REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
04/22/08	FINAL REPORT	JULY 2007 TO JULY 2008

4. TITLE AND SUBTITLE
Improving Healthcare Delivery through Evidence-Based Practice

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
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5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Veterans Affairs Palo Alto Health Care System
3801 Miranda Ave.
Palo Alto, CA. 94304

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
US Army Medical Department Center and School
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Fort Sam Houston, TX 78234-6135

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
38-08

12. DISTRIBUTION/AVAILABILITY STATEMENT
Internal improvement study

13. SUPPLEMENTARY NOTES
This is an internal improvement study - it has not been through IRB process.

14. ABSTRACT

This study examines whether correlations exist between practice and outcomes. By reducing variations in practice, patient outcomes (quality of care) and cost containment efforts improve, length of stay decreases, and access issues improve. Sample size is well-representative with an 897-bed facility. A non-experimental design comparing outcomes related to actual practice and the effects of reducing variations is completed. Data is collected from the nurse surveys, documentation systems, and Proclarity (a national nursing outcomes database) from August through December 2007. The statistical tool of regression analysis is used. An extensive literature review was completed to determine whether patient outcomes have historically shown a positive, neutral, or negative effect related to variations in care. Standardizing care on a national level is an innovative idea; a study on care provided and its impact on patient outcomes is necessary because of the potential impact it will have on patient safety and well-being, cost containment, and resource depletion. Non-VA hospitals may benefit as well by using future VA guidelines as a benchmark.

15. SUBJECT TERMS
Veterans Affairs Nursing Outcomes Database, reducing variations, standardization, pressure ulcers, staging, templates.

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Education Technician
U	U	U	UL	66	19b. TELEPHONE NUMBER *(Include area code)* 210-221-6443

Army-Baylor University Graduate Program in Health and Business Administration

Improving Healthcare Delivery through Evidence-Based Practice

Presented to LTC M. Nicholas Coppola, Ph.D., FACHE

In partial fulfillment of the requirements

The Graduate Management Project

Ms. Padma Patel

Veterans Affairs Palo Alto Health Care System, California

12 February 2008

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Acknowledgements

I would like to thank my colleagues at the Veterans Affairs Palo Alto Health Care System who helped with this project. I would like to convey many thanks to my preceptors Alice Naqvi, Carry Thacker, and Patricia McCarthy for guidance throughout the year and for taking the time to review my writing. Thanks to my clinical colleagues, members of the Skin Care Committee and Skin Care Champions, without whom none of this would have been possible. I would like to thank Dr. Karen Zulkowski, Montana University, for taking the time to help a novice researcher. I would like to thank all of the wonderful leaders who have invited me into their world and have served as role models. My family has always been there for me, supporting and encouraging me throughout life. Thank you. Without all of you, I would be left with blank pages.

Abstract

This study addresses whether access and use of the Veterans Affairs National Nursing Outcomes Database will improve specific patient care outcomes. It examines whether correlations exist between practice and outcomes. By reducing variations in practice, patient outcomes (quality of care) and cost containment efforts improve, length of stay decreases, and access issues improve. Sample size is well-representative with an 897-bed facility. A non-experimental design comparing outcomes related to actual practice and the effects of reducing variations is completed. Data is collected from the nurse surveys, documentation systems, and Proclarity (a national nursing outcomes database) from August through December 2007. The statistical tool of regression analysis is used. An extensive literature review was completed to determine whether patient outcomes have historically shown a positive, neutral, or negative effect related to variations in care. Standardizing care on a national level is an innovative idea; a study on care provided and its impact on patient outcomes is necessary because of the potential impact it will have on patient safety and well-being, cost containment, and resource depletion. Non-VA hospitals may benefit as well by using future VA guidelines as a benchmark.

Introduction

The purpose of this study is to evaluate the effects of standardizing care through reducing variations based upon best practice medicine (also known as evidence-based practice). Currently used benchmarks are based on varying literature reviews and individual facility preference. This is important because variations in the delivery of care leave room for errors and mistakes that may otherwise have been avoided. The problem with variations in delivery of care provided is that it is not based on evidence and thus care can be inefficient (costly, time-consuming, and deplete limited resources), as well as hinder patient recovery and possibly create new issues that warrant longer lengths of stay in the hospital. All of this adds to the already escalating health care costs. Access, quality of care, and cost are all factors that are affected by inefficiency. The unit of analysis is pressure ulcer incidence (and prevalence) and the predictor variables involve actual nursing care such as turning/repositioning, nutrition, and education. Dependent variables for future studies include falls, hours per patient day and skill mix, nursing staff musculoskeletal patient handling injuries, patient satisfaction, and RN satisfaction.

According to the National Health Coalition (NHC), Gross Domestic Product (GDP) was 15% in 2005. NHC estimates that as health care costs continue to rise, the GDP will be approximately 20% by 2015. Health care costs amount to over 60% of total GDP (Hall & Taylor, 2005). With this information in mind, let us examine the Department of Veterans Affairs Medical Center (VA) and its part in health care cost containment and resource utilization. In particular, we will look at the facility in Palo Alto, California.

The VA Palo Alto Health Care System (VAPAHCS) is an 897-bed capacity hospital. Due to demand for beds exceeding supply on a typical day, the facility is often on divert (meaning patients can no longer be accepted and have to be redirected to other facilities in the community).

This demand versus supply status contradicts the actual current status of VAPAHCS within the industry. According to recent reports, this VA is one of the leaders in the cutting edge of advanced technologies. With technological advances, resource utilization should improve. This would affect cost containment in a positive way and length of stay should also decrease. Factors that may affect this include efficient and effective utilization of such technology. Utilization of limited resources and resource allocation is necessary to combat the spiraling and out of control health care costs today (as evidenced by GDP and predicted GDP). Efficient and effective utilization of resources is also necessary to improve access and quality of care, thereby making things equitable for all patients. For these reasons, it is vital that our life-and-death decision-making practice be based on sound evidence collected from a well-representative sample.

Another important reason that the VAPAHCS should undergo modification from the current practice to a more standardized way of delivering care is that it is part of the only national healthcare system in the country. The Veterans Health Administration (VHA) has authorized the establishment of a national database (Veterans Affairs National Outcomes Database or VANOD) to analyze nursing care indicators. The patient population involved encompasses all aspects of representation (various levels of education, wealth, and demographics). The government benefits from the results of the database study also as it finances the VA. These are just some of the reasons why the VA is an ideal system to undergo creating an infrastructure that develops and operationalizes a standardized methodology of collecting information, and then developing evidence-based standards which may be benchmarked.

This innovative perspective on collecting VAPAHCS data of nurse-sensitive indicators (such as pressure ulcer prevalence) may result in the difference in quality of life, affordability, and decreased wait times.

Purpose Statement

The purpose of this proposal is to initiate the use of a national outcomes database in the VAPAHCS. This system is known as VANOD and is sponsored by the VHA Office of Nursing Services (ONS). The data collected may be utilized by any VA hospital or clinic across the country, and each site can determine best-practices based on local, regional, or national results. The database was originally piloted in 12 randomly selected sites. Based on the success of the initial sites, ONS is expanding participatory sites. VAPAHCS is ready to join this endeavor.

Why is it so important that this database be implemented on a national level? Whether we are speaking about national, regional, or local levels, the bottom line is that inefficient patient care and education may lead to complications, and these resulting complications have been shown to deplete resources and add to costs that are already escalating. The Centers for Medicare and Medicaid Services will not pay for extended length of stay due to untoward events such as nosocomial pressure ulcers and injuries related to falls. Any complication, whether it involves such conditions as skin breakdown, falls, or dysphagia, will usually result in an extended length of hospital stay. Benchmark of appropriate length of stay depends on diagnosis (e.g., type of surgery) and therefore varies. There are benchmarks for certain interventions such as for cardiac surgery; Tu, Mazer, Levinton, Armstrong, Naylor, and Phil (1994) describe a long ICU stay after cardiac surgery as more than 2 days. Length of stay and death can be predicted with a multivariate predictive index (Tu et al., 1994). Some reasons that current practices may contribute to length of stay extensions include lack of evidence-based knowledge, not optimally maximizing the patient's well-being, increased exposure to foreign bacteria or pathogens which increases the potential risk for nosocomial infection, and increased potential for pain and psychological issues. By implementing this national database, evidence-based practice may be

extracted, and these reasons/risks should diminish or possibly be eliminated. Others may use the VA evidence-based practice as a benchmark.

Problem Statement

A stay in the hospital becomes extended when the patient's medical status declines to a level that does not meet the industry or organization's standards for discharge. The patient may develop pressure ulcers related to lack of appropriate turning, lack of patient education, friction and shearing from hospital sheets and gowns for those who are unable to reposition themselves, and poor nutrition. Also, pressure ulcers may progressively worsen if not attended to in a timely manner. This can lead to other complications and length of stay may be increased many-fold. An increased length of stay adds to the already burdened healthcare industry, escalating healthcare costs and GDP, depletes resources that may have otherwise been utilized for non-iatrogenic reasons, and adds to the already taxed access issues.

Relevance

The VANOD system will provide leaders with data needed for clinical and administrative decision-making. Quality of care and cost containment should drive the organizational policies and procedures, not preferences and self-interests (including funding sources). According to Weber (as cited in Hofmann & Nelson, 2001), individual rights are more important than either individual or organizational interests. The organizational interests are more important than an individual's self interest (in this case the patient). This is because resources are limited and the organization's mission, vision, and values should result in caring for the population as a whole. The good of the community supersedes that of organizational interests, which goes back to addressing the limited resources and its efficient and effective utilization for the community as a whole. Government funding should be optimally utilized to benefit the good of the community.

Implementing the VANOD system will make the VA system the largest repository of nursing outcomes data in the United States. It will provide transformation opportunities for the way healthcare is delivered.

Improving the quality of care during and after a stay in the hospital is important to the patient's physiological, psychological, and emotional well-being. The most efficient and effective way to achieve this higher level of quality of care is through evidence-based practice. It is generally known that the hospital is the dirtiest place in the world, and it is relatively much safer for the patient to transfer from a higher level unit to a step-down unit and progressively work his way until he is discharged home. The home is a much safer place because the patient is in an environment that contains his (and his family's) inherent bacteria and reduces the chances of negative outcomes related to increased exposure to other patient's bacteria due to an extended length of stay in the hospital. Other adverse outcomes may include an increased risk for developing pressure ulcers and nosocomial infections, falls with or without injury, increased level of stress, decreased level of freedom (e.g., to move about the intensive care units since the ICU policy states the patient must be monitored at all times) or confinement related to restraint use, increased psychological problems, and decreased patient morale.

Accessibility is affected in the sense that when one patient is not transferred or discharged in a timely manner, the bed is not available to someone who does need to be hospitalized and the limited resources that are available in the medical field are wasted due to improper utilization. Cost containment is therefore not adequately controllable related to these variations in length of stay outcomes. The need to utilize resources that would not have otherwise been necessary had a timely transfer or discharge taken place results in waste and misuse of limited resources. Preventable conditions may evolve and the patient would need additional time to recover, which

means additional use of the bed and resources that would otherwise have been unnecessary. Cost containment is important regardless of who is paying the bill because spiraling healthcare costs mean more people can not afford the rise in cost of care, accessibility diminishes, and the outcome may leave the patient's quality of care diminished.

The patient is not the only person affected. The family members' lives are altered while the patient remains in the hospital. The employees working with the patient may suffer decreased staff morale since an unnecessary length of stay in the hospital may generate new problems, resulting in a vicious health cycle (patient sick, treated, original diagnosis improves, remains in hospital for newly developed issues which were preventable, condition worsens, treated, improves, etc.). This vicious cycle may leave the staff feeling less productive, and a sense of futility may result from the appearance of being unable to help the patient.

This study will attempt to show that variations exist with routine and non-routine care delivered within this setting as compared to the rest of the VAHCS throughout the country. The results will show a decreased accessibility to health care services, depletion of limited resources, and additional health care costs. Standardizing care by reducing variations will improve quality of care delivered, boost employee morale, alleviate the depletion of limited-resources such as time and materials, and improve patient and employee satisfaction.

Research Question

The research question is "Will improving the efficiency of healthcare delivery through evidence-based care in the hospital industry affect patient care outcomes?"

Objective

The objective of this study is to determine if evidence-based practice will diminish the variations associated with non-standardized care outcomes, and whether diminishing these

variations will have an affect on patient outcomes and spiraling health care costs (cost containment). Variations in practice may result in any of the following: developing pressure ulcers, increasing risk for infections, potential increasing risk for falls, psychological issues and other. Processes that may affect these outcomes are: an increased exposure to bacteria or virus from other patients and staffs, poor nutrition, shearing and friction forces associated with repositioning, failure to reposition body when needed to alleviate pressure from bony prominent areas, and gaps in patient and staff knowledge related to processes affecting these outcomes. A survey of staff knowledge will be the instrument used as a foundation to help guide the improvement of healthcare delivery; with validation of reduced nosocomial rates of pressure ulcers and other indicators from the VANOD database.

Hypothesis Statement

H_0: Results from survey do not show a difference in knowledge of delivery of care processes.
H_1: Results from survey show a difference in knowledge of delivery of care processes.

Statistical Notation

H_0: $u_1=u_2=u_n$
Ha: $u_1+u_2=u_n$

Literature Review

According to the VHA ONS, VANOD's Skin Risk templates (assessment and reassessment tools) will provide guidance on minimum expectations for skin risk assessment frequency, Braden Risk Scale (with scores), skin assessment and presence of skin problems (including stage and location of pressure ulcers), and the ability to select pressure ulcer prevention interventions (VHA Office of Nursing Services, 2007).

There are many skin assessment tools available. According to recent research, such as the study completed by King (2007), the Braden Scale appears to be the most reliable and valid tool

available. Utilizing a universally accepted tool will help improve patient outcomes. VANOD has chosen to incorporate the Braden Scale tool into its skin assessment and reassessment templates because this scale has been found to be at the forefront of reliable and valid tools.

The California Nursing Outcomes Coalition (CalNOC) launched a nursing quality indicator pilot project in 1996. Six nursing-sensitive indicators were chosen related to service quality, human resources, work life quality, clinical processes/outcomes, and patient safety metrics: Nurse staffing, RN education/experience and certification, patient falls, pressure ulcers, restraint prevalence, and patient satisfaction. These indicators were integrated onto a dashboard system that provides a strategic view of operations, quality, safety, and outcomes (Donaldson, Brown, Aydin, Bolton, & Rutledge, 2005). Utilizing this dashboard will help optimize performance improvement in California hospitals.

The VA Health Care System is the largest national system in the United States. The VA National Nursing Executive Council chartered a work group to initiate a similar system within the VAHCS. Three nurse leaders led the first development of VANOD, including Alice Naqvi, a Nurse Executive leader at the VAPAHCS facility. This VANOD system operationalizes the Council's sixth strategic goal: developing a standardized methodology to collect data related to nurse-sensitive indicators of quality within VHA facilities into a national database (VHA Office of Nursing Services). VANOD rolled out its data collection in July 2003, initially piloting the system at 12 randomly selected sites. VAPAHCS initiated VANOD on August 1, 2007. The indicators chosen by the VA system include administrative, pressure ulcer prevalence, patient falls, hours per patient day and skill mix, nursing staff musculoskeletal patient handling injuries, patient satisfaction, and RN satisfaction. Pressure ulcer prevalence is the second indicator

initiated, and will be the focus of this study. The others will follow when the timing is appropriate.

Pressure ulcers may be either community-acquired (noted and documented within 24 hours of admission) or hospital-acquired (undocumented on day 1, but noted day 2 or later). Developing a pressure ulcer is one type of hospital-stay related complication. An extensive literature review of length of stay has been completed. There is no recent research found that suggests whether pressure ulcers unnecessarily prolong length of stay or how this prolonged length of stay may affect other outcomes. Most of the literature found revolves around staffing turnover rates, Emergency Department patient turnover rates, and subjective surveys related to quality of care.

However, we can learn from the impact of other complications of length of stay found in the literature. Shebrain, Zelada, Lipsky, and Putnam (2006) researched what affect a delay in diagnosis had on morbidity. They based their research on literature review that looked at the critical cut-off times from arrival to time of surgery (by way of diagnosis). Using two groups, early versus delayed, the results showed that the delayed group experienced 30% longer hospitalizations, 55% longer ICU stays, and 38% longer usage of mechanical ventilation support. While Shebrain's team used a retrospective approach, Kahn, Goss, Heagerty, Kramer, O'Brien, and Rubenfeld (2006) followed four patients who were diagnosed with Boerhaave's Syndrome (spontaneous esophageal rupture) and required surgery immediately. The focus of their study was on a trans-abdominal approach to managing this syndrome, and the outcomes showed no correlation between length of ICU stay and complications. That is not to say correlations were non-existence, but rather no obvious evidence was seen. Senkowski, Adams, Beck, and Brower (2006) reports a medium ICU stay for minimally invasive esophagectomy to be 2 days, with

hospitalization lasting 12 days. This study showed that an average ICU stay of 2 days may result in a prolonged hospital stay of 12 days due to complications. From this, we may infer that the longer the ICU stay, the higher the risk of deterioration due to non-diagnosis related reasons such as increased risk for skin breakdown, potential for picking up infections (physiological deterioration), and becoming more depressed or anxious (psychological deterioration). Initial data from the VAPAHCS Annual Pressure Ulcer Prevalence Studies shows the rate of ICU prevalence is higher than the reported averages from CalNOC.

Tu et al. (1994) showed that length of ICU stay can be predicted and identifying patients at risk for an extensive stay is relevant in an era of escalating health care costs and limited resources. The authors of this study cite that in Canada, a major factor affecting access and waiting lists is limited ICU resources. Few studies were found that directly looked at unnecessarily extending hospital stay and the affect this has on outcomes. The few studies that were found were completed in the early 1990s; there were no recent studies found. Therefore, the need for further research in this area (complications that affect patient outcomes and length of stay) definitely should be addressed.

Data

A survey will be conducted of staff nurse's perception of variations in practice. The Pieper Pressure Ulcer Knowledge Tool is a standardized assessment test and will be utilized to conduct the surveys. It consists of three categories: prevention, staging, and general wound knowledge (Zulkowski, Ayello, & Wexler, 2007). Responses to the 47 questions are binary in nature; true and false. These responses will be converted to percentages and reported in a table. Nursing demographics will be categorized using the following: work experience, education, and certification (wound care certification, other certification, and no certification).

Data will also be collected and analyzed for possible trends with healthcare delivery practices. The initial collection and analysis of nosocomial pressure ulcer data will be compared with resulting data collected over a five-month period. The sample size should be representative of the general VA population nationwide. The patient population seen at this VA is quite diversified and includes a wide range of diagnoses (e.g., cardiac, respiratory, gastrointestinal, and renal). In fact, patients come from all over the nation to this facility because of the wide range of services provided here and the technological advances that have been made by this facility. Patients have traveled to this facility for multiple transplant surgery, immune conditions, and cardiac expertise.

Statistical Power

Statistical power analysis is used to determine the probability of receiving a statistically significant result given that there is a real effect in the employee population. The overall power is useful in interpreting the accuracy of correctly rejecting a null hypothesis when it is false. Analysis of sample size, effect size, and the alpha level help determine power. The sample size for this study will include all staff nurses within the predetermined areas within VAPAHCS. It will mostly depend on subjective, yet trustworthy provider evaluation regarding documentation of when a patient is determined to have developed a pressure ulcer, the specific pressure ulcer assessment information, and interventions carried out for the event. Effect size is based on the researcher's confidence in the relationship between the variables (high, medium, and low). This will initially be set at 0.3 (which is the minimum effect needed to meet the legitimate national depository; 0.3 = low) and will be modified as data reveals accurate data effect. The alpha level helps determine if type I error occurs or not (type I error occurs when a researcher rejects a null

hypothesis that is actually true). Alpha will be set at <.05, which means that less than 5% of the results are due to chance or more than 95% of the results are not due to chance.

According to the Clinical Reminders Tool within the VAPAHCS database, there were 1676 patients that were reviewed for pressure ulcers during the months of August through December 2007. There were 65 surveys distributed and 43 responses. With an effect size of 0.3 and alpha <0.05, the statistical power is 0.50-0.52. Increasing the effect size to 0.5 changes the statistical power to 0.93-0.94. This is greater than 0.80, so the sample size is well representative. And increasing the effect size to 0.6 or greater maximized the statistical power to 0.99 for this sample size. Initially, the minimum possible statistical power was calculated by using a test value of 0.3. This produces the largest possible variance. Since the variance improves when increasing the effect size, the effect size was set at 0.9 (effect size of 0.6-0.9 have a same statistical power >0.99) as the researcher is relatively confident that the relationship between variables is high (the variance is minimal). The demographics (work experience, education, and certification) are highly related to the level of pressure ulcer knowledge that staff possess. The probability of incorrectly rejecting the null hypothesis or incorrectly rejecting that there is no difference among the survey results remained at <0.05 or 95% to ensure not only that type I errors are minimized, but also type II errors.

Statistical Tool/Techniques

The Pieper Pressure Ulcer Knowledge Tool, VANOD system, and Excel spreadsheets will be used with the unit of analysis being employee assessment knowledge related to the pressure ulcer incidence.

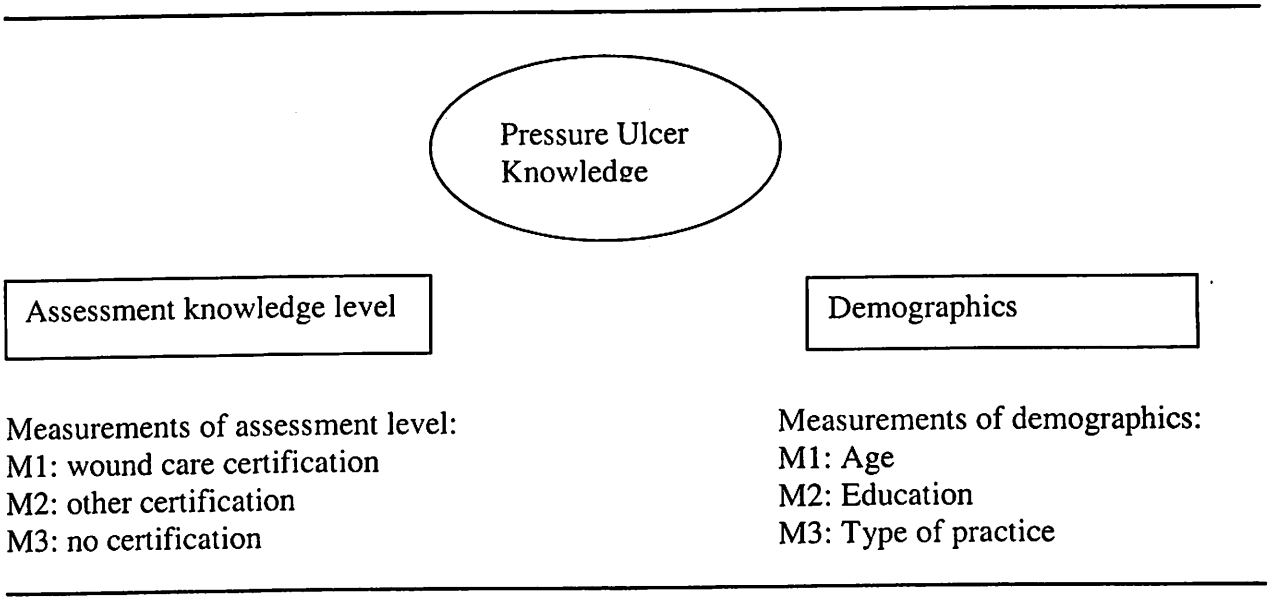
The dependent variable is the level of assessment knowledge. The independent variables will be education and wound care certification, other certification, and no certification. These

variables will be measured using a binary mode where yes responses are coded as yes and all other responses will be coded as no (no and do not know). Demographics will be defined using descriptive statistics (age, education, and type of practice). Inferential statistics will include t-tests (examines differences among groups) and Pearson correlations (examines relationships among items).

The experimental design does not include a control group. The groups will be divided according to certification levels. This comparison study most appropriately fits the criteria for a Non-Experimental Design. It is expressed as $O_1O_2O_n$ with no deliberate treatment at this time.

Theoretical overview/Conceptual Model of Theory

Is pressure ulcer development preventable with delivery of care variation reduction?



Conceptual model I. *Pressure ulcer knowledge.*

The conceptual model is derived from Bacharach (1989) and it is used as a visual aid in showing the relationship between constructs, variables, and measures. In this study, the two

variables that describe the construct Pressure Ulcer Knowledge are assessment knowledge level and demographics. These are operationalized by the measures (wound care certification, other certification, and no certification) and (age, education, and type of practice), respectively. The scales are categorical and binary for both measures. See Conceptual Model I above.

Limitations of this Study

The source of this data will come from the VA's nursing staff and database system. The entries may have subjective bearings, which may alter the data being analyzed. This applies to both the surveys and data collection.

The surveys are tools to evaluate the levels of assessment knowledge based on subjective responses. Data collection will be completed by registered nurses. Educational sessions were provided to minimize variation, maximize inter-rater reliability, and maximize data validity and reliability. These sessions will be repeated as needed.

Selected RNs perform weekly skin rounds to maintain the integrity of this research study. Monthly reports are generated to audit and track information. Providers are encouraged to document accurately and not skew the documentation in fear of incident reports or other adverse outcomes. All data will be utilized in a professional manner so that the issue of biasness is minimized. Although many of the possible outcomes variables may be unique to each individual, the population should be well represented due to the sample size and unbiased data collection methods. The limiting factor of representation may be that the majority of patients seen at the VA are male. Female veterans and active duty members are seen, but they are a minority. The measures of central tendency may be skewed; limiting the regression analysis as far as its predictive values goes.

Other possibilities of limitations include double-counting during the data collection process and with the Clinical Reminder Tool. The processes used during this project were continuously monitored and modified. For example, initially the data collected did not allow for a definitive determination that the incidence was not previously reported and counted. Reviewing the data collection process with the Skin Care Champions during Skin Care Committee meetings helped resolve this and other issues as they came up.

Methodology

Initially, the plan was as follows: The Pieper Pressure Ulcer Knowledge Tool will be given to all Nurse Managers, Skin Care Champions, and one or two representatives from each unit twice. The first survey will take place as close to the beginning of this study as possible, while the second survey will follow after a five month data collection period. Responses to the 47 question pre and post surveys will be converted to percentages and reported in a table format. Analysis of the pre and post surveys should show a positive difference in pressure ulcer knowledge among staff nurses in selected areas. Due to staff time constraints, the plan was changed from giving the survey pre and post to giving it once only. Instead of comparing the results pre and post, the results from the one-time survey will serve as a baseline. This baseline will help guide VAPAHCS in its efforts to improving the delivery of health care.

Selected Skin Care Champions from each unit at VAPAHCS will complete weekly skin care assessment and data collection. These Champions, although not wound care specialists, are educated and trained registered nurses. They will use a standardized collection system and template so that process variations will be minimized. Data will be collected, entered, and retrieved from the VA's CPRS (Computerized Patient Record System) and Picis Care Suite software systems during the period covering August 1 through December 31, 2007. This data

collection may also be pulled from VANOD and utilized by the entire VA system on a local, regional, and/or national basis. The national patch for pressure ulcer rolls out is effective December 1, 2007. The sample size should be representative of the general VA population nationwide. The patient population seen at this VA is quite diversified and includes a wide range of diagnoses (e.g., cardiac, respiratory, gastrointestinal, and renal). In fact, patients come from all over the nation to this facility because of the wide range of services provided here and the technological advances that have been made by this facility. Patients have traveled to this facility for multiple transplant surgery, immune conditions, and cardiac expertise.

All admissions that have gone through the selected inpatient units at the VAPAHCS will be used. The data will be collected in a non-experimental design format where the information retrieved will fall under one of two categories: study responses to survey and demographic responses to survey. No control group is used, but instead this design type will use the comparison method. Experimental notation is as follows: $O_1O_2O_n$ and $X_1X_2X_n$ with no deliberate treatment. National data will be available in the VANOD database beginning December 1, 2007. The data collected each month by Skin Care Champions will be used, along with Excel spreadsheets and graphs, to generate monthly reports. Data is being collected internally using VANOD templates; this collection began August 1, 2007. Comprehensive data is being collected as an internal quality and performance improvement project. This data will be analyzed and presented to the VAPAHCS Medical Executive Board, and will be available to internal employees. Differences and relationships will be examined using the t-test and Pearson's correlation. A regression analysis will be completed to statistically qualify the effects of the results on healthcare delivery practice.

The equation that shows this relationship is as follows:

$Y = b_0 + b_1x_1 + b_2x_2 + b_nx_n + E$ where y is the dependent variable assessment knowledge, b_0 is a constant, x 1 through n represent the independent variables, and E is the error coefficient.

The regression analysis examines the relation of the dependent and the predictor variable. It is a method used to predict or forecast, model causal relationships, or test hypothesis relationship between variables. Method of least squares is a common parameter of regression analysis. This method describes linear regression by determining the values of unknown quantities in a statistical model through minimizing the sum of the residuals squares (difference between the observed and predicted values). The results of the regression analysis will show whether a correlation exists or not between the dependent and predictor variables. The effects of the predictor variables on the pressure ulcer incidence and outcome will be seen while other variables remain constant. Results should show that there is a significant difference between standardized evidence-based care and the current non-standardized practice of care.

VAPAHCS set goals to be accomplished during the time period August 1, 2007 through December 31, 2007. Summary of the plan is as follows:

To reduce documentation variation:

1. The VA National Nursing Executive Council chartered a national database repository that involves various nursing-sensitive quality indicators. This database is the Veterans Affairs Nursing Outcomes Database (VANOD). VAPAHCS was a pilot site for the most recent indicator (Pressure Ulcer), and to prepare for the rollout of the national patch, we conducted an internal improvement project during August through December of 2007. Standardized templates were implemented.

2. A standardized note title was selected - Wound Care Documentation Note. Nurses will use this note for consistency and accuracy purposes. Clinical Nurse Specialists may use additional templates.

To address inter-rater reliability and documentation variation:

3. Selected Skin Care Champions have been conducting weekly skin rounds as of August 1, 2007. All Skin Care Champions received educational training during scheduled periods on 9/27 and 10/1; the education provided will help to reduce variation in knowledge and care provided by Skin Care Champions.

4. A Clinical Application Coordinator conducted re-education sessions for Skin Templates during the week of August 20, 2007.

5. Pressure Ulcer Knowledge Tool deployed. A standardized survey will help to determine level of variation, if any, in knowledge and delivery of care provided by nursing staff is in progress.

To address incidence and prevalence tracking:

6. Skin Care Champions conduct weekly pressure ulcer rounds. The Skin Care Committee approved and implemented a standardized worksheet. This worksheet provides monthly incidence data. This data will be charted, graphed, and analyzed by unit, area, and the facility as a whole. A report will be generated and presented to the Medical Executive Board on a bi-annual basis.

To increase interdisciplinary involvement in the review of the skin care program:

7. The Skin Care Committee expanded to include medical, surgical, pharmacy, nutrition, OT, PT and support service representatives, as well as the existing representation from each clinical

nursing area. Some of these service department members are ad hoc members who will attend when issues needing their input are raised.

A plan should always be monitored and updated as needed. Following is an updated check list:

1. Various note titles:

- The Skin Care Committee approved documentation under one note title. Although number of various note titles decreased, room for marginal error in using the wrong note exists.
- Increasing awareness and reminder is on-going. Continue working to increase awareness and educate (e.g., send out facility-approved messages, unit in-service by Skin Care Champions, use of Skin Care Website resources and new nurse orientation).

2. Tracking a specific pressure ulcer:

- The implemented tools have reminder boxes. Tools incorporate uniformity of terminology, but subjectivity and thoroughness by documenter is still a factor.
- Tools were implemented August 1, 2007 and education sessions provided.

3. Inter-rater reliability:

- Educational sessions provided to standardize knowledge; goal of reducing variations in delivery of care practiced.
- Any unit-specific issues brought to the attention of Skin Care Committee have been discussed and communicated with staff.
- The Skin Care Champion acts as a liaison for his or her unit and should provide his or her unit with feedback.

4. Monthly data collection and tracking began August 1, 2007.

- Internal quality and performance improvement indicator.
- Official VANOD Pressure Ulcer national patch went into effect December 1, 2007.

5. Reports have been generated for VAPAHCS.

- Reports for the three major areas (LTC, Rehab, and GM&S/CC) and individual units were generated on a quarterly basis.
- The Clinical Reminder Tool reports were generated on a monthly basis.

6. Reassess progress is on-going.

- Goal: Improved documentation using assessment and reassessment templates
- Increased number of interventions documentation
- Increased inter-rater reliability with the Braden Scale and score
- Improved weekly wound notes.

Improved and increased refer to the number of nurses using the right template and note, as well as the quality of the documentation. Above all, we will be monitoring the trends of newly developed pressure ulcers with a goal to minimize new developments.

Code Sheet

Table I

Code Sheet

Excel variable	Standard range or description	Excel data code	Literature/reference
Y = assessment knowledge	Wound care certification =2 Other certification =1 No certification = 0 Any certification under 1 and 2 → 1 (yes)	Binary: Yes = 1 No = 0	Zulkowski, K., Ayello, E.A., and Wexler, S. (2007). *Certification and education: Do they affect pressure ulcer knowledge in nursing?* Advances in Skin & Wound Care. V. 20 (1).
X_1 = Age	$22 > X_1 < 67 = 1$ $> 67 = 0$	Binary: Yes = 1 No = 0	N/A.
X_2 = Education	Associate degree or diploma =1 Bachelor degree =2 Graduate degree = 3 Grad degree → 1 (yes), all others → 0 (no)	Binary: Yes = 1 No =0	Zulkowski, K., Ayello, E.A., and Wexler, S. (2007). *Certification and education: Do they affect pressure ulcer knowledge in nursing?* Advances in Skin & Wound Care. V. 20 (1).
X_3 = Type of practice	Hospital =3 Long-term care =2 Rehabilitation care = 1 Other area = 0 First three → 1 (yes) and other area = 0 (no)	Binary: Yes = 1 No = 0	N/A.

Measurement Assumptions

Knowledge about pressure ulcers is needed to reduce variations and standardize care. Knowledge is a precursor for care and serves as a foundation. Actual care will be studied through the incidence and prevalence of nosocomial pressure ulcers and community-acquired pressure ulcers, but focus will be placed on nosocomial incidence. It is more practical to predict and prevent something that occurs within our facility than something that occurs outside of our facility, and therefore outside of our control.

Results

Survey

A standardized survey consisting of 47 pressure ulcer knowledge questions was given to staff throughout the facility. Areas included General Medical and Surgical, ICUs, Rehabilitation and Spinal Cord Injury, and Long-Term Care (which includes Hospice). Forty-two of 65 surveys were returned for a response rate of 64.6%. Analysis of the survey responses shows that VAPAHCS results were above other comparable locations: Rural locations reported 78% (N=110), urban areas reported 79% (N=848), and VAPAHCS reported 82.45% (N=39). See Appendix A for description of stages and Appendix B for Pressure Ulcer Knowledge Report prepared in collaboration with Dr. Zulkowski. Note that the sample size represents registered nurses only and these percentages reflect the average correct answers to the 47 question survey based on standard pressure ulcer knowledge. Although 82.45% is above the average of comparable surveys, VAPAHCS will continue its quest in improving the delivery of health care.

Data collection

VAPAHCS graph represents the facility as a whole. The regression line shows the newly developed pressure ulcers trending downwards overall. Note that August and September data

results are similar, but that the number of nosocomial pressure ulcers decreases starting from October. The downward trend is thought to be due to the interventions implemented. Implemented interventions produced positive results:

- ✓ Assigned Skin Care Champions.
- ✓ Reduce variations in delivery of care.
- ✓ Improve knowledge. → → → Decrease incidence rate
- ✓ Completed educational programs.
- ✓ Standardized templates.

Analysis and interpretation are easier to understand when data collected are placed into graphs. For this project, I separated data by area of clinical care: VAPAHCS represents all data collected (Figure I). Three major areas within the hospital are General Medicine and Surgery/Critical Care Units (Figures II, III, IV, and V), Extended Care Services (also known as Long-Term Care, Figure VI), and . Rehabilitation Services (Figures VII and VIII), See Figures section for the graphs representing VAPAHCS and its areas. A description of the pressure ulcer stages is found in Appendix A.

Results: T-Test and Regression Analysis

One of the cited articles (Tu et al., 1994) suggests that both the t-test and Pearson's correlation are calculated with this type of study. These tools are not relevant for the purpose of this particular study for the following reasons: a.) The t-test determines whether two group means are statistically different and is useful with a two-group randomized experimental design. This study does not compare two groups and is not a randomized experimental design. Therefore, the t-test will not be used. b.) Each graph does show a regression analysis line that represents the best moving estimate of means. However, the moving estimate results in skewed predictive value. Unusual occurrences or outliers do affect the moving estimate. Even though

the t-test was not calculated for this study, the regression analysis results may be used in lieu of the t-test because the t-test and regression analysis results should be mathematically equivalent.

Results: Pearson's Correlation

The Pearson's correlation tests the null hypothesis and determines whether the relative frequencies of observed events follow a specified frequency distribution. Assumptions about events are that events are independent, are mutually exclusive, and have the same distribution. Pressure Ulcer incidence for our patient population fulfills two of the three assumptions: events are independent and are mutually exclusive. They do not have the same distribution as evidenced by the higher incidence rates reported by Critical Care Units and Hospice. We can assume that these high incidence rates were outliers since the high rates occurred early on in the study, and with interventions implemented, the rates decreased in the following months. Pearson's correlation is not a useful test for our study because we do not have a specified frequency distribution. Ideally, the frequency distribution of pressure ulcer incidence would be zero, but realistically, this is not a plausible goal because random variation exists. And we do not want the frequency distribution to be bell-shaped as this would imply that we want to see an increase in the number of pressure ulcer incidence, followed by a decrease. What we do want to see is a downward trend in the number of newly developed pressure ulcers.

A bell-shaped curve should result when using measures of central tendencies. A bell-shaped curve shows that the mean, median, and mode show normal distribution. The data generated during this study reflects only the right half of the bell curve. It can loosely be said that our data follows the bell-shaped curve because the VAPAHCS graph does show a slight increase in incidence followed by a decrease, but we are concerned more with rates of improvement than the distribution of the results and our rates have been decreasing overall.

The results of this study show that standardized evidence-based practice results in fewer patient complications, improved patient outcomes, decreased length of stay, increased accessibility, and cost containment.

Analysis of Results

Referring back to the VAPAHCS graph (Figure 1), we can see that the initial trend is upwards (from August to September). This is thought to be attributed to the educational interventions that were implemented. From September through December, the trend is downwards. This is thought to be attributed to the improved nursing interventional care and patient education implemented (improved through reduced variation in delivery of care).

Going back to regression analysis, the graphs shown in the figures section indicate Critical Care and Hospice units have the highest incidence reported. Analysis of these units resulted in the following: The Critical Care Units care for patients with unstable conditions which prevents intervention implementation at times. These patients usually have decreased levels of mobility, self-care, and level of consciousness. Hospice patients tend to have poor prognosis because they are terminally ill and have decreased psychological motivation, comfort care issues are more important than newly developing conditions, and addressing pain issues is also much more important than addressing pressure ulcer development. These unusual circumstances or outliers affect the predictive value of the regression line. The circumstances are not unusual for the particular units (Critical Care and Hospice), but are unusual when referring to health care in general. Other underlying reasons include, but are not limited to: Unrelieved pressure over bony prominence, poor nutrition, shearing/friction, hard surfaces, moisture, insensate, compliance, and unknown reasons. These reasons pertain to all units within the facility.

Results: Effectiveness

VAPHCS' progress and effectiveness during this project are as follows:

1. Completed:
   - Standardized tools implemented.
   - Data collection process established.
   - Presented first official report to hospital leadership in January 2008.
2. Areas needing improvement:
   - Incomplete or unclear documentation
   - Better method to monitor for duplication of reported pressure ulcers
   - Improving method of incidence documentation
   - Collecting/reporting data in a timely manner
3. This is a work-in-progress:
   - Further improvements to the plan will be determined and implemented as needed.
   - The end-goal should result in the generation of reliable and accurate information.
   - Implement clear process/system to drill down from hospital-acquired to unit level reporting

VAPAHCS has made considerable progress. Bringing attention and focus to an area of patient care that we have some control with is a major first step. Planning, designing, and implementing processes that help alleviate resource waste while keeping patient well-being at the forefront is essential and VAPAHCS has clearly proven that it is a facility which all others may look up to as a role model. Through this internal improvement project, VAPAHCS has shown that reducing variations in the delivery of health care and standardizing this care

definitely has potential to make a difference during a critical time in the health industry. Making a difference can actually mean making the difference.

Discussion

Tools were created and implemented to make data collection through the VANOD system possible. The Clinical Reminder Tool is based on information inputted into the Skin Assessment and Skin Reassessment Templates. Depending on documentation, checking particular boxes or health factors triggers the reminder. This Clinical Reminders Tool is useful as it provides staff with a list of patients who triggered as having pressure ulcers – either hospital-acquired or community-acquired. The drawback is the list is not inclusive. The ICU units have their own charting system and, although all staff members are required to use the main charting system CPRS to chart admission notes (which utilizes the Skin Assessment Tool), the ICU staff do not have to use the Reassessment Tool in CPRS. Also, in general, the acute care and LTC setting staff are mandated to use the Skin Assessment Tool, while only the acute care setting staff is mandated to use the Reassessment Tool. The LTC setting staff has its own standards and documentation protocols. It is up to the individual facility to determine whether its LTC will use this latter tool or not. So, although data is collected nationally, it is not consistently available for all clinical settings.

On a more local level, the following discussion/conclusion applies to VAPAHCS: The development of new pressure ulcers may be minimized through improved knowledge and delivery of care as evidenced by the downward trend seen in the overall internal improvement project at VAPAHCS. Intervention occurred during August through October 1 and the downward trend began with the month of October. Zero-tolerance for development of new

pressure ulcers may not be a realistic goal due to random variations and the nature of some patients: critically unstable or terminally-ill, thus preventing intervention implementation.

Limiting factors: Although well-representative of the national population, sample is limiting in gender representation due to majority of VA patient population seen is male. While VAPAHCS is a leading level 1A complexity facility, not all VA facilities see the level of acuity patients that VAPAHCS sees. This is an on-going project, so although the results may only cover a five month period for the purposes of this project, the actual internal improvement project is not time-limited.

Discussion: Goals for VAPAHCS

Since this project is on-going, VAPAHCS will continue to work towards improving the incidence of pressure ulcers and the delivery of health care as a whole. Following are some goals:

- Continue to work towards minimizing incidence of pressure ulcers by improving practice (delivery of care), knowledge, and documentation variations. Improve reporting process of incidence rate by individual unit representatives. Optimize documentation efforts by reducing double-documentation
- Assure patient education brochure is given to all patients, especially high-risk.
- Analyze survey results to identify areas of needed staff education
- Continue to use specialty surfaces for patients who have low (lower score = higher risk) Braden Scores or appear to have a high risk for developing pressure ulcers
- Identify collectable reassessment methods for ICU from PICIS. PICIS Care Suite is the ICU documentation system used throughout VA Health Care System
- Consideration for Wound Care Nurse FTE is underway

Although many of these goals have been initiated, improving quality and performance is a continuous long-term project. Successes and failures will be evaluated and modifications will be made as needed to ensure patient safety, well-being, and positive outcomes are achieved.

Conclusion

Research shows that a decrease in the complications such as development of pressure ulcers leads to a decrease in hospital length of stay days. There is no change in the average severity of the illness, but the time of recovery is altered with extended hospital stay. Although the pressure ulcer does not directly affect mortality, the related frailty and high disease burden associated with pressure ulcers does increase the risk of death. Also, area breakdown increases potential for further skin breakdown. Pressure ulcers are a common cause of morbidity, and contribute to hospital costs and length of stay increases. There is no reliable cost analysis data available according to a reliable source at the Centers for Medicare and Medicaid Services. According to VHA Directive 1180.2 (2006), the estimated cost of treating hospital-acquired pressure ulcers is greater than $50,000 per newly developed pressure ulcer. This estimation is based on Medicare data from 1994. The annual estimated cost of pressure ulcers in all hospitalized patients is $1.3 to $3.6 billion. With the rising costs of health care today, these figures are probably much higher.

Among preventable health issues, respiratory infections are the most commonly occurring due to instrumentation (e.g., endotracheal tube, foley, and other invasive items). Bacterial and fungal infections are less common, but still are of concern. While respiratory infections are among the most preventable, most pressure ulcers are also preventable. More studies need to be completed to determine contributors to variations in outcomes, if any. Based on these contributors, possibly establish a new benchmark for the VAHCS, and enforce the new

benchmark and monitor the outcomes post modification to see if variations of outcomes have been minimized. Through our study, we have shown that by implementing patient education and nursing care interventions, we can predict and prevent pressure ulcers from developing.

Aside from the effect length of stay has on the patient, another consideration is wasting limited resources. Allocating limited resources inappropriately will deplete resources, leading to decreased access and quality of care. The community will not benefit as a whole if resources are misappropriated to a "few". For example, the VA has a responsibility to the community which includes the people who served this country and those that serve in other ways. VA leaders and employees hold the VAHCS accountable to meeting industry standards and are not given a free pass because funding comes from the government. In fact, VAHCS is an inspiration as it has taken the first steps towards creating a national evidence-based repository that will help improve delivery of care through reducing variations. In addition, CMS has announced it is not funding the treatment of nosocomial pressure ulcers due to rising healthcare costs as of October 2008 and cost efficiency would dictate that preventable conditions should be prevented to avoid undue financial burden. Thus information gleaned from VA studies to reduce nosocomial incidents would be applicable to the community costs of care as well. Taxpayers are ultimately the payers to some degree and since they are the community, we need to optimize resource utilization and maximize the benefits to the population as a whole. In this manner, we can improve accessibility and more veterans can benefit from the limited, but valuable resources.

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Appendix A

Description of Pressure Ulcer Stages

Deep Tissue Injury. Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

Stage I. Non-blanchable erythema of intact skin; discoloration of skin, warmth, edema, induration, or hardness over bony prominence may be indicators. Clinically appears as hue of red, blue, or purple. May indicate changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy), and/or sensation (pain, itching).

Stage II. Partial thickness skin loss involving epidermis, dermis, or both. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.

Stage III. Full thickness skin loss involving damage to, or necrosis of, subcutaneous tissue that may extend down to, but not through, fascia. The ulcer presents clinically as a deep crater with or without undermining adjacent tissues.

Stage IV. Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures. Undermining and sinus tracts may be associated.

Unstageable. Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. When eschar is present, accurate staging of the pressure ulcer is not possible until the eschar has sloughed or the wound has been debrided.

National Pressure Ulcer Advisory Panel (2007) and VAPAHCS – Health Care System memorandum No. 118-07-31 (2007). Pressure Ulcer Prediction, Assessment, and Prevention

Appendix B

PRESSURE ULCER KNOWLEDGE REPORT

TABLE OF CONTENTS

Test Results

Pressure Ulcer Knowledge Test Results

Total Number Completing Test = 42

Overall Test Score (out of 100%)

- Mean= 82.5%
- SD= ± 5.5
- Range = 72.3% - 93.6%

Total Number RN Completing Test = 39

RN Only Test Score

- Mean= 82.45
- SD= ±
- Range =

Aggregate Data

Demographics, Professional Information, Education, Certification, and Sources

I. Overall Demographics

Age

- Mean = 46.5 years
- SD ± 8.6
- Range=31-62 years

Gender

- Female = 95%
- Male =5%
- No response=0

II. Overall Professional Information

License Category

- RN= 93% (44)
- LPN=7% (1)
- Other=0
- No response=0

Current job type

- Staff nurse= 81%
- Administration = 9%
- MDS coordinator 5%
- Wound nurse 2.5%
- No response= 2.5%

Years in Practice

- ☐ Less than 1 year = 0
- ☐ 1 -3year = 5%
- ☐ 4-5 years = 5%
- ☐ >5 <10 years = 7%
- ☐ >10, <15 years = 2%
- ☐ >15, <20 years = 7%
- ☐ >20 years = 43%
- ☐ No response = 2%

III. Overall Education

Initial Nursing Education

- ☐ Diploma = 15%
- ☐ Associate degree= 40%
- ☐ BSN = 33%
- ☐ MSN =5%
- ☐ Doctorate=0
- ☐ Other =2%
- ☐ No response = 5%

Highest Nursing Education

- ☐ Diploma = 5%
- ☐ Associate degree= 31%
- ☐ BSN = 40%
- ☐ MSN = 17%

- Doctorate=0
- Other = 2%
- No response = 5%

Highest Non-nursing Education

- Diploma = 7%
- Associate degree = 2%
- Baccalaureate degree = 10%
- Masters degree = 0
- Doctorate = 2%
- No response = 79%

IV. Overall Certification

Any certification

- Yes = 17%
- No=83%

Wound Certification

- Yes = 2%
- No= 98%

V. Overall Pressure Ulcer Knowledge Sources

Attended a lecture

- Yes = 87%
- No= 13%
- No response = 0

Last time attended a lecture

- Less than 1 year = 78.5%
- 1-2 years = 5%
- 2-3 years = 9.5%
- 4 years or more= 5%
- Never = 2%
- No response =0

Read a book or article about pressure ulcers

- Yes = 95%
- No= 5%
- No response = 0

Last time read a book or article about pressure ulcers

- Less than 1 year = 86%
- 1-2 years = 7%
- 2-3 years = 2%
- 4 years or more = 5%
- Never= 0
- No response= 0

Used the web to find pressure ulcer information

- Yes = 69%
- No= 31%
- No response = 0

Read the AHCPR Pressure Ulcer in Adults Prediction and Prevention Clinical Practice Guidelines

- ☐ Yes = 48%
- ☐ No= 48%
- ☐ No response = 4%

Read the AHCPR Treatment of Pressure Ulcers Clinical Practice Guidelines

- ☐ Yes = 45%
- ☐ No= 48%
- ☐ No response = 7%

RN Data

Demographics, Professional Information, Education, Certification, and Sources

I. RN Demographics

Age

- Mean = 46 years
- SD ± 8.9
- Range = 31-62 years

Gender

- Female = 95%
- Male = 5%
- No response = 0

II. RN Professional Information

Years in Practice

- Less than 1 year = 0
- 1 year = 0
- 2 years = 0
- 3 years = 5%
- 4 years = 2%
- 5 years = 2%
- >5, <10 years = 17%
- >10, <15 years = 21%
- >15, <20 years = 7%
- >20 years = 43%

- No response = 2%

III. Education

Initial Nursing Education

- Diploma = 14%
- Associate degree= 40.5%
- BSN = 33%
- MSN =5%
- Doctorate=0
- Other = 2%
- No response = 5%

Highest Nursing Education

- Diploma = 5%
- Associate degree= 31%
- BSN = 40.5%
- MSN = 17%
- Doctorate=0
- Other = 2%
- No response = 5%

Highest Non-nursing Education

- Diploma = 7%
- Associate degree = 2%
- Baccalaureate degree = 10%
- Masters degree = 0

- Doctorate = 2%
- No response = 79%

IV. Certification

Any certification

- Yes = 17%
- No= 83%
- No response = 0

Wound Certification

- Yes = 2%
- No= 98%
- No response = 0

V. Pressure Ulcer Knowledge Sources

Attended a lecture

- Yes = 87%
- No= 13%
- No response = 0

Last time attended a lecture

- 1 year or less= 77%
- >1year, < 2 years = 5%
- 2-3 years = 10%
- 4 years or more= 5%
- Never= 3%
- No response = 0

Read a book or article about pressure ulcers

- Yes = 95%
- No= 5%
- No response = 0

Last time read a book or article about pressure ulcers

- 1 year or less= 85%
- >1year, < 2 years = 8%
- 2-3 years = 2%
- 4 years or more = 5%
- Never= 0
- No response= 0

Used the web to find pressure ulcer information

- Yes = 69%
- No= 31%
- No response = 0

Read the AHCPR Pressure Ulcer in Adults Prediction and Prevention Clinical Practice Guidelines

- Yes = 51%
- No= 49%
- No response = 0

Read the AHCPR Treatment of Pressure Ulcers Clinical Practice Guidelines

- Yes = 49%
- No= 49%

- No response = 2%

Overall RN Question Breakdown

RN Questions Breakdown

Questions missed 75% or more of the time

1. It is important to massage bony prominences (Question 5)

2. A stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis (Question 6)

3. Corn starch, creams, transparent dressings (i.e., Tegaderm, Op-site), and hydrocolloid dressings (i.e., DuoDerm, Restore) do not protect against the effects of friction (Question 8)

4. In a side lying position, a person should be at a 30-degree angle with the bed (Question 15)

5. A person who cannot move self should be repositioned while sitting in a chair every two hours (Question 17)

6. Persons who can be taught should shift their weight every 30 minutes while sitting in a chair (Question 18)

7. Stage II pressure ulcers are a full thickness skin loss (Question 20)

8. A low humidity environment may predispose a person to pressure ulcers (Question 23)

9. Eschar is good for wound healing (Question 27)

Questions missed 50% or more of the time

1. Heel protectors relieve pressure on the heels (Question 13)

2. Vascular boots protect the heels from pressure (Question 40)

Questions correct 100% of the time

1. All individuals should be assessed on admission to a hospital for risk of pressure ulcer development (Question 7)

2. An adequate dietary intake of protein and calories should be maintained during illness.

(Question 10)

3. The incidence of pressure ulcers is so high that the government has appointed a panel to study risk, prevention, and treatment (Question 22)

4. Blanching refers to whiteness when pressure is applied to a reddened area (Question 32)

5. All care given to prevent or treat pressure ulcers must be documented (Question 39)

6. The skin is the largest organ of the body (Question 44)

7. For persons who have incontinence, skin cleaning should occur at the time of soiling and routine intervals (Question 46)

8. Educational programs may reduce the incidence of pressure ulcers (Question 47)

Breakdown Correct Response by Individual Question

Pressure Ulcer Knowledge Survey Questions Breakdown Of Correct Response By Question	Correct
1. Stage I pressure ulcers are defined as non-blanchable erythema	93%
2. Risk factors for development of pressure ulcers are immobility, incontinence, impaired nutrition, and altered level of consciousness	98%
3. All individuals at risk for pressure ulcers should have a systematic skin inspection at least once a week	76%
4. Hot water and soap may dry the skin and increase the risk for pressure ulcers	93%
5. It is important to massage bony prominences	55%
6. A stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis	62%
7. All individuals should be assessed on admission to a hospital for risk of pressure ulcer development	100%
8. Corn starch, creams, transparent dressings (i.e., Tegaderm, Op-site), and hydrocolloid dressings (i.e., DuoDerm, Restore) do not protect against the effects	57%

of friction	
9. Stage IV pressure ulcers are a full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structure	98%
10. An adequate dietary intake of protein and calories should be maintained during illness	100%
11. Persons confined to bed should be repositioned every 3 hours.	79%
12. A turning schedule should be written and placed at the bedside	93%
13. Heel protectors relieve pressure on the heels	26%
14. Donut devices/ring cushions help to prevent pressure ulcers	76%
15. In a side lying position, a person should be at a 30-degree angle with the bed	69%

16. The head of the bed should be maintained at the lowest degree of elevation (hopefully, no higher than a 30 degree angle) consistent with medical conditions	90.5%
17. A person who cannot move self should be repositioned while sitting in a chair every two hours	24%
18. Persons who can be taught should shift their weight every 30 minutes while sitting in a chair	7%
19. Chair-bound persons should be fitted for a chair cushion	93%
20. Stage II pressure ulcers are a full thickness skin loss	69%
21. The epidermis should remain clean and dry	98%
22. The incidence of pressure ulcers is so high that the government has appointed a panel to study risk, prevention, and treatment.	100%
23. A low humidity environment may predispose a person to pressure ulcers	59.5%

24. To minimize the skin's exposure to moisture on incontinence, under pads should be used to absorb moisture	81%
25. Rehabilitation should be instituted if consistent with the patient's overall goals of therapy	98%
26. Slough is yellow or creamy necrotic tissue on a wound bed	93%
27. Eschar is good for wound healing	71%
28. Bony prominences should not have direct contact with one another	95%
29. Every person assessed to be at risk for developing pressure ulcers should be placed on a pressure-reducing bed surface	90.5%
30. Undermining is the destruction that occurs under the skin	93%

31. Eschar is health tissue	81%
32. Blanching refers to whiteness when pressure is applied to a reddened area	100%
33. A pressure relieving surface reduces tissue interface pressure below capillary closing pressure	79%
34. Skin, macerated from moisture, tears more easily	98%
35. Pressure ulcers are sterile wounds	81%
36. A pressure ulcer scar will break down faster than unwounded skin	93%
37. A blister on the heel is nothing to worry about	98%
38. A good way to decrease pressure on the heels is to elevate them off the bed	98%
39. All care given to prevent or treat pressure ulcers must be documented	100%

40. Vascular boots protect the heels from pressure	40.5%
41. Shear is the force which occurs when the skin sticks to a surface and the body slides	98%
42. Friction may occur when moving a person up in bed	100%
43. A low Braden score is associated with increased pressure ulcer risk	90.5%
44. The skin is the largest organ of the body	100%
45. Stage II pressure ulcers may be extremely painful due to exposure of nerve endings	86%
46. For persons who have incontinence, skin cleaning should occur at the time of soiling and routine intervals	100%
47. Educational programs may reduce the incidence of pressure ulcers	100%

Comparison of Results to Other Locations

Comparison of First Time Test Takers

Percentage Score	Rural (N=110)	Urban (N=848)	VA (N=39)
	78%	79%	82.45%

Attended a lecture	Rural	Urban	VA
Yes	58%	67%	87%
Read an article			
Yes	77%	83%	95%
Used the web for information			
Yes	21%	42%	69%
Read the AHCPR Pressure Ulcer in Adults Prediction and Prevention Clinical Practice Guidelines			
Yes	24%	30%	51%
Read the AHCPR Treatment of Pressure Ulcers Clinical Practice Guidelines			
Yes	24.5%	33%	50%

Figures

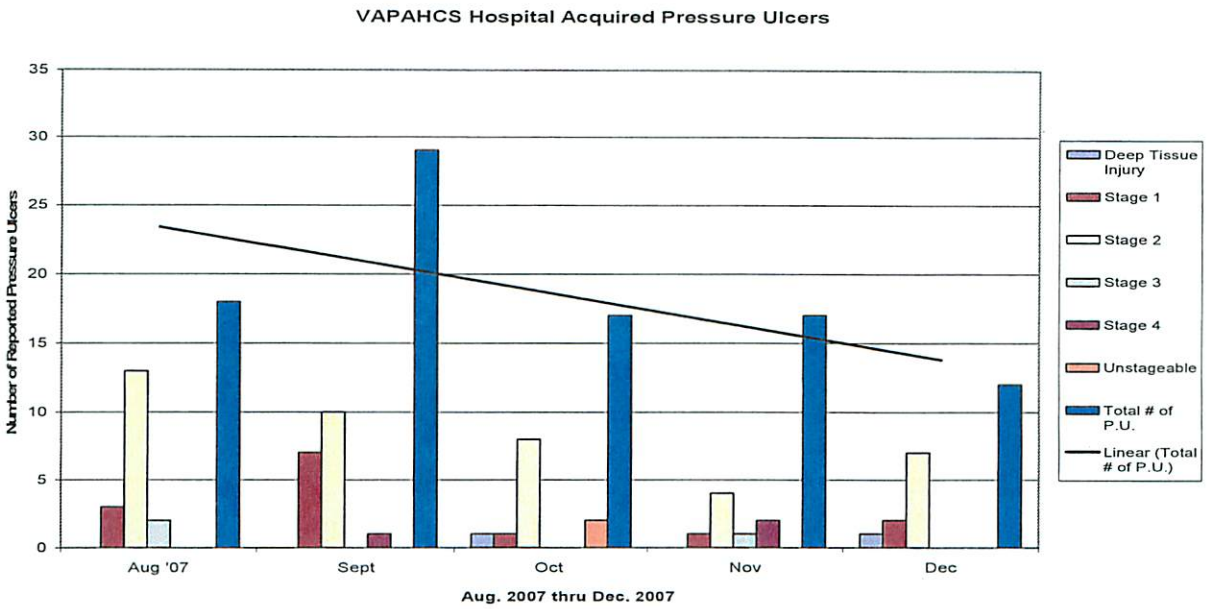

Figure I. VAPAHCS hospital acquired pressure ulcers.

Analysis: As noted above, the downward trend in the number of newly developed pressure ulcers reported may be due to the interventions implemented to reduce variation. Please note that some pressure ulcers may have originated in a unit other than the reporting unit as this was not clearly indicated on the worksheet (area for improvement). (Also, September may represent improved detection of pressure ulcers as evidenced by the September spike).

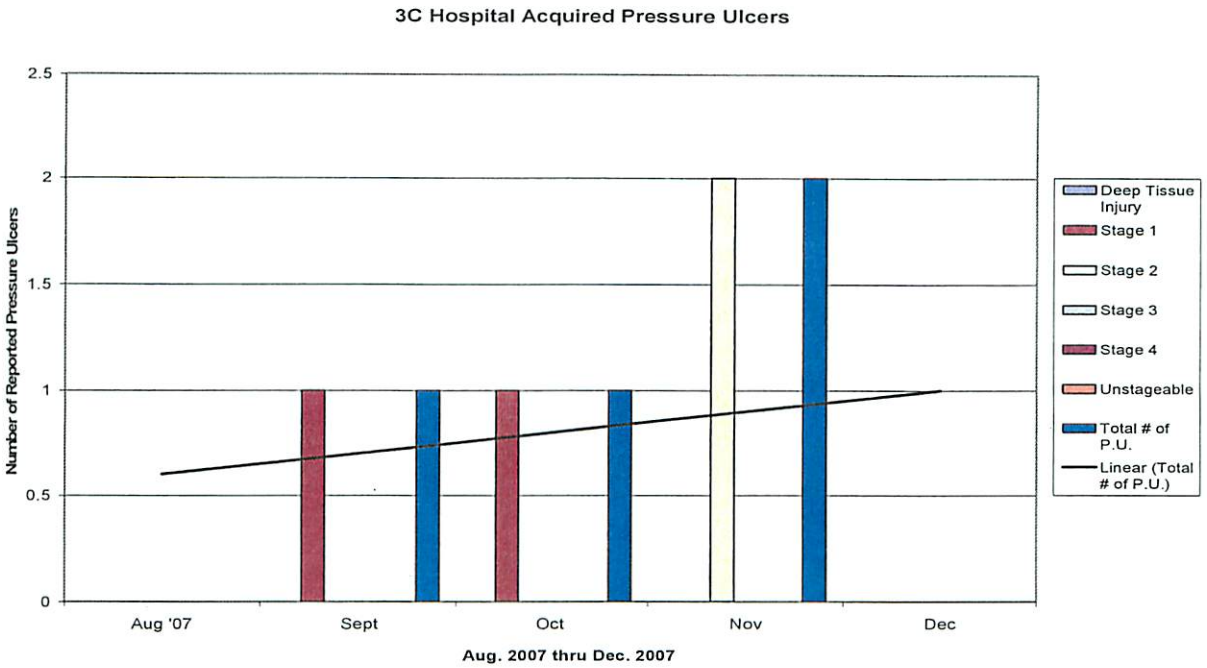

Figure II. GM&S 3C hospital acquired pressure ulcers.

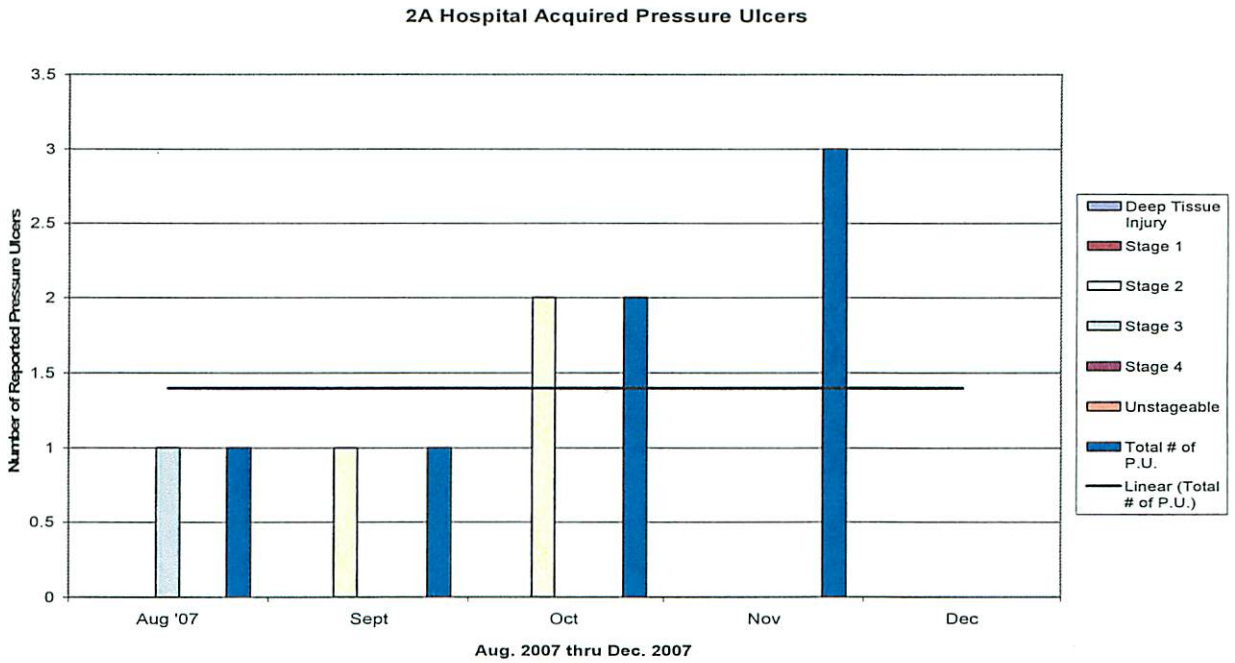

Figure III. GM&S 2A hospital acquired pressure ulcers.

Analysis: Data collected for 2A is incomplete; staging for pressure ulcers will be reflected at a later date.

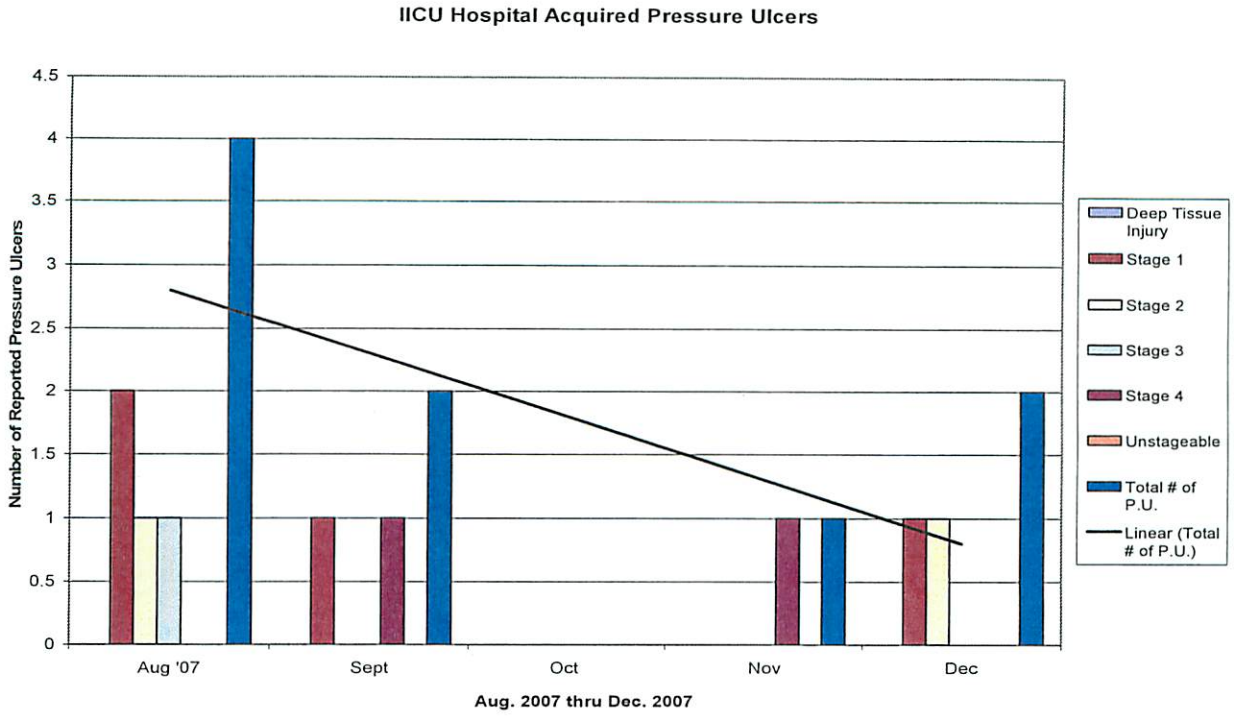

Figure IV. Critical Care IICU hospital acquired pressure ulcers.

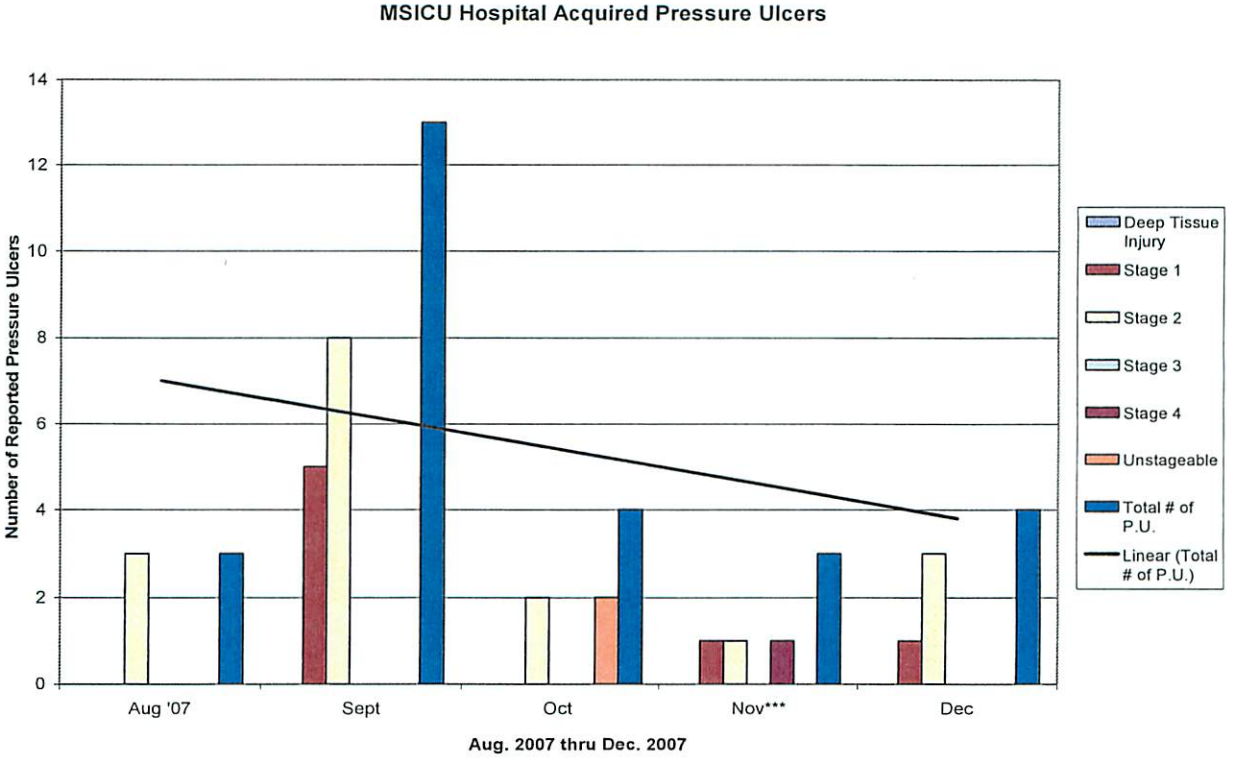

Figure V. Critical Care MSICU hospital acquired pressure ulcers.

Analysis: The Critical Care Units had a higher than expected incidence rate for newly developed pressure ulcers. The rates reported by the California Nursing Outcomes Coalition (CalNOC) are used as a benchmark. Within the Critical Care area, the incidence of pressure ulcers is reportedly higher in the MSICU than in the IICU. The underlying reason for this high incidence is believed to be related to unstable hemodynamics (reducing the ability to turn patients without patient deterioration). Restrictive mobility is another factor. Poor nutrition, friction, shearing, and moisture related to compromised condition contribute to incidence rate also.

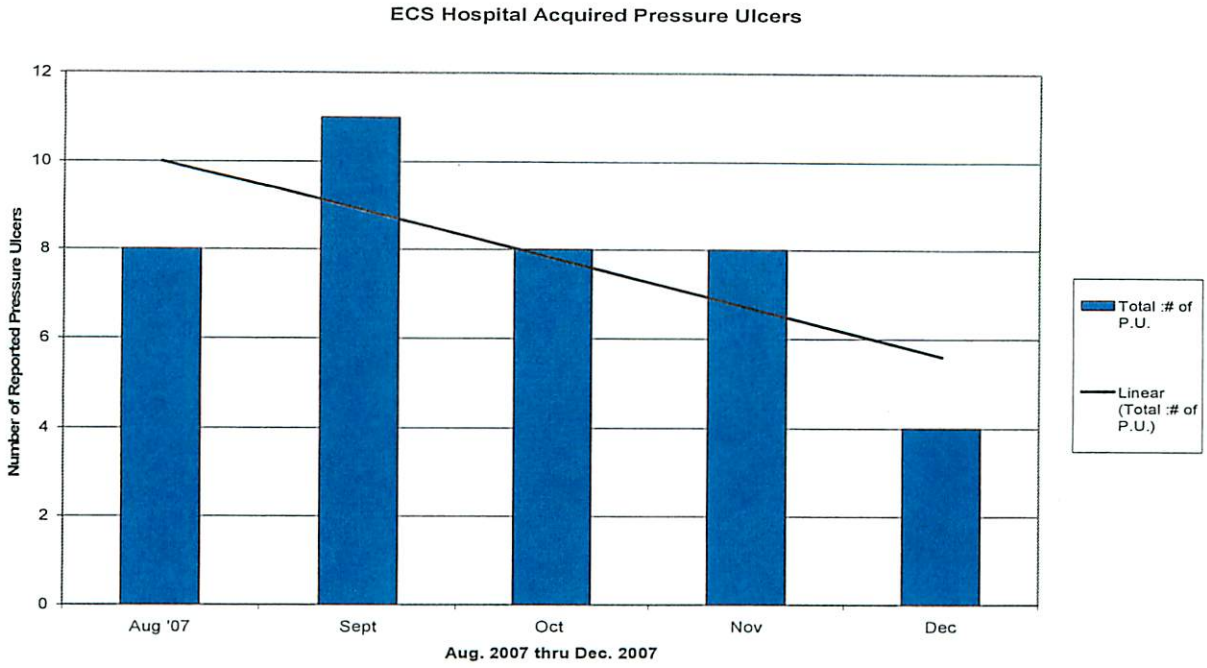

Figure VI. LTC or ECS hospital acquired pressure ulcers.

Analysis: Extended Care Services consists of 3 divisional sites: PAD, LVD, and MPD. Overall, this service is consistently below VISN 21 and national prevalence rates for pressure ulcers based on MDS quality improvement. The Hospice unit is located at PAD and has a higher incident rate than the other units within ECS. The major contributor to the high incidence is thought to be related to the terminal status of the patient's illness. Restrictive mobility related to terminal illness may be another factor. Diminished will/motivation, poor nutrition, friction, shearing, and moisture related to condition are contributing factors. Note: MDS is currently working on matching staging with VANOD staging

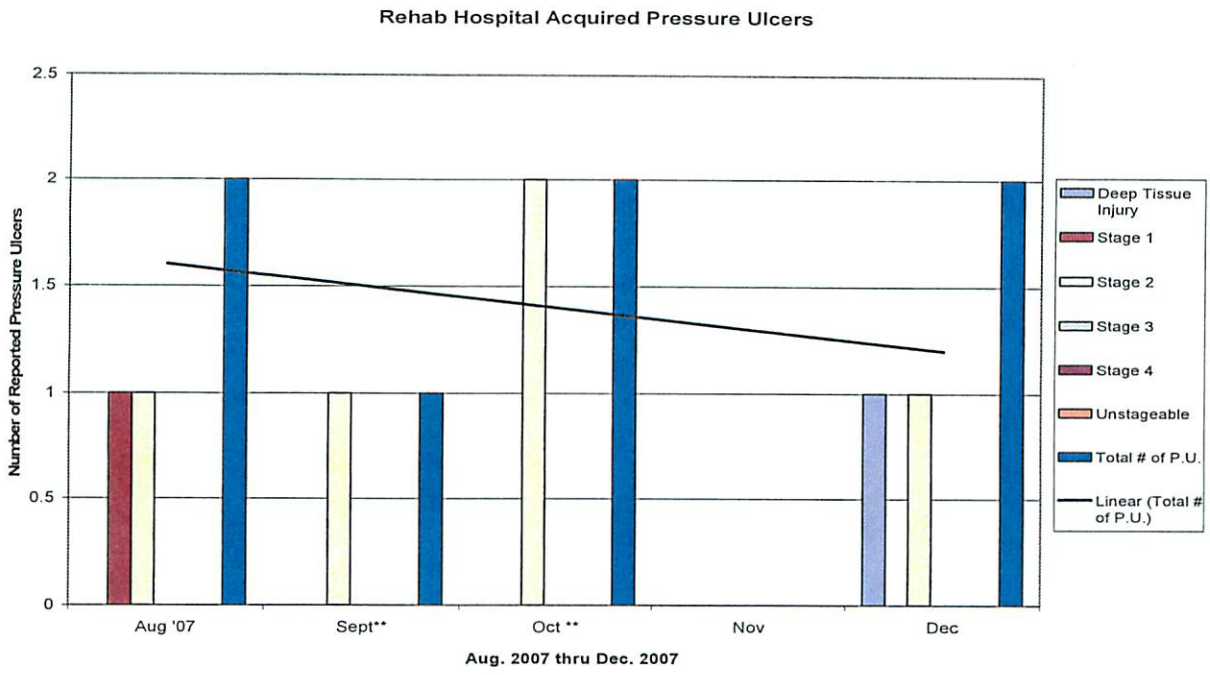

Figure VII. Rehabilitation Services hospital acquired pressure ulcers.

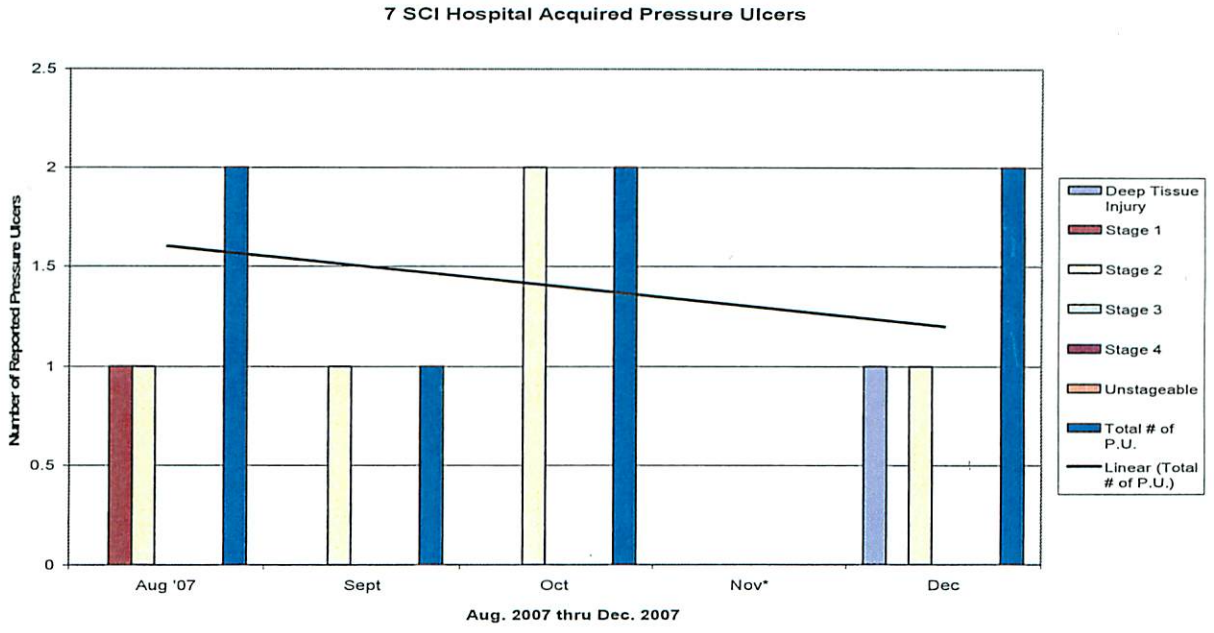

Figure VIII. Rehabilitation Services 7 SCI hospital acquired pressure ulcers.

Analysis: A Clinical Nurse Specialist who specializes in Wound Care provides excellent patient care and education to the Rehabilitation area. The relatively low number of incidence of newly developed pressure ulcers reported may be due to this factor. The reported pressure ulcers may have developed due to friction, shearing, pressure related to inability for patient to move or adjust body while sitting up in a chair or on a commode, bowel contamination, compliance, insensate and unknown reasons.