care goals. The bioethics principle of beneficence was also part of the plan of care as the treatments received by the patient were clearly directed at resolving illness and preventing patient harm.

The bioethics principle of justice, which focuses on fairness, and allocation of resources (McCormick, 1999) is the focal point of this dilemma along with the public health principle of communitarian orientation (Callahan & Jennings, 2002). Both suggest that use of resources and what is best for the common good of a population should be an integral part of health care decision making. These ethical stances are in direct opposition to the bioethics principle of autonomy where the rights of the individual provide direction for decision-making. However, it is deemed acceptable to exclude the request from the decision making process if a person's desired actions are thought to "seriously" infringe on the welfare of others (Jonsen, Siegler, & Winslade, 2006).

Policy. The Department of Veterans Affairs and the treating organization have documents that guide care and decisions in this case. First, the Patient Rights and Responsibilities (Department of Veterans Affairs, 2006) provides for individual respect and respect for personal freedoms as well as patient involvement in health care decisions. Additionally, the document provides for participation in treatment decisions to include the expectation that patients will notify the treatment team if they cannot follow the treatment plan and that the patient will be involved in resolving any ethical issues related to care. Second, organizational policy on visitation (Portland VA Medical Center, 2007) provides latitude to department level management to determine if exceptions to the visitation policy can and should be made. This would include the decision to allow a family member to stay the night in the patient room.

Recommendations

The recommendation for this case is to treat the patient with the complete four to six week course of IV antibiotic therapy followed by a four to six week course of oral antibiotic therapy.

The following are strategies for achieving this recommendation:

1. Provide the patient with a private inpatient room until an adequate living situation can be located.
2. Continue to seek suitable housing that meets the needs of the patient and the treatment goals.
3. Continue to assist the SO with obtaining employment.

In order to achieve this recommendation the treating organization will have to utilize an inpatient resource for a therapy that is typically performed in the outpatient setting. Mr. P will need to remain in the inpatient setting until an outpatient or community setting can be secured.

This will allow him to receive the appropriate therapy as well as meet his personal needs of remaining with his SO.

Ethical Essay

The recommendation for this case is based on the historical practice of the bioethics principle of autonomy taking precedence over the bioethics principle of justice and communitarian orientation (Callahan & Jennings, 2002). Although the consideration of resource utilization and the needs of a population are pertinent, it should not be heavily weighted in the determination of health care goals. Before resource utilization and population needs can be heavily weighted, changes in the United States health care system infrastructure must occur. The changes must include adequate support to set health care goals based on population needs versus individual needs (Woolf, 2007).

Additionally, it could be argued that utilizing inpatient resources for an outpatient therapy might be beneficial to the population thus supporting the principle of justice and communitarian orientation. The argument could also be made that appropriately treating an MRSA infection reduces the risk of furthering antibiotic resistance, a societal concern. Also, if the infection continues to be ineffectively treated an amputation could be indicated. The resources needed to perform an amputation and manage a patient post amputation may be considerably more than the inpatient resources required for long-term IV antibiotic therapy.

The final point to be considered is one related to truthful communication between patients and health care teams. In this situation the patient was open and honest about his living and financial situation and clearly communicated his boundaries ("I will not be separated" from my SO). The healthcare team fully expected to be able to accommodate Mr. P and communicated this to him. The truthful communications lead to consent and placement of a

peripheral central catheter and initiation of long-term IV antibiotic therapy. This level of communication is promoted and recognized as being the ethical course of action (Josen et al, 2006).

In summary, this case illustrates two important dimensions of an ethics case. First, the case clearly demonstrates the ethical challenges present when treating a patient within a system that is responsible not only to the patient but also to a population. Second, the case highlights the positive effects that open, honest communication can have in the clinical setting.

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Running head: DIABETES IN THE HOSPITALIZED VETERAN

Diabetes in the Hospitalized Veteran

Christy Locke

Oregon Health and Science University

School of Nursing

Introduction

Health disparity results when the health of a defined reference group varies from the health of a comparison group (Carter-Pokras & Baquet, 2002). In 2004, Reiber, Koespell, Maynard, Haas, and Boyko evaluated demographics and behavioral and health care status of veterans and non-veterans using the Behavioral Risk Factor Surveillance System and the Veterans Administration (VA) Veteran Health and Benefit databases. The findings demonstrate there is a higher prevalence of diabetes in the veteran population (16%) than the non-veteran population (6.2%); thus supporting the existence of a health disparity within the veteran population. The purpose of this paper is to provide an overview of diabetes to include the economic impact followed by a discussion of diabetes in the veteran population, specifically the hospitalized veteran, and conclude with change strategies to improve diabetes care in the acute care setting.

The growing rate of diabetes is a national concern as well as the subsequent economic burden. In 2007, the American Diabetes Association (2008) estimated that 17.5 million people had diabetes and that 6.9 million had undiagnosed diabetes. This is a growth rate of about one million people per year since the 2002 estimates. Health care costs in 2007 dollars were estimated at 205 billion dollars, translating to one of every five health care dollars being spent on diabetes care (American Diabetes, 2008).

In 2007 (American Diabetes, 2008) there were a total of 186 million inpatient hospital days of care. The ADA (2008) estimated that 40.7 million (22%) inpatient days of care were incurred by people with diabetes and that an additional 24.3 million (13%) were attributed to care of people with diabetes. Furthermore, the ADA reports that half the total costs associated

with the care of diabetes comes from higher hospital admission rates and longer length of stays (American Diabetes, 2008).

In general, diabetes puts patients at risk for neurological events, peripheral vascular disease, cardiovascular disease, renal complications and ophthalmic complications (American Diabetes, 2008). During acute events, glycemic control can become unstable due to the stress of illness or a procedure such as surgery. Additionally, changes in activity and sleep patterns and food intake can alter glycemic status (McCulloch & Inzucchi, 2008). This instability in blood glucose, specifically hyperglycemia, produces physiological responses that can impair immune system function and promote vasoconstriction and platelet aggregation (Clement et al., 2004).

Discussion

The American Diabetes Association (n.d.) reports that nationally type two diabetes is most common. This is presumably true for veterans also as type one diabetes (childhood onset) would lead to exclusion from military service (Paris, Bedno, Krauss, Keep & Ruberton, 2001). The higher prevalence of diabetes in the veteran population can possibly be explained by the following factors. First, in 2000, type two diabetes was added to the list of diseases associated with exposure to Agent Orange and qualifies veterans for VA care (American Diabetes, n.d.). Agent Orange is an herbicide that was used by the United States military for defoliation and crop destruction. Vietnam Veterans who served in the Republic of Vietnam between January 1965 and April 1970 were at risk for Agent Orange exposure (Environmental, 2003). Next, in 2007 the Vietnam Veterans of America began advocating for changes to the VA pharmacy formulary claiming that the restrictive formulary denied veterans access to new medications to manage diabetes. In March 2008, the VA formulary was upgraded to include newer medications for the management of diabetes (Vietnam, 2008). Prior to this change veterans may have received

diabetes care through the private or Medicare system. Finally, the VA serves a socio-economically challenged population and socio-economic status is shown to be a risk factor for diabetes development (Smith, 2007).

Nationally, increased attention has been placed on glycemic management in response to the rising prevalence of diabetes and the associated economic burden. Specifically in the inpatient setting, findings suggest that although diabetes is commonly a secondary diagnosis, it requires appropriate treatment to avoid negative outcomes (Clement et al., 2004). In 2006, a consensus conference held by the ADA, American Association of Clinical Endocrinologists, and American College of Endocrinology and attended by 10 major medical associations developed a consensus statement aimed at improving glycemic control in hospitalized patients (Bradley, 2006).

Even with the growing national attention, tight glycemic control often is not achieved. Within the consensus statement there are several identified barriers to achieving tight glycemic control in the inpatient setting (American Association, 2006). First, fear of hypoglycemia deters health care professionals from maintaining tight control. Next, the amount of nursing time to follow protocols is often burdensome. Finally, lack of knowledge about diabetes and appropriate management strategies and the lack of an information system which supports tracking glycemic management efforts often exists.

Within the acute care setting at the Portland VA Medical Center (PVAMC) there are processes in place to support achieving tight glycemic control yet barriers continue to exist. First, there are two nurse driven protocols for glycemic management (hypoglycemia and insulin infusion). The protocols have demonstrated effectiveness. However, as pointed out in the consensus statement, they are burdensome for the acute care nurse. There is an identified need

for the development of a subcutaneous insulin protocol as the lack of a protocol creates a barrier to achieving tight control. A plan to develop a protocol has been conceptualized but not operationalized. Finally, a glycemic monitoring window to track and trend patient response to glucose management is available to all health care providers. Unfortunately, the tool is not widely used.

Change Strategies

The prevalence of diabetes in the veteran population and the evidence supporting tight glycemic control in the hospital setting sets the stage for developing change strategies aimed at improving diabetes management. Promoting tight glycemic control for improved patient outcomes is feasible within the acute care setting. This is demonstrated in two recent publications, *Management of Diabetes and Hyperglycemia in Hospitals* (2004) and *Improving Glycemic Control* (2007), provide evidence and guidance on practice changes needed to improve glycemic control. Both of these documents have been used extensively by PVAMC to develop the existing glycemic management program.

Since there is an existing program that is in accordance with current published evidence, the next logical step is to build from this program. There are three key areas in which to focus. First, a subcutaneous hyperglycemia management protocol is needed as the majority of acute care patients are managed via subcutaneous insulin. Taking this step would provide health care professionals with the necessary tools to provide for tight control and specifically would eliminate sliding scale insulin algorithms. Next, continued growth of the glycemic monitoring window is needed. This requires a commitment to ongoing education of direct care providers and a commitment of leadership for programming support. Finally, a meaningful mechanism to provide health care providers with feedback about glycemic control is needed. Currently data is

evaluated to determine safety and effectiveness of the two existing protocols (hypoglycemia and insulin infusion). However, the data is not available in a timely or meaningful manner for direct care providers.

Implementation of the identified change strategies are expected to improve outcomes. The ADA (2008) reports that the length of stay when diabetes is documented as either the primary or secondary diagnosis extends the hospital stay by four days. This is almost a 50% increase from patients who do not have diabetes. For each inpatient day of care, the average daily cost related to diabetes is \$1853 (American Diabetes, 2008). Continued growth of a well designed glycemic control program is expected to reduce length of stay, reduce costs, and increase bed availability to provide care to more veterans.

Implementation of the change strategies would support development of a strong glycemic management program and position PVAMC to pursue disease specific certification from the Joint Commission. The Joint Commission, in collaboration with the American Diabetes Association, offers a disease specific certification for inpatient diabetes care. The certification is awarded to organizations that have made exceptional efforts to improve glycemic care and outcomes in the inpatient setting (Joint, n.d.). Building a glycemic program that strives to meet the certification criteria detailed by the Joint Commission conveys PVAMC's commitment to the organization, patients, the community, and to all VA medical centers.

Implications

The continued pursuit of developing a glycemic management program that promotes tight control for improved outcomes directly impacts advanced practice nursing. Clinical Nurse Specialists (CNS) serve as change agents in reducing barriers to practice. The CNS role is recognized for its ability to advance nursing practice through the infusion of evidence-based

nursing at the system level and by facilitating the use of evidence based care to improve patient outcomes (National, 2004). At PVAMC a CNS serves as the co-chair of the glycemic control team. In this role the CNS facilitates change and improves practice through activities such as staff education, consultation, analysis and interpretation of data, and development of evidenced based protocols.

Recent changes in health care policy directed the Centers for Medicare and Medicaid Services (CMS) to develop the Hospital Acquired Conditions and Present on Admission program. This program places an additional spotlight on glycemic control as the program calls for a reduction in reimbursement for hospital acquired diabetic ketoacidosis, nonketotic hyperosmolar coma, hypoglycemic coma, secondary diabetes with ketoacidosis, and secondary diabetes with hyperosmolarity all considered manifestation of poor glycemic control (Centers, 2008). The program, effective October 2008, does not directly impact PVAMC as the VA system does not receive reimbursement from CMS, however it is expected that secondary insurance companies will adopt similar programs from which the VA does receive reimbursement.

Self-reflection

Designing and implementing a successful glycemic control program requires leadership skills and dedication. The existing glycemic control program has been evolving for the past three years. In order to take the project to the next level (Joint Commission certification) at least another two year commitment will be required. The growth that needs to occur relates to “selling” the project to leadership. Up until now the project has been moved forward by clinicians who value the need to achieve tight control. Achieving buy-in from leadership will take a different approach and skill set than achieving buy-in from a direct care provider. Leadership will be interested in patient outcomes but they will also want to know how this

translates into organizational and national level objectives. One of the first steps that must occur is completing a cost effectiveness analysis so that outcomes can be measured and reported as a cost-effectiveness ratio (Stone, Curran, & Bakken, 2002). I have minimal experience in performing a cost effectiveness analysis. I have discussed this with my co-chair (Hospitalist) and we have decided to work through the process together. We will seek help as needed.

As the prevalence of diabetes continues to rise, patients continue to get sicker, and the demands placed on nurses at the bedside continue to grow, it is imperative that glycemic control measures are developed and tested to determine feasibility for the bedside nurse. Many of the interventions to promote tight control focus on nurse-driven protocols. This places a tremendous burden on the bedside nurse. If a protocol is not developed to meet both the needs of the patient and the nurse it is likely to be unsuccessful. This requires excellent communication and relationship skills. As a driving force behind protocol development, I need to be able to talk to nurses and to hear nurses. Continued development of strong communication skills is crucial for my success.

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Running head: CASE STUDY: USE OF EVIDENCE

Case Study: Use of Evidence Based Protocols

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

Glucose control has been described in recent literature as a mechanism for reducing morbidity and mortality in select groups of hospitalized patients (Portland Veterans, 2008; American Association, 2007). Achieving control requires organizational commitment to ensure that structure and processes are in place. Evidence based protocols are one mechanism to provide both structure and process and are recommended by the American Association of Clinical Endocrinologists (2007).

The following case study is presented as an example of the use of evidence based nursing protocols. The case was selected because it demonstrates how a protocol can be used effectively to manage a severe case of hypoglycemia but also how protocols aimed at achieving glucose control must be linked with existing processes to ensure continuity in care.

Case

Mr. H is a 46 year old insulin dependant diabetic. He has been insulin dependant for more than 20 years. His most recent Glycosolated Hemoglobin was 8.5. His capillary blood glucose (CBG) at home ranges from 45-385 mg/dL. Mr. H. reports one to two, mild hypoglycemic episodes per week. He usually does not become symptomatic until his blood glucose is in the 45-55 mg/dL range. When his “sugar is low” he drinks a soda and eats a peanut butter sandwich.

Mr. H. was admitted to the surgical unit for a right trans-metatarsal amputation. His post-operative orders included a subcutaneous basal/bolus insulin regimen of NPH and Regular with a high dose sliding scale. On post-operative day two at 3:00 p.m. Mr. H. was found unresponsive in his bed with a CBG of 14mg/dL. The Registered Nurse (RN) initiated the hypoglycemia protocol (Appendix A) by administering 50mL of 50%

Dextrose intravenously. The primary providing team was notified. Thirty minutes later his CBG was 114 mg/dL and Mr. H. was alert and oriented. Subsequently, an insulin infusion via a nursing protocol (Appendix B) was ordered for Mr. H. as a means to determine his 24 hour insulin requirement. His next CBG was assessed at bedtime and was 109 mg/dL. At 6:00 a.m. the next morning, the insulin infusion was initiated when his CBG reached 170 mg/dL. The insulin infusion protocol instructs the RN to start the insulin infusion when the CBG is greater than 150 mg/dL.

Analysis

An analysis of the case demonstrated that the RN utilized the hypoglycemia protocol to provide timely and efficient care to the patient. The treatment was effective as the patient returned to baseline in less than 30 minutes. This provides an example of how an evidence based protocol can be used to support glycemic control.

Further analysis provided insight related to continuity of care issues. The morning following the hypoglycemia event, the attending physician and team were reviewing Mr. H's CBG trends. The team questioned why CBGs were only assessed once at bedtime and again at 6:00 a.m. The RN replied that the orders reflect before meal and bedtime CBG checks. The team disagreed stating that an insulin infusion was ordered and that the infusion protocol includes hourly CBG checks. The RN replied that the insulin infusion was not initiated until 6:00 a.m. when the CBG was greater than 150 mg/dL, as per protocol. The hourly CBG assessments do not start until the protocol has been initiated.

A review of the incident demonstrated that the RN followed the orders and protocol as written. The situation revealed a gap in care when there is a transition from subcutaneous (SC) insulin to insulin infusion. SC insulin orders include before meal and bedtime CBG checks. The insulin infusion protocol, which includes, on average, hourly

CBG checks, is not implemented until the CBG is greater than 150 mg/dL. Therefore, when a patient transitions the CBG frequency remains as before meals and bedtime unless the providing team changes or discontinues the CBG order when writing the insulin infusion order. In the case of Mr. H. the order was not discontinued and this resulted in no CBG assessment for nine hours. This presented a major safety concern as the patient had an episode of severe hypoglycemia and then no CBG checks from 9:00 p.m. until 6:00 a.m.

Another critical issue identified relates to RN documentation and communication. Many details had to be extracted from the chart (the RNs were unavailable for debrief) and the chart lacked the necessary documentation. First, it was noted that there was no dayshift RN note describing the details of the severe hypoglycemia event. Additionally, since the electronic RN to RN shift report does not remain in the patient record, it could not be reviewed. Days after the situation an attempt was made to obtain the details of the actual conversation that occurred between the dayshift and nightshift RNs at shift report, however the details were sketchy.

The final critical issue is clinical judgment. Applying the Clinical Judgment Model developed by Tanner (2006) helps assess where gaps in decision making may have occurred. First, the RN must notice and interpret by having a grasp and sufficient understanding of the situation. In this case it is difficult to determine how much information the nightshift RN had about the severe hypoglycemia event. Next, the RN responds based on what they deem appropriate for the situation. If the RN had an awareness of the hypoglycemia event then the course of action would be different than if they had no awareness. The final component is reflection which is an assessment of patient responses. There was an insufficient amount of information available to determine if the

nightshift RN had all the necessary information. This highlights the importance of documentation and communication in relationship to clinical judgment.

This case has several other contextual features worth mentioning. First, the dayshift RN was floating. During a conversation about the situation, the dayshift RN, an experienced nurse, was asked if the RN he gave report to was novice or experienced. He replied, “I don’t know, I don’t usually work on that floor.” The nightshift RN in fact was a new graduate. Next, the resident writing the order for insulin infusion was not familiar with the insulin orders sets and did not discontinue the before meal and bedtime CBG order at the time the SC order was discontinued. This left the novice RN with CBG orders; had there been no CBG orders the RN would have likely contacted the team for clarification.

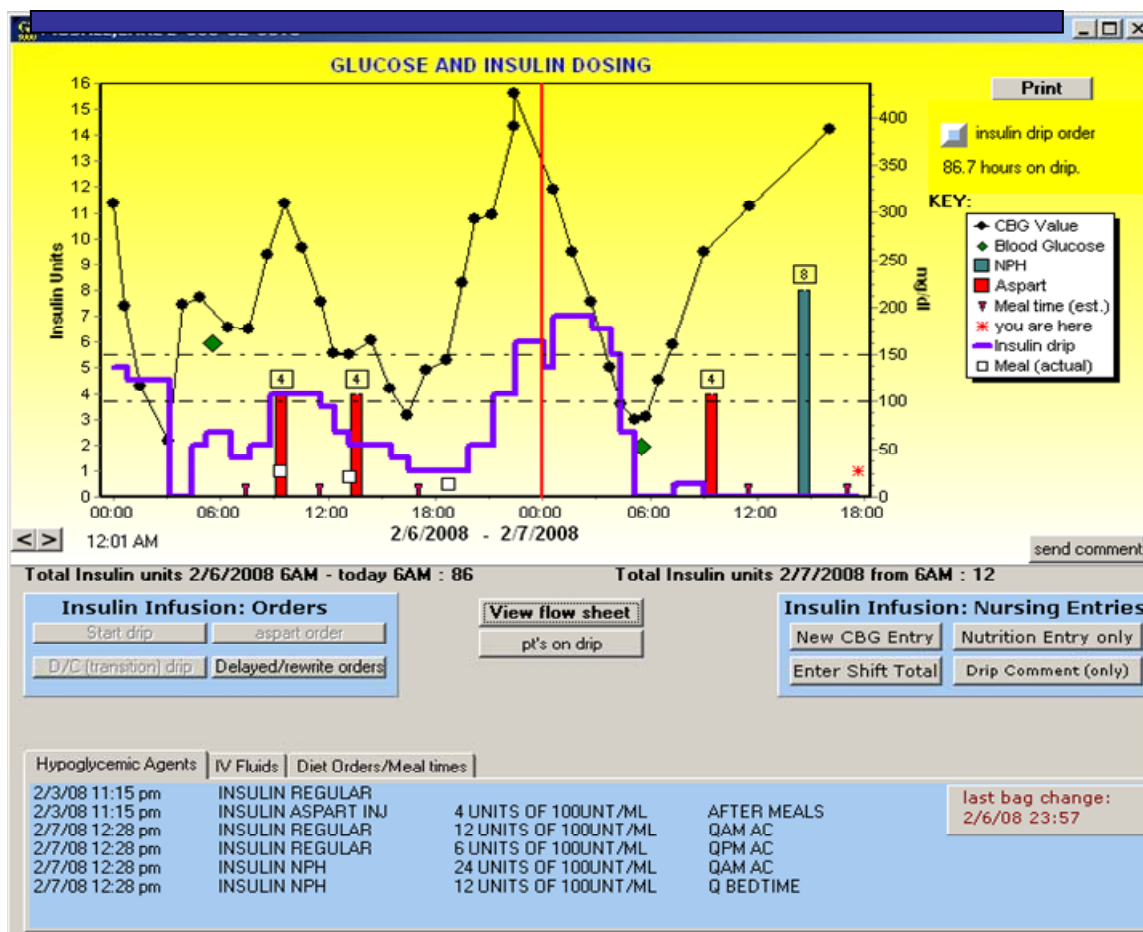
Recommendations and Outcomes

There are three recommended strategies to enhance continuity of care. First, RN staff should be re-oriented to the new hypoglycemia note template which was developed and implemented about two months prior Mr. H’s situation. Next, incorporation of the hypoglycemia protocol, documentation, and treatment regimen(s) into the aggregated data display (Figure 1) for glucose management should be viewed as a high priority. The incorporation into the aggregated display brings events such as this to the forefront in the patient record. This electronic solution also provides a mechanism to generate a nursing text alert if a CBG less than 70 is recorded via the glucometer software and no corresponding RN note has been completed. These additions enhance both documentation and communication within the electronic health record.

The final strategy is aimed at improving the transition from SC insulin to insulin infusion. This strategy was submitted by the novice RN involved in the situation and is

likely the key to resolving the issue. The recommendation is to imbed CBG frequency options as part of the insulin infusion order menu (e.g. every two hours, every four hours) so the providing team can select the frequency of CBG assessment prior to initiation of the

Figure 1. Aggregate data display.



insulin infusion (occurs when the CBG is greater than 150 mg/dL). This strategy will not eliminate the potential presence of a bedtime and before meal CBG order as the team will still be responsible for discontinuing these when they discontinue the SC insulin order.

Implementation of the recommended strategies is expected to produce several outcomes. First, incorporating the hypoglycemia protocol, documentation, and treatment regimen(s) into the aggregated data display will bring attention to hypoglycemic episodes.

This is expected to improve communication, enhance clinical judgment, support safe patient care and reduce repeat episodes of hypoglycemia. In the case of Mr. H., this may have prevented the nine hour gap with no CBG assessment. Next, including CBG orders with the insulin infusion order menu will allow providers to be specific in their orders versus making assumptions about what they have ordered; again promoting safe patient care. Finally, an evaluation of hyper- and hypoglycemia rates can be used to determine the effectiveness of these changes to the overall glucose control program.

Evaluation of Care and Impact

This case study represents how evidenced based protocols can be used to effectively provide patient care. It also demonstrates the importance of ensuring protocols are connected with existing processes to support communication and continuity in care. The actual outcome attained in this case was positive. However, the potential for an adverse outcome was present. The advanced practice nurse (APN) must evaluate these “close calls.” The evaluation process allows for identification and resolution of gaps in care. Evaluation also testifies to the APN’s awareness that protocols do not stand alone; they are part of a larger system of care. It is within this larger system of care that the APN must continuously evaluate the protocol’s effectiveness. It is only when this occurs that an evidence based protocol can achieve the greatest impact on care and ultimately effect patient outcomes.

Self-Reflection

This case was initially presented to me by a charge nurse. She was approached by the attending physician who felt the orders had not been carried out (hourly CBGs) and the patient was at risk. As we walked through the case together we determined that there was no actual incident to report. It then became clear that there was a gap in care, poor

documentation, and we questioned whether or not the nightshift RN used good clinical judgment. Unfortunately, the RNs involved were not available for the discussion. Their unavailability and the lack of documentation led to a lot of unknowns. I opted to focus on what was known and presented the case to the Inpatient Glycemic Control Team (IGCT) for discussion. About a week later I found a handwritten note on my desk from the nightshift/novice RN describing a solution to the gap in care regarding the frequency of CBG assessment. Her solution was one that had not been previously thought of and appeared to be the answer. This was also shared with the IGCT. As of this writing the IGCT has not reached a decision on how to proceed regarding CBG orders. The group has initiated the process to incorporate the hypoglycemia protocol, documentation, and treatment regimen(s) into the aggregated data display. This process will take at least eight to ten weeks to develop, test and implement.

The skill that will be most beneficial to me in this situation is persistence. It would be very easy to let this go since there was no actual adverse event. I feel obligated to implement the recommended strategies as they will improve the system and possibly prevent an adverse event from occurring in the future. The changes also support the goal of achieving glucose control which is an effort I am committed to.

This case has fostered professional growth as I felt it was necessary to have a conversation with the experienced RN about his role in mentoring novice RNs. We specifically discussed the case and I role modeled for him some of the dialogue that could have occurred during shift report to help the novice RN make safe decisions when caring for a patient who had a severe hypoglycemic episode just hours earlier. We also discussed the importance of documentation and the absence of it in the record. The RN was very open to my feedback and I felt reassured by the interaction.

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Running head: ORGANIZATIONAL CHANGE CASE STUDY

Organizational Change Case Study: Non-ICU Insulin Infusion Protocol

Christy Locke

Oregon Health & Science University

School of Nursing

Introduction

The Portland Veterans Administration Medical Center (PVAMC) is a tertiary care university affiliated medical center with four medical-surgical units that have a total of 112 beds. Within these 112 beds there is a 52 bed capacity for telemetry monitoring in addition to typical medical and surgical services. PVAMC Registered Nurses (RNs) also care for post-operative open heart, liver and renal transplant, spinal cord injury, mechanically ventilated, and seizure monitored patients.

Summary of Issue

In early 2005, the medical and surgical nursing staff at PVAMC verbalized dissatisfaction with the existing insulin infusion protocol to the unit based Clinical Nurse Specialist (CNS). RN dissatisfaction focused on safety and effectiveness of the protocol. For example, the existing protocol did not provide direction on how to manage all capillary blood glucose (CBG) values. As a result of the feedback received by the RNs, the unit based CNS prepared a summary of the issue which outlined the reported concerns. Concurrently, at an organizational level, the Inpatient Glycemic Control Performance Improvement Team (IGCT) was forming. The CNS, also a member of the newly formed IGCT, presented the summary to the team for consideration.

Based on the presentation, the IGCT conducted an in depth assessment of the issue. The assessment revealed that RNs were not the only discipline dissatisfied with the protocol. Providers, Residents, and Registered Dietitians were expressing dissatisfaction as well. RNs stated the protocol did not provide adequate guidance on management of all CBG values nor allow for administration of meal coverage (bolus) insulin. RNs anecdotally described how they had to “chase” meals with multiple infusion adjustments. Registered Dietitians also were

dissatisfied with the lack of provisions for meal coverage. Providers and Residents stated the order sets lacked guidance on best practice for initiation, maintenance, and discontinuation (transition to subcutaneous insulin) of insulin infusion. Providers additionally reported that the protocol was not an effective tool for adequately managing blood glucose. Lastly, providers and RNs described difficulties in communicating the patient's current status on the protocol as documentation consisted of a paper flow sheet at the bedside and CBG values were not downloaded into the electronic record in a timely manner.

Significance of Issue

In addition to the safety, efficiency, and effectiveness concerns reported by staff a review of the literature provided the team with a collection of published evidence highlighting the benefits of tight glycemic control in the hospitalized patient. One piece of evidence was the technical review by Clement et al. (2004) which summarizes published findings that demonstrate a reduction in morbidity and mortality when hyperglycemia is aggressively controlled. Additionally, the technical review provides guidance on how to achieve euglycemia in the hospitalized patient. The American College of Endocrinology (Garber et al., 2004) also published a position statement on inpatient diabetes and glucose control. The statement acknowledges that recent studies demonstrate hyperglycemia complicates other illnesses and is shown to be an independent risk factor for untoward outcomes.

The findings of the literature review that were most concerning related to the fact that the strongest evidence was generated in an intensive care setting and not in a medical-surgical setting. However, the team felt it was appropriate to extrapolate the findings to PVAMCs medical-surgical environment as the patient acuity is consistent with that of a progressive care environment rather than a traditional medical-surgical environment.

After investigation of the described short comings, a review of the literature, and community and national benchmarking it was determined that the insulin infusion protocol utilized in the non-ICU environment truly did not reflect the current published evidence base which promotes tight glycemic control for improved outcomes. The combination of “difficult to use” and lack of use of current evidence resulted in uncontrolled glucose values, prolonged length of time on the insulin infusion, and confusion about how to order appropriately and manage safely. As a result, the IGCT agreed to facilitate an interdisciplinary revision of the existing protocol to address the lack of an evidence based non-intensive care unit (ICU) insulin infusion protocol which promotes safety, effectiveness, and efficiency.

Change Process

A multi-phase project plan was conceptualized with the goal of developing a non-ICU insulin infusion protocol that safely, efficiently, and efficiently provided for tight glycemic control in the non-ICU environment to provide improved patient outcomes. The phases, objectives, and associated timeline of the project are outlined in Table 1. The project was reviewed by the PVAMC institutional review board and was determined to be quality improvement. The project is currently in Phase III and anticipates initiating phase IV in mid-2008.

Table 1

Project Plan

Phase	Objectives	Timeline
I	<ul style="list-style-type: none"> • Protocol revision • Develop electronic order sets • Staff education • Pilot test: vascular surgery patients, one care area • Staff evaluations • Data analysis 	Start: November 2005 Finish: April 2006
II	<ul style="list-style-type: none"> • Implementation: four medical-surgical units • Staff education • Staff evaluations 	Start: May 2006

	<ul style="list-style-type: none"> • Data analysis 	
III	<ul style="list-style-type: none"> • Develop electronic protocol • Pilot test: vascular surgery patients, one unit • Implementation of electronic protocol: one unit • Staff evaluations • Data analysis 	Start: October 2006 October 2007: fully implemented on one unit January 2008: staff evaluations and data analysis
IV	<ul style="list-style-type: none"> • Implementation of electronic protocol: four medical-surgical units 	Start: projected for mid-2008

Outcomes

Measures to address safety, effectiveness, efficiency, and patient outcomes were conceptualized as part of the project plan development as shown in Table 2. One year of baseline data (November 2004- October 2005) was electronically extracted and used to compare pre and post implementation data. Six hour intervals were established to control for the variation in number of CBGs per patient. For example, as a patient becomes more out of control, whether high or low, the frequency of CBG assessment increases. Therefore, a patient who is out of control will have more CBGs than a patient who is in control. For this project, if a patient has a single out of control value within an interval, the entire interval is counted as out of control regardless of how many out control CBG values were present.

Comparison of pre and post implementation data to evaluate safety, effectiveness, and patient outcomes revealed; 1) a decrease in the number of both hypoglycemic (0.86%) and hyperglycemic (1.7%) events, 2) a reduction of persistent hyperglycemia episodes (1.9%), 3) a six hour reduction in length of time on protocol compared to previous protocol, and 4) 14% (n= 221) of the intervals had 100% of the blood glucose values in goal range. Evaluation of RN satisfaction and efficiency was conducted using a tool developed by the project team. The evaluation revealed; 1) more education on the new protocol is necessary (53%), 2) the protocol is not easy to understand (38%), 3) RNs find it difficult to manage the rigors of the protocol with

Table 2

Outcome Measures

Outcome Hierarchy	Outcome	Frequency	Measure
Primary outcomes	Hyperglycemia: any CBG > 400 mg/dL	Common	Number of intervals with at least one CBG value >400 mg/dL
	Hypoglycemia: any CBG < 60 mg/dL	Moderate	Number of intervals with at least one CBG value <60 mg/dL
	Persistent Hyperglycemia: three consecutive CBGs > 250 mg/dL	Moderate	3 or more consecutive CBGs >250mg\dl
	Length of stay (LOS)	Very common	Average LOS
	Transfer to ICU	Moderate	Proportion of patients with a transfer from Med/Surg to the ICU
	Duration of insulin infusion	Very common	Number of intervals/number of infusion episodes
Additional outcomes	Death	Extremely rare	Number of days between events

other patient care demands (46%), 4) the added instructions for managing CBGs less than 100mg/dL are difficult to complete (24%) and understand (27%), and 5) incorporating dietary intake into the protocol does not add any difficulty (82%).

Analysis

Change is a dynamic process and understanding the details of the change process provides insight related to successes and failures of the change initiative. Therefore, a system level analysis of the change effort was conducted by review of the ecological environment, inputs and outputs, facilitators and barriers, root cause analysis, readiness to change and stages of change.

Ecological Environmental Perspective

The environment as described by Cusins (1994) is “everything not within the boundary of the focus system.” The focus system of this change effort is the process of providing insulin infusion in a non-ICU environment utilizing an insulin infusion protocol. The environment is made up of a network of focus systems that are connected by inputs and outputs from the multiple focus systems. The focus system of this change effort impacts the environment within the organization as well as the environment globally. The organization is directly impacted in the non-ICU environment but the impact extends to all levels within the organization by impacting variables such as economics, safety, satisfaction, and retention. Globally, the change process impacts similar variables but in a much broader perspective such as impacting the budget for entire VA system.

Inputs and Outputs

Since inputs and outputs from focus systems are what connect all the focus systems to form the environment, understanding and evaluating the inputs and outputs of a focus system is necessary. Inputs are received into the focus system from the environment. Examples of inputs significant to this change effort include; 1) current evidence related to tight glycemic control, 2) patient need for insulin infusion, 3) existing insulin infusion protocol, and 4) health care professional utilization of insulin infusion. Inputs are then transformed as part of the change process and released back into the environment as an output. In this case the inputs were transformed by; 1) development of a revised insulin infusion protocol, 2) development of provider order sets, and 3) implementation of the protocol and order sets. Examples of outputs as a result of the change effort include; 1) CBG values, 2) length of time on insulin infusion, and 3) satisfaction.

Facilitators and Barriers

The flow of inputs and outputs within the focus system and environment can be facilitated or inhibited by certain variables. In this project two variables were key facilitators. First, all health care providers utilizing the protocol had peaked in their level of dissatisfaction and second, the timing of the change effort coordinated not only with the dissatisfaction level but with the strengthening evidence base and the formation of the IGCT. The predominant barrier to the change effort was access to organizational level data related to insulin infusion. Initially a data analyst was allocated to the change effort. When the analyst changed positions, no replacement was available. Lack of data inhibited the team's ability to fully evaluate protocol efficacy as well as provide a mechanism for ongoing evaluation of safety.

Root Cause Analysis

A root cause analysis was conducted utilizing a fish bone diagram procedure based on the problem statement for the change effort. Brainstorming identified four major categories as causes of the problem and includes; 1) culture, 2) resources, 3) data availability, and 4) communication. Further brainstorming within each major category identified several root causes. This paper focus on two of the identified causes. The first cause is related organizational culture. The culture prior to the change effort was focused on status quo and resulted predominately from; 1) acceptance as there was no expectation for change, 2) staff frustration related to verbalizing dissatisfaction and with no follow up, and 3) staff learning to live with the problem. The organization was not able to effectively address the identified problem as evidence based practice was a new concept and change could not be expected or initiated as there were no personnel dedicated to addressing identified practice issues. The second cause is related to organizational communication. PVAMC, prior to the change effort, possessed the necessary resources to provide evidence based care to insulin infusion patients. However, the need had not

been communicated to leadership and therefore no effort had been made to unite the resources. This is the direct result of no formal communication mechanism between the direct care provider and organizational decision makers.

Readiness to Change

The organization exhibited a readiness to change from executive leadership to the direct care provider as evidenced by vocalization of dissatisfaction with the existing protocol and formation of the IGCT. The heightened desire for change directly supported the successful implementation of the change effort. Additionally, two system level strategies fostered success to include; 1) the formation of a strong, cohesive multidisciplinary team, and 2) the expectation to complete the project utilizing existing resources. Even though the team was new, all members had worked together on various projects in the past and had an understanding of one another's strengths. This allowed the team to move forward rapidly and through productivity, demonstrate commitment to leadership. This in turn led to enhanced support from leadership to further the project. For example, data analyst services are extremely limited in the organization. Leadership, at the team's request, provided the team data analyst support. Furthermore, all team members were aware of the expectation to accomplish the project within existing resources as this is a common expectation at PVAMC. The team was comfortable with and accepted the expectation. As a result, the team was able to make alterations to the insulin infusion protocol without the need of additional funding. The ability to move forward without the need for funding further supported the fast pace of the team and the demonstration of commitment to leadership.

At the time of implementation some resistance from providers and RNs was experienced. The resistance was overcome by ongoing education and a presence by team members during the change process. The change has been sustainable and continues to evolve as each phase of the

project is implemented. Sustainability is a direct result of leadership support, the commitment of IGCT, and the direct care providers desire to incorporate current evidence into their practice. Stakeholders in the project view the project as successful and are committed to implementation of all phases of the project as well as ongoing evaluation.

The success of the project has enhanced relationships within the system from leadership to the direct care provider. The project has demonstrated that there is a mechanism to voice concerns, receive a response from leadership, and work collaboratively to develop a safe, effective process to improve patient outcomes and staff satisfaction. Relationships have also been formed outside the organizational environment as the work of the team has been recognized nationally as a best practice in the VA system.

Stages of Change

Lewin's framework is a change model that accounts for the forces in an organization that are striving for change and the forces that are striving to maintain status quo (Maxwell, 2005). The framework consists of three stages, unfreezing, moving, and refreezing. Unfreezing encompasses the process of gaining problem awareness. Moving is the process of working toward change through planning, goal setting, and implementation (Tomey, 2004). The final stage, refreezing, reflects the status of this change effort as the change effort has been integrated into the organization. However, the stage is not complete as processes for stabilizing the change (sustainability) have not been integrated.

Conclusion

The implementation of the change effort has produced a safe, evidence based non-ICU insulin infusion protocol. The initial review of data supports some degree of efficacy, however further data collection and review is needed to substantiate the degree of efficacy. Although, RN

efficiency and satisfaction have improved from baseline, an acceptable level has not been achieved. Further efforts are needed to develop work practices that support satisfaction and efficiency within the RNs workload. The first step towards improving efficiency and satisfaction is currently being piloted as the change effort moves towards the final phase.

Recommendations

This two year project has proven initially to be successful. However, systems must be put in place to ensure sustainability. These systems include; 1) re-designation of the protocol as a Medical Center Memorandum to ensure future multidisciplinary oversight at the medical center level, and 2) creation of a sustainable process to collect and analyze organizational data.

Goals

The short term and long term goals that have been identified to support future success of the change effort are summarized in Table 3.

Table 3

Goals and Outcomes

	Goal	Outcome(s)
Short Term	Evaluate RN satisfaction with protocol	1) RN satisfaction will remain at 90% or greater
	Evaluate organizational data to determine efficacy of protocol	1) 90% of all insulin infusion intervals will be in control 2) Average length of insulin infusion will be 3 days or less
	Implement electronic protocol	1) All Medical-Surgical units will utilize the electronic protocol
Long Term	Biannual review of protocol safety	1) Episodes of hypoglycemia will remain equal to or less than baseline
	Biannual review of protocol efficacy	1) 90% of all insulin infusion intervals will be in control 2) Average length of insulin infusion will be 3 days or less 3) Length of stay for insulin infusion patients will decrease 50% from baseline data
	Annual review of RN satisfaction	1) RN satisfaction will remain at 90% or

		greater
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Organizational provisions for the implementation of the system level recommendations and attainment of the short and long term goals will provide the foundation needed to secure stabilization of the change process. Stabilization of the process will create an environment for the change effort to reach it's maximum potential.

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Case Study: Analyzing an Ethical Dilemma

Christy Locke, RN, MSN, CNS, CNOR

Clinical Nurse Specialist

22117 NE 267th Ct

Battle Ground, WA 98604

360-910-1813

Christine.locke@va.gov

Portland VA Medical Center

503-220-8262 x56177

503-721-1433 (fax)

Biographic Sketch

Christy Locke is a Medical-Surgical Clinical Nurse Specialist at the Portland VA Medical Center. Ms. Locke has been clinical nurse specialist for 4 years and is nationally certified by the Association of Operating Room Nurses. She is currently enrolled in a Doctor of Nursing Practice program.

Abstract

Purpose/Objectives: The purpose of this paper is to analyze a clinically focused ethical dilemma utilizing a case study approach.

Background/Rationale: The code of ethics developed by American Nurses Association is a statement which reflects the ethical obligations and duties of nurses and expresses nursing's commitment to society. This code of ethics as well as other specialty nursing association codes is written in global terms as they are designed to provide the foundation for the profession.

However, when a healthcare professional is presented with an ethical dilemma it can be challenging to find resolution using only this global language. Hence, many professionals utilize the principles of bioethics in addition to professional codes when analyzing an ethical dilemma.

Description: A method of ethical analysis known as the Four Topic approach offers an alternate means of analysis to the traditional method of utilizing only the principles of bioethics. This approach not only incorporates the principles of bioethics it also provides a structured framework for identifying, analyzing, and resolving ethical issues.

Conclusion: Resolution of an ethical dilemma can be challenging and seem overwhelming to healthcare providers. The structure offered by the Four Topic approach provides the foundation to identify key issues and to ensure a thorough analysis is completed leading to recommendations for resolution.

Case Study: Analyzing An Ethical Dilemma

Introduction

Ethics, defined as a system of moral principles¹, forms the foundation of many professions. This foundation can be formalized by developing a written code of ethics for the profession. Nursing is an example of a profession with a written, formal code of ethics. The American Nurses Association (ANA) published the first code of ethics in 1985 and a revision in 2001². In addition to the ANA code many specialty nursing organizations, such as the Emergency Nurses Association³, have a formal code of ethics.

The ANA code of ethics is a statement which reflects the ethical obligations and duties of nurses and expresses nursing's commitment to society². The ANA code as well as other specialty association codes is written in global terms as they are designed to provide the foundation for the profession. However, when a healthcare professional is presented with an ethical dilemma in a clinical situation it can be difficult to find resolution using only the global language in a professional code of ethics. Hence, many healthcare professionals utilize the principles of bioethics when analyzing an ethical dilemma in addition to their professional code(s) of ethics.

The principles of bioethics consist of four principles which are generally accepted by all healthcare professionals⁴. The first principle is respect for autonomy. This principle assumes that patients are involved in decision making and that decisions are made voluntarily. The next principle, nonmaleficence, requires no harm to be committed intentionally. The third principle is beneficence which states healthcare providers will take actions to prevent or remove harm. The final principle of justice serves as the foundation for fairness to ensure all persons are treated equally⁴.

The principles of bioethics in conjunction with foundational professional codes of ethics provide a mechanism for healthcare professionals to evaluate clinical ethical dilemmas and form recommendations. However, as we all know, ethical dilemmas are not straightforward and each case presents a different set of circumstances for consideration. The purpose of this paper is to utilize a case study approach to present a structured method of analyzing a clinically focused ethical dilemma.

Jonsen, Siegler, and Winslade⁵ describe a method of ethical analysis known as the Four Topic approach. This approach offers an alternate means of analysis to the traditional method of utilizing only the principles of bioethics to analyze an ethical dilemma. This practical approach incorporates the principles of bioethics and provides a structured framework for identifying, analyzing, and resolving ethical issues. The Four Topic approach consists of four topics of interest: 1) medical indications, 2) patient preferences, 3) quality of life, and 4) contextual features. Medical indications guides the healthcare professional to explore the indications for the intervention and the surrounding features such as goals of treatment and probabilities of success. This topic incorporates the principles of beneficence and nonmaleficence. The second topic, patient preferences focuses on the how the patient contributes to decision making by analyzing components such as decision making capacity and expressed preferences of the patient. The principle of respect for autonomy is incorporated within this topic. Quality of life is integrated into the analysis by investigating aspects such as how treatment versus no treatment will affect life in the future. Beneficence, nonmaleficence, and respect for autonomy are captured in this portion of the analysis. The final topic, contextual features focuses on the legal, social, institutional, and economic circumstances of the case. These circumstances can include family

issues, financial resources, religious and cultural factors, and conflict of interest issues. This final topic addresses the principle of justice and fairness.

The following case study illustrates the analysis of an ethical dilemma utilizing the Four Topic method.

Case

Mr. P is a 39-year-old male who fractured his right heel in 2003 and underwent an open reduction with internal fixation. Since his injury he has had multiple Emergency Department visits related to heel pain and drainage. He has completed several courses of oral antibiotic therapy over the past three years for the chronic drainage. Recently, he was admitted for osteomyelitis of the right heel. During this visit Mr. P consented to an incision and drainage and removal of hardware.

Mr. P lives with his long-term significant other (SO). Six months ago they lost their apartment due to financial difficulties and they have been living together in a tent ever since. Their combined monthly income is less than \$700.00. Prior to this admission they had actively been seeking help through community resources to find low-income housing. During the preoperative visit, social work provided Mr. P and his SO with a list of potential housing options. The social worker stated that they must obtain housing prior to surgery so that Mr. P would have a place to recover. During this visit Mr. P clearly stated that the only housing option he would consider is one that would allow his SO to live with him. At the time of admission Mr. P and his SO had not been able to secure housing. After admission they continued to actively collaborate with social work to find an adequate place for Mr. P to recover.

Postoperatively Mr. P was found to have Methicillin-resistant *Staphylococcus aureus* (MRSA). The recommended treatment option was long-term intravenous (IV) antibiotic therapy.

He consented to placement of a peripheral central catheter for the antibiotic therapy. After the diagnosis of MRSA was made, Mr. P was notified that there were limited housing options available to MRSA patients. Additionally, he was informed that none of the options available would allow his SO to live with him. Mr. P again stated that he would not agree to being separated from his SO. When asked if they could afford a hotel they reported having only \$45.00 and stated they could not afford a hotel. The health care team communicated to Mr. P the importance of living in a consistent and sanitary environment while undergoing long-term antibiotic therapy via a peripheral central catheter.

Dilemma

Should the patient be treated with long-term intravenous antibiotic therapy or with oral antibiotic therapy?

Review of Topics

Medical Indications

Mr. P has chronic osteomyelitis that has been unsuccessfully treated by multiple courses of oral antibiotic therapy over the past three years. Tissue cultures obtained during the hardware removal were MRSA positive. The recommended first line of treatment is a four to six week course of IV antibiotics followed by a four to six week course of oral antibiotics. Completion of this treatment regimen is anticipated to fully resolve the osteomyelitis. A treatment plan of oral antibiotic therapy only (as previously used) is considered a suboptimal option and would not be expected to fully resolve the osteomyelitis. Inadequate treatment could lead to the need for amputation in the future or could potentially promote further development of antibiotic resistance.

Patient Preferences

Mr. P is considered mentally competent and fully capable of making self-care decisions. He agreed with the long-term IV antibiotic treatment recommendation and consented to placement of a peripheral central catheter. As part of the treatment regimen it was communicated to Mr. P that a consistent and sanitary place to live must be secured prior to discharge. He was in agreement with this and worked collaboratively with social work to locate an acceptable place to live throughout his therapy.

Since the time of admission, Mr. P openly acknowledged to all staff involved in his care that he and his SO are homeless and live together in a tent (she resided at the hospital with him during his stay). He also clearly communicated that he would not agree to any living situation that separated him from his SO. As his anticipated discharge date approached, it was determined that the only living option available (due to MRSA status) was a housing unit that could not accommodate his significant other. Mr. P again conveyed that he would not agree to any living situation that separated him from his SO.

Quality of Life

For the past three years, Mr. P has lived with an extremely painful, draining heel wound. This has resulted in several visits to the Emergency Department for pain medication and oral antibiotic therapy. The current recommended treatment, IV antibiotics followed by oral antibiotics, is the first line treatment. The second line treatment, which is considered suboptimal, is another course of oral antibiotics alone. Opting for the second line of treatment would put Mr. P at risk for continued infections that could lead to the need for an amputation and/or development of further antibiotic resistance.

In order for the first line treatment option to be successful two conditions related to Mr. P's homeless situation must be resolved. First, a living arrangement that is conducive (sanitary

and consistent) to long-term IV antibiotic therapy via a peripheral central line must be located. Second, a living arrangement that permits Mr. P and his SO to continue living together is required. Procurement of a living situation that meets both of these criteria directly impacts the success of Mr. P's treatment regimen and ultimately his quality of life both short-term and long-term.

Contextual Features

Since the time of admission, social work, Mr. P, and his SO have worked collaboratively to find resolution to their homeless status. Several options were explored to include the possibility of living with family and friends during the four to six week course of IV antibiotic therapy. Neither Mr. P nor his SO had any immediate family or friends that could support them through this health care episode. Additionally, it was determined that many community options were no longer available to Mr. P once his MRSA diagnosis was made.

At this time Mr. P is not employable, however his SO is fully employable and desires to seek employment. Unfortunately, she lost her identification and cannot seek employment until she has obtained identification. She is currently working with social work to resolve this issue. Once she is able to find stable employment they expect their combined income to be sufficient enough to find and maintain suitable housing.

At the time Mr. P consented to IV antibiotic treatment he was fully aware of the expectation to discharge to a consistent and sanitary living environment. Concomitantly, the healthcare team was fully aware that Mr. P would not agree to any living situation that would require him to separate from his SO. It was not until after the peripheral central catheter had been placed, and the IV antibiotic therapy initiated that it was determined there was no place for Mr. P to discharge to that would accommodate his SO.

Mr. P is entitled to full care in a government institution and he has no other form of health care entitlements. Since government institutions operate with a limited budget, resource availability and judicious use of resources are a consideration in patient care.

Analysis and Recommendations

The Four Topic approach provides structure for identifying the key issues related to the ethical situation. Identification of key issues is necessary to conduct a complete analysis and formulate recommendations for resolution.

Analysis

The analysis of this ethical dilemma requires a review and consideration of ethical principles as well as healthcare policy to fully analyze the situation.

Principles. The bioethics principles of autonomy, beneficence, and justice specifically apply to this ethical discussion. However, since Mr. P receives his health care from a governmental institution that is responsible for the care and well being of a defined population, the ethical dilemma needs to be evaluated from the public health perspective in addition to the traditional bioethics perspective.

From the bioethics standpoint, the principle of autonomy was valued in this case as the patient was viewed to be a competent decision maker and his views were respected as well as incorporated into his care goals. The bioethics principle of beneficence was also part of the plan of care as the treatments received by the patient were clearly directed at resolving illness and preventing patient harm.

The bioethics principle of justice, which focuses on fairness, and allocation of resources⁴ is the focal point of this dilemma along with the public health principle of communitarian orientation⁶. Both suggest that use of resources and what is best for the common good of a

population should be an integral part of health care decision making. These ethical stances are in direct opposition to the bioethics principle of autonomy where the rights of the individual provide direction for decision-making. However, it is deemed acceptable to exclude the request from the decision making process if a person's desired actions are thought to "seriously" infringe on the welfare of others⁵.

Policy. The governmental institution and the treating organization have documents that guide care and decisions in this case. First, the organization's Patient Rights and Responsibilities provides for individual respect and respect for personal freedoms as well as patient involvement in health care decisions. Additionally, the document provides for participation in treatment decisions to include the expectation that patients will notify the treatment team if they cannot follow the treatment plan and that the patient will be involved in resolving any ethical issues related to care. Second, organizational policy on visitation provides latitude to department level management to determine if exceptions to the visitation policy can and should be made. This would include the decision to allow a family member to stay the night in the patient room.

Recommendations For Resolution

The recommendation for this case is to treat the patient with the complete four to six week course of IV antibiotic therapy followed by a four to six week course of oral antibiotic therapy.

The following are strategies for achieving this recommendation:

1. Provide the patient with a private inpatient room until an adequate living situation can be located.
2. Continue to seek suitable housing that meets the needs of the patient and the treatment goals.

3. Continue to assist the SO with obtaining employment.

In order to achieve this recommendation the treating organization will have to utilize an inpatient resource for a therapy that is typically performed in the outpatient setting. Mr. P will need to remain in the inpatient setting until an outpatient or community setting can be secured. This will allow him to receive the appropriate therapy as well as meet his personal needs of remaining with his SO.

Ethical Essay

The recommendation for this case is based on the historical practice of the bioethics principle of autonomy taking precedence over the bioethics principle of justice and communitarian orientation⁶. Although the consideration of resource utilization and the needs of a population are pertinent, it should not be heavily weighted in the determination of health care goals. Before resource utilization and population needs can be heavily weighted, changes in the United States health care system infrastructure must occur. The changes must include adequate support to set health care goals based on population needs versus individual needs⁷.

Additionally, it could be argued that utilizing inpatient resources for an outpatient therapy might be beneficial to the population thus supporting the principle of justice and communitarian orientation. The argument could also be made that appropriately treating an MRSA infection reduces the risk of furthering antibiotic resistance, a societal concern. Also, if the infection continues to be ineffectively treated an amputation could be indicated. The resources needed to perform an amputation and manage a patient post amputation may be considerably more than the inpatient resources required for long-term IV antibiotic therapy.

The final point to be considered is one related to truthful communication between patients and health care teams. In this situation the patient was open and honest about his living

and financial situation and clearly communicated his boundaries (“I will not be separated” from my SO). The healthcare team fully expected to be able to accommodate Mr. P and communicated this to him. The truthful communications lead to consent and placement of a peripheral central catheter and initiation of long-term IV antibiotic therapy. This level of communication is promoted and recognized as being the ethical course of action⁵.

In summary, this case illustrates two important dimensions of an ethics case. First, the case clearly demonstrates the ethical challenges present when treating a patient within a system that is responsible not only to the patient but also to a population. Second, the case highlights the positive effects that open, honest communication can have in the clinical setting.

Conclusion

Resolution of an ethical dilemma with this level of complexity can be challenging and seem overwhelming to the healthcare provider. Thorough analysis is crucial to ensure that the healthcare provider and the patient are comfortable with the recommendations. The structure offered by the Four Topic approach provides the foundation to identify key issues and to ensure a thorough analysis is completed.

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May 23, 2008

RE: 08-06, entitled "Case Study: Analyzing an Ethical Dilemma"

Dear Ms. Locke,

The review of your manuscript is complete. Reviewers agreed that it is an interesting and important topic; however, it is not accepted for publication. The reviewer comments are included below.

You are encouraged to revise and resubmit the manuscript. Please include with your revised submission an itemized, point-by-point response to the comments of the reviewers. The revisions should be completed by Jun 22, 2008 to avoid being considered as a new submission.

To submit a revision, go to <http://cns.edmgr.com/> and log in as an Author. You will see a menu item called "Submission Needing Revision." Please click on this item to obtain your submission record and begin the revision process.

Your username is: lockec2

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Sincerely,

Janet S. Fulton

Editor

Clinical Nurse Specialist: The Journal for Advanced Nursing Practice

Reviewer Comments:

Reviewer #1 The manuscript attempts to tie difficult ethical principles to a case study. It raises a question about the common good. Is it better to provide very expensive in patient care for five to six weeks rather than to convince the couple that a separation for this period of time is not insurmountable. Isn't there also some personal moral responsibility of the patient to balance the need for personal comfort against their social needs. Also the case study should include something related to the fact that the government is funding his care, to some extent that is not revealed.

The ethical principles should be presented in more depth. The ethical dilemma as presented in this paper is misleading. There is no question about the needed treatment, but there is about how and where treatment will occur.

Areas for improvement

- Strengthen the level of discussion related to ethical principles.
- Re-consider the nature of the ethical dilemma as presented in this paper.
- Include some related research that supports the purpose of the paper.
- Integrate the Four Factor theory into the final summary essay.

Reviewer #2: The article has some interesting ideas and I would encourage you to make some revisions and resubmit it. You need some scholarly analysis of the concepts presented in the paper. Overall, I suggest you strengthen in for publication and include the following:

- 1) ANA's new Code of Ethics--just published. Would be useful to cite some of it and integrate it into your manuscript.
- 2) The Four Topics approach was developed in 1982. Suggest you cite the original authors and strength discussion and citations of it. There are numerous ones in the literature including JAMA and other journals, textbooks. Give credit to the original authors who have at least 5 editions of their work published. Would not just cite someone who has used it. This will improve your manuscript. If someone isn't familiar with the topic, your presentation of it appears superficial. Show the reader that others think it's a good process to use for ethical dilemmas.
- 3) You need to provide discussion as to how the process should be implemented. The manuscript lacks any direction as to how the CNS and other readers would apply. Discuss how an Ethics Committee and interdisciplinary team would use this process. It isn't something that the average nurse or CNS would use in isolation. These should be group think decisions. An Ethics Committee is essential. Tell how an interdisciplinary team might be used to process this--who might be on the team for such a case study as you have proposed.
- 4) How does the CNS provide leadership and influence a case such as this? Remember who your audience is for this article.
- 5) The conclusions don't flow from the analysis--show reader how (and who) got to those conclusions
- 6) Commas needed in MANY places for accuracy.
- 7) You might strengthen it by adding a small table showing the process. Gives the reader a picture of what it involves.

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2. Author Biographies: A biographical sketch of 50 words or less for each author.
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Title of Study:

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Facilitation at the Point of Care

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