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# Healing Wounds Through Nutrition

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Healing Wounds Through Nutrition

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### Abstract

The role of nutrition in wound care is often overlooked. The main reasons why wounds fail to heal are malnutrition, infection, impaired organ function due to co-existing diseases such as diabetes, hypertension, renal disease, and peripheral vascular disease to name a few. These factors have contributed to poor patient outcomes and patient satisfaction, as well as an increase in hospital length of stay. To promote wound healing, fuel from macro and micronutrients are necessary to deliver oxygen and energy for cell regeneration. However, nurses must possess knowledge and understanding of these requirements and the effects of nutrition on wound healing to improve quality of care. In recognition of this need, educational sessions on nutrition and wound healing were planned using problem based learning as a teaching strategy.

Continuous professional development (CPD) is necessary to produce spread of changed work practices, resulting in local and eventually system wide improvement. Optimum nutrition has been shown to improve wound healing outcomes, especially for those who are at risk for impaired healing. Therefore, increasing nursing knowledge will allow them to gain the skills necessary to apply evidence based care that produces high quality outcomes.

*Key Words: wound care, malnutrition, nursing education, dietitian, older people, elderly, pressure ulcers, nutrition, synergy model, continuous professional development, Kirpatrick model, outcome measures, quality improvement.*

## Healing Wounds Through Nutrition

### **Description of the Problem**

The effects of poor nutrition on wound care healing outcomes has contributed to delayed discharge and affected readmission rates within the microsystem in which I am completing my project. Patients treated at the hospital are often either malnourished or overweight due to lack of resources to maintain a healthy diet. Consequently, these patients are at greater risk for impaired wound healing and infection. The results of a prevalence study conducted earlier this year shows that the length of hospital stay is tri-modal, where 16% of patients stay less than 3 days, 22% stay between 4-7 days, and 42% are admitted for 30 days or more. Of these patients, 40% were underweight, 40% obese, and 20% of the patients were within normal weight. The quality gap identified was that nurses lack knowledge about the relationship between nutrition and wound healing.

Reliance on clinical signs or lab testing to assess nutritional index alone is not adequate as they are often affected by acute illnesses, rather than chronic wound healing. By enhancing nursing knowledge, nurses will be able to help ensure that the appropriate nutritional care is identified early on. Therefore, it is important to increase nursing knowledge about the wound healing process and how injury and infection undermine the process (Leininger, S., 2002).

Nurses must understand the role of nutrition on wound healing so they can identify and suggest interventions which affect the healing process.

### **Available Knowledge**

Nutrition plays an important role in wound healing and is an area that is often overlooked in the wound care patient (Rabess, 2015). In 2009, it was reported that there are 41,000 food insecure adults among low- income households who are at risk for malnutrition or obesity (San

Mateo County Food System Alliance, 2014). According to the 2013 San Mateo County Community Health Needs Assessment, 55.4% of survey respondents are overweight, 10% of the adult population has diabetes, and 85.4% of adults exhibit at least one cardiovascular risk factor. Evidence-based data shows that optimum nutrition is a key factor in “all phases of wound healing” (Rabess, 2015). While malnutrition is a concern for wound healing, those with increased body mass index (BMI) are also at risk (World Health Organization, 2004). Malnutrition impairs the healing process of wounds, which is why it is essential for nurses to understand the effect of nutrition on wounds. The Agency for Health Care Policy and Research (AHCPR) clinical guidelines provide recommendations for nutritional assessments and pressure ulcer management and should be used to ensure that nutritional deficiencies are addressed (Agency for Healthcare Research and Quality, 1994).

### **Nursing Relevance**

The data suggests an area of opportunity for nurses to improve the quality in wound outcomes and care across the continuum. Thus, the focus of the quality improvement project is to educate nurses working on the medical surgical unit on the nutritional requirements for wound healing. It is important to increase nursing knowledge about the wound healing process and how injury and infection undermine the process so they can identify at risk patients at the early stages of treatment and suggest interventions which affect the healing process. (Leininger, S., 2002). Improving nursing knowledge about the impact of nutrition on wound healing is essential to improve wound healing outcomes. After completion of the educational course, nurses on the unit will gain a greater understanding of the physiologic and immunologic factors that affect wound healing.

### **PICOT**

How does nursing education on wound care healing and nutrition compared to no education affect wound healing outcomes for patients on the medical surgical unit and hospital length of stay?

### **Synthesis of Literature**

Cartwright (2002) describes the relevance of nutrition in wound healing and the importance of improving nutritional intake to improve the quality of care. The author illustrates that nutritional screening is a patient-focused clinical practice that is a nursing responsibility and a fundamental aspect in the holistic care of patients with healing wounds. Using nutritional screening tools are helpful in obtaining a quantitative assessment to identify patients who are at risk for impaired nutrition. According to Leininger (2002) proper nutrition is necessary to promote wound healing throughout the three stages of wound healing: inflammatory, proliferation, and remodeling. Predisposing factors must also be considered and the relationship between the demographic and physiologic differences of acute and chronic wound patients (Molnar, Underdown, & Clark, 2014). Gaining a basic understanding on the value of specific supplementation of macronutrients and micronutrients necessary for wound healing and nurses must understand the impact of nutritional deficiencies to advocate for patients and ensure they receive proper interventions. Quain & Khardori (2015) states that the role of nutrition is often overlooked in wound care patients and stresses that the cause of poor wound healing is multifaceted, with many nutritional components playing a variety of roles in wound healing. Suboptimal nutrition can alter immune function, synthesis of collagen, and wound tensile strength. Although wounds should not be treated equally, nutrition is a common denominator for all wound patients.

### **Rationale**

Nutrition plays an important role in wound healing and is an area that is often overlooked in the wound care patient (Rabess, 2015). In the microsystem for this project, we have found the need to improve (1) staff knowledge, (2) quality of care, and (3) patient satisfaction. To qualify as an Evidence-based Change in Practice Project, rather than a research project, the criteria outlined in the United States (US) Department of Health & Human Services federal guidelines will be used. This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (see appendix A).

### **Theoretical Framework**

The conceptual framework of the American Association of Critical Care Nurse's (AACN) synergy model (SM) for patient care will guide a review of the evidence by identifying competency strengths and areas for professional development to optimize patient outcomes (Deborough, 2012). There is a growing body of evidence indicating that successful application of the model to current practice is cultivated by gaining an understanding of three components: the relationship between patient needs or characteristics, patient perception of the importance of nurse competencies, and environmental factors that affect synergy (MacPhee, Wardrop, Campbell, Wejr, 2011). Synergy is accomplished when the needs and characteristics of a patient or health care environment corresponds with a nurse's competencies pertaining to the nutritional demands for wound healing (Kaplow, 2008).

The basic premise of the synergy model (SM) provides a unifying framework for the development and implementation of an innovative approach to professional nursing and patient care (Gralton & Brett, 2012). It is a mechanism for evaluating the needs of patients and families as well as the level of care they require. The model objectively quantifies eight patient characteristics: resiliency, vulnerability, stability, complexity, resource availability, participation

in care, participation in decision making, and predictability (Kaplow, 2003) and eight nurse competencies that influence patient outcomes.

The Continuous Professional Development (CPD) model consists of six steps: identify a problem; perform a needs assessment to identify the problem; set goals and objectives according to the needs; select educational strategies; implement; evaluate; and obtain feedback on the program (see appendix C). According to this model, performance gaps result due to lack of knowledge. Thus, the focus of CPD is to maintain, develop, and enhance skills, knowledge, and performance of healthcare professionals to improve patient outcomes and systems of care (Sargeant et al., 2017).

The Kirkpatrick model of evaluation was used as a tool to evaluate the effectiveness of the teaching plan, which suggests four levels of evaluating an educational course: Reaction, Learning, Behavior, and Results (Lawler, 2017). The effectiveness of the educational course will be measured qualitatively through participant and supervisor surveys as well as post test scores to determine the participant's reaction to the training session, obtain direct feedback, and assess the knowledge gained from the education. The impact on reducing hospital length of stay will be measured within the next few months as it requires data that must be collected after a longer period of time to better assess the impact of the education provided on patient outcomes.

### **Aim of Project**

We aim to provide all nurses on the medical surgical unit with knowledge to incorporate evidence based practice in meeting nutritional requirements for patients and the benefits of wound healing. A general knowledge of the health benefits should be given to nurses in the medical surgical unit to allow them to improve their nursing knowledge about the impact of nutrition on

wound healing. This is a key skill to ensure that at risk patients are identified at the early stages of treatment to improve wound healing outcomes.

The process begins with several planned didactic sessions to review the importance of nutrition in the various stages of wound healing holding. The educational sessions will be offered within a one month time frame to ensure that all nurses have the opportunity to attend. Upon completion, the nurses will be provided with a post-test to assess the knowledge gained and competency. By working on this process, we expect (1) improved outcomes for wounds healing (2) a reduction in hospital length of stay, readmissions for those with wounds, and (3) an improved flow of consistent information between interdisciplinary team members, patients, and their families.

### **SWOT Analysis**

An analysis on the strengths, weaknesses, opportunities, and threats (SWOT) (see appendix B) was conducted to determine whether this intervention plan is feasible and aligned with the organizational goals. The main strengths identified were training opportunities, availability of resource nurses on the unit, regular multi-disciplinary team meetings, and augmented care to meet the needs of patients. These strengths are substantial because they could impact the quality of patient care and learning environment for the nurses. Some of the weaknesses that should be considered are inconsistent nursing knowledge pertaining to wound care and nutritional requirements for healing, resulting in delays in treatment intervention, as well as patient compliance with prescribed diet. Therefore, there is an opportunity to enhance nursing education on the relationship between nutrition and wound healing. Increasing nursing knowledge on the impact of nutrition will help support implementation of best practices for healing, decrease hospital length of stay, increase patient satisfaction, and improve outcomes.

Threats include various levels of learning for the training participants and limited time for each educational session.

### **Intervention**

The use of problem-based learning (PBL) modules or scenarios is an effective teaching strategy that promotes active learning. PBL is a teaching tool that heightens awareness of incivility that occurs in nursing practice and the impact of patient care. This teaching strategy helps to address the gap between what is learned in a classroom setting and real life situations in the workplace (Yew & Goh, 2016). PBL is a tool that is widely used in clinical and classroom settings, which allows students to experience real-life situations encountered in professional practice and the opportunity to apply problem solving techniques to evaluate situations they may experience in a safe learning environment. PBL is a teaching strategy that engages students in finding meaningful solutions to ill-structured problems such as bullying. This teaching method allows the nurse educator to determine what the student knows and areas in which further education is needed (Yew & Goh, 2016). The training and education will be conducted using PBL methods through power point and distribution of written materials in one unit based class for each nurse. Each class will consist of PBL simulations that are 4 hours long. Each course will include an interactive presentation on nutrition and wound healing.

### **Outcome Measures**

The goal of the educational sessions is to promote healing through nutrition by use of spread to improve quality of care. Spread is driven by specific improvements in a microsystem which expands across the system (IHI, n.d.). In order to replicate best practices, skilled and knowledgeable nurses that are supported with CPD are necessary to produce spread of changed work practices, which will eventually result in spread of optimal results (Slaghuis, Strating, Bal

& Nieboer, 2013). Because there are no valid instruments to test the effectiveness of the outcome measure (Slaghuis, Strating, Bal & Nieboer, 2013) spread of work practices and results will be measured qualitatively through pre and post tests to determine the participant's reaction to the course, gain direct feedback, and assess their knowledge pertaining to the nutritional requirements for wound healing. Participant application of the strategies learned and the intrinsic or extrinsic rewards after the course would also be great to assess and can be obtained through a survey completed by the direct supervisor.

### **Ethical Considerations**

Pieper (2009) conducted a literature review of available data pertaining to societal factors such as race/ethnicity, immigration, health insurance, and literacy which affect the provision of optimal healthcare. The literature shows that disparities continue to exist in vulnerable populations and is an issue that must be addressed to ensure that equitable care is accessible to all. The author discusses the physical and psychological concerns and the need for collaboration between clinicians, community, and federal agencies to enhance access to necessary services.

The ethical dilemma that nurses and health care providers face arises from balances between beneficence and non-maleficence. As a nurse or health care provider, it is important to advocate for the safety and welfare of the patient and deliver care that provides the most benefit. Therefore, nurses should be committed to veracity and fidelity to the patient (American Nurses Association [ANA], 2015) and maintain lifelong learning to apply current evidence practices that result in quality patient care.

### **Results**

While conducting a root cause analysis (RCA) of the microsystem, some of the problems identified were lack of collaboration between nurses and dietitians, lack of nursing knowledge

pertaining to the relationship between nutrition and wound healing, the measuring scales were not always functional, and delays in treatment due to inconsistent identification of risk factors with nursing assessments (see Appendix D for the fishbone diagram of the RCA). The strengths include the support of management to provide education, availability of resource nurses, and opportunity to include nutritional requirements for wound care patients in multidisciplinary team meetings (see Appendix B for the SWOT analysis diagram).

A cost benefit analysis was performed and based on an average of 4 patients admitted for 30 days or more per month for 12 months, the yearly cost savings would be \$271, 346 including the costs for nursing education on the unit (see Appendix I). The plan do study act (PDSA) problem solving model was used to carry out the quality improvement project (see Appendix G for PDSA process map). In cycle one, a joint action plan with the unit managers, wound care nurse, and nurse educator was discussed. It was suggested that the best approach is to incorporate a problem based learning method to provide the necessary education. Cycle two involved the design of evaluation methods such as satisfaction surveys, post test questions, and the content covered in the class. Three educational classes were offered in cycle three and the evaluation tools were reviewed for improvement. Finally, in Cycle 4 the learning content was modified according to the level of learning data obtained feedback received from satisfaction surveys. Successively, the last 3 sessions offered were completed.

After reviewing the information collected through each method of measurement, the results for Reaction, Learning, & behavior exceeded our goal of 85% for each area. Though the participants provided feedback for improvement, they were 100% satisfied about the learning experience. The average post test scores were 90% and direct supervisor observational surveys indicated that the content learned was applied 90% of the time. The results pertaining to

improvement in decreasing hospital length of stay is an ongoing process and will be measured within the next few months (see appendix G for the measures, measurements, goals and results table).

### **Conclusion**

Studies show that optimum nutrition is a key factor in all phases of wound healing. Malnutrition and obesity are risk factors that impair the healing process. Furthermore, appropriate nutritional support is linked with shorter lengths of stay, improvement in quality of life, and cost effective service delivery. Nurses have the opportunity to improve patient wound healing outcomes by gaining knowledge and understanding of the effect of nutrition on wound healing. Due to the unique characteristics of each patient, wounds should not be treated equally. Thus, continuous professional development is necessary to foster best practices for wound management and ability of the nurse to identify patient risks and implement interventions early on.

Changes that can be made to improve healing outcomes is to offer continuing education about the nutritional requirements for wound healing, improve nutritional assessments for those with wounds, and close collaboration with dietitians and other members of the team. Implementation of these changes augments the current processes for wound assessments and can prevent complications that result in longer lengths of hospital stay. Through this quality improvement project, nurses were provided with education on wound healing and nutrition to supplement the learning of those who do not have any knowledge on the subject. Competency was assessed using pre and post-tests with a follow up survey completed by the unit managers after three months. The results show that the nurses gained the knowledge necessary to improve the quality of care delivered and applied the skills 90% of the time. Though these results are promising, there is opportunity for further research as to whether synergy was achieved.

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## Appendix A

**EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST**

**Instructions: Answer YES or NO to each of the following statements:**

<b>Project Title:</b>	<b>YES</b>	<b>NO</b>
Importance of Nutrition in Wound Care Healing and Early Nursing Intervention		
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	√	
The specific aim is to improve performance on a specific service or program and <b>is a part of usual care</b> . ALL participants will receive standard of care.	√	
The project is <b>NOT</b> designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does <b>NOT</b> follow a protocol that overrides clinical decision-making.	√	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does <b>NOT</b> develop paradigms or untested methods or new untested standards.	√	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does <b>NOT</b> seek to test an intervention that is beyond current science and experience.	√	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	√	
The project has <b>NO</b> funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	√	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., <b>not</b> a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	√	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: <i>“This project was undertaken as an Evidence- based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</i>	√	

**ANSWER KEY:** If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does **NOT** meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files. If the answer to **ANY** of these questions is **NO**, you must submit for IRB approval.

\*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

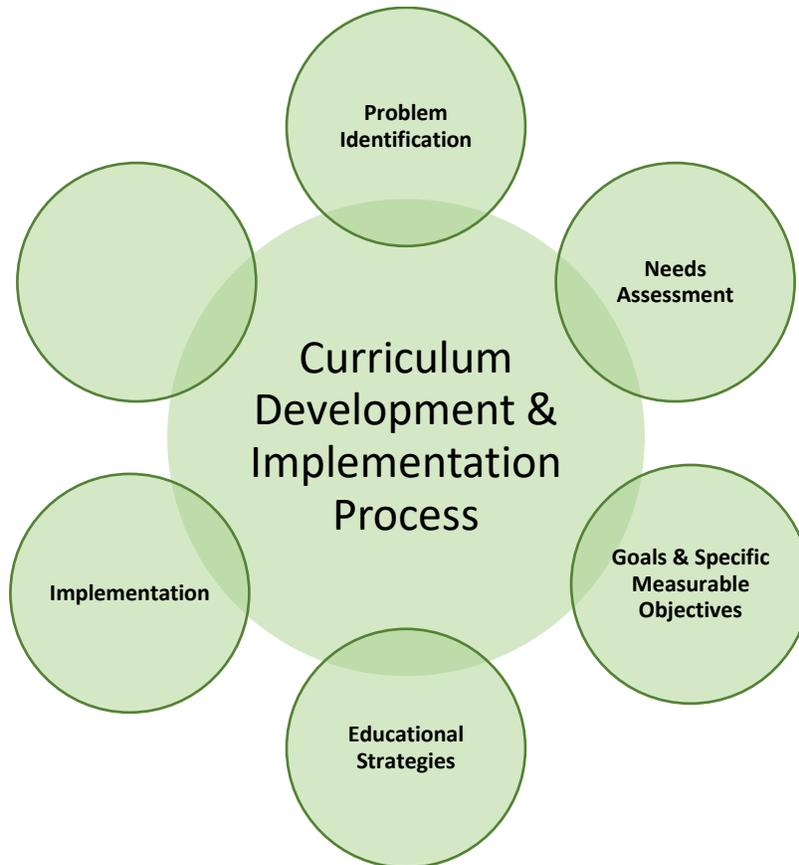
Appendix B

SWOT Analysis



Appendix C

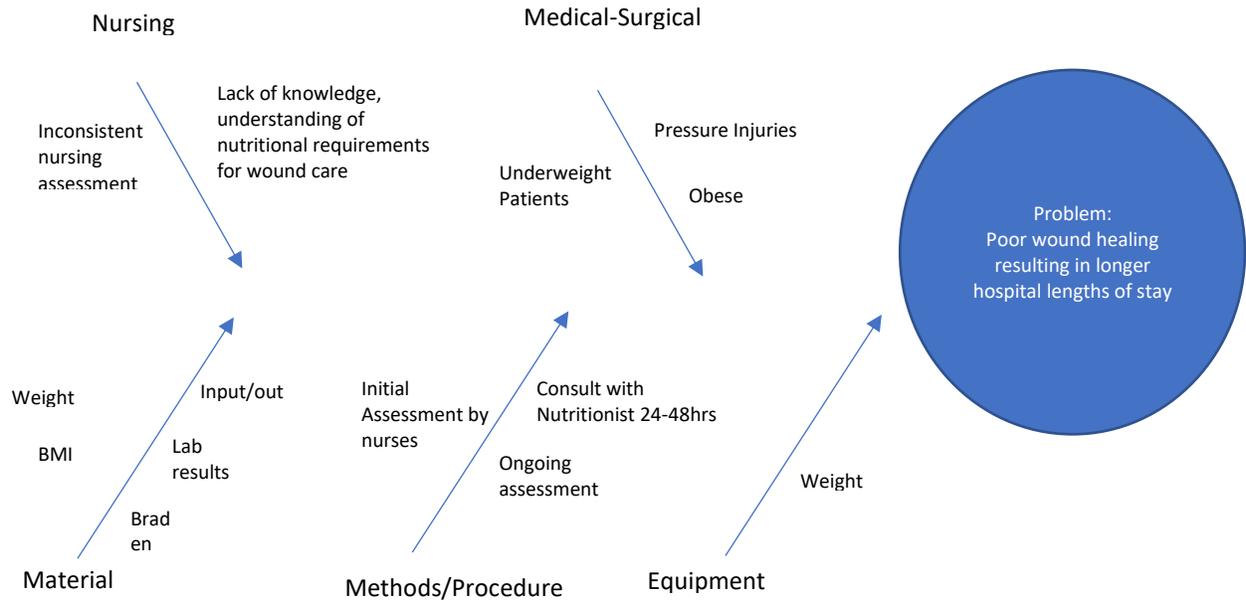
Continuous Professional Development Framework Based on Kern's Curriculum Design Model



Sargeant, J., Borduas, F., Sales, A., Klein, D., Lynn, B., Stenerson (2017).

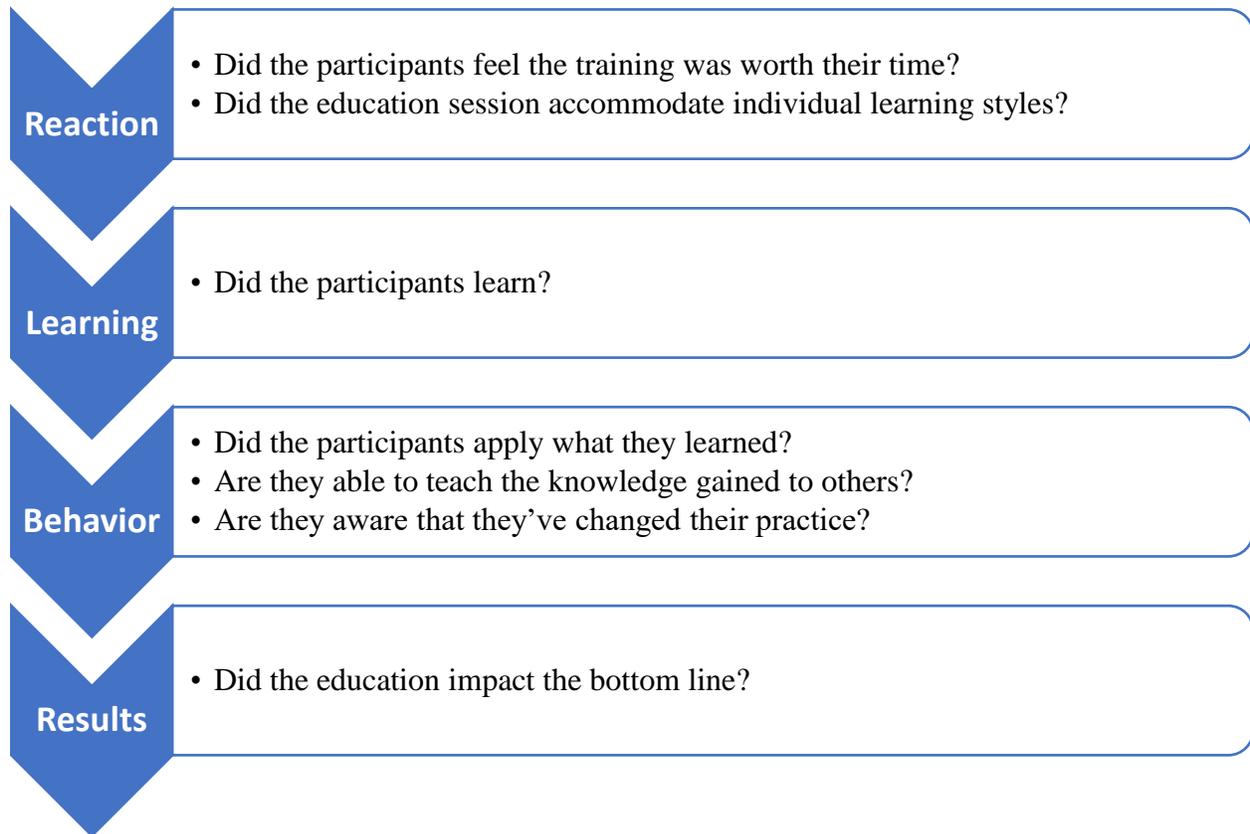
Appendix D

Root Cause Analysis (RCA)

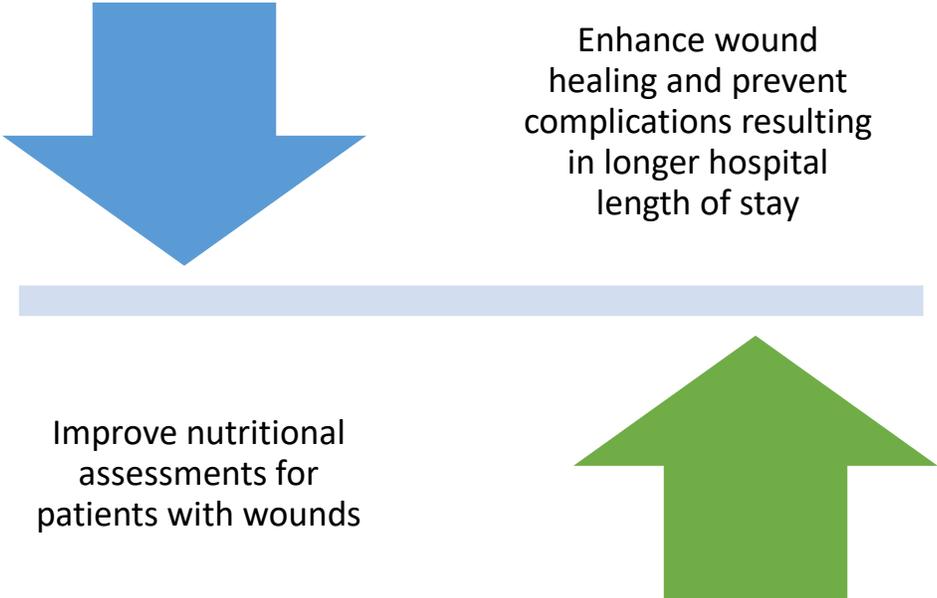


## Appendix E

## The Kirkpatrick Model of Evaluation

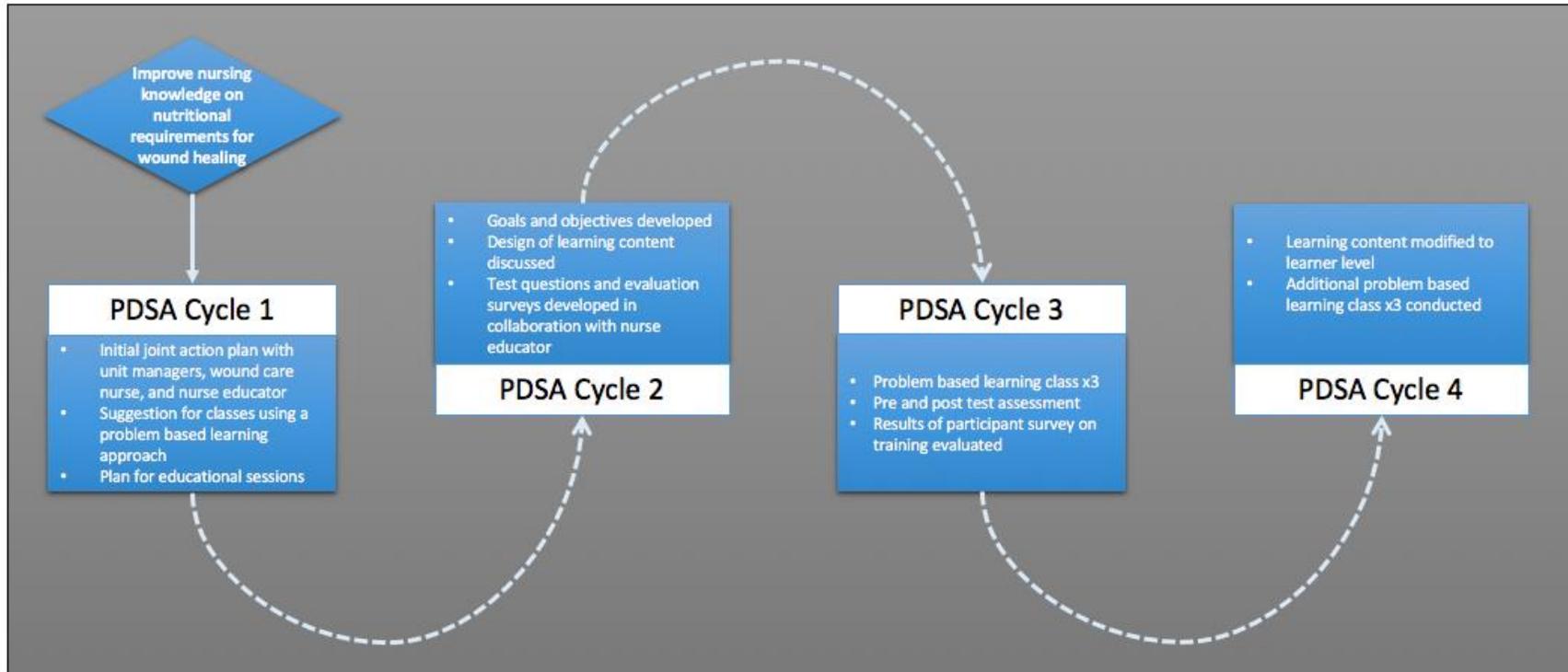


Appendix F  
Driver Diagram



Appendix G

PDSA Process Map



Appendix H

Measures, Measurements, Goals, and Results

<b>Measure</b>	<b>Measure Definition</b>	<b>Measurement</b>	<b>Goal</b>	<b>Result</b>
Reaction	Was it a valuable experience?	Employee satisfaction survey	85%	100%
Learning	Did they learn?	Pre and post test	85%	90%
Behavior	Did they apply what they learned?	Survey completed by direct supervisor	85%	90%
Results	Did it impact the bottom line?	Measurement of before and after hospital length of stay for the studied population	30% (12% reduction in hospital length of stay $\geq$ 30 days)	Ongoing

Appendix I  
Cost Benefit Analysis

<b>Cost Benefit of Reducing Hospital Length of Stay</b>								
		#of Staff	Hours per Staff	Total Hours	Hourly Rate	Hourly Salary	Benefits	Total Amount
Nurses education		75	1.5	112.5	\$60.00	\$6,750.00	1.4	\$ 9,450.00
CNL		1	220	220	\$75.00	\$16,500.00	1.4	\$ 23,100.00
Supplies								\$1,000.00
Project Implementation Cost								\$ 33,550.00
	Average Cost for Wound Care			Average Wound Care Patients Admitted >30 days per month		# of Months		
	\$6,352			4		12		\$304,896.00
Yearly Cost Savings								\$ 271,346.00