

St. Catherine University

**SOPHIA**

---

Doctor of Nursing Practice Projects

Nursing

---

5-2011

## Wound Care Referral Algorithm

Luciana T. Arntson  
*St. Catherine University*

Follow this and additional works at: [https://sophia.stkate.edu/dnp\\_projects](https://sophia.stkate.edu/dnp_projects)

---

### Recommended Citation

Arntson, Luciana T.. (2011). Wound Care Referral Algorithm. Retrieved from Sophia, the St. Catherine University repository website: [https://sophia.stkate.edu/dnp\\_projects/10](https://sophia.stkate.edu/dnp_projects/10)

This Doctor of Nursing Practice Project is brought to you for free and open access by the Nursing at SOPHIA. It has been accepted for inclusion in Doctor of Nursing Practice Projects by an authorized administrator of SOPHIA. For more information, please contact [sagray@stkate.edu](mailto:sagray@stkate.edu).

WOUND CARE REFERRAL ALGORITHM

Systems Change Project

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

St. Catherine University

St. Paul, Minnesota

Luciana Tavares Arntson

May 2011

ST. CATHERINE UNIVERSITY

ST. PAUL, MINNESOTA

This is to certify that I have examined this

Doctor of Nursing Practice systems change project

written by

*Luciana Tavares Arntson*

and have found that it is complete and satisfactory in all respects,

and that any and all revisions required by

the final examining committee have been made.

Graduate Program Faculty

\_\_\_\_\_  
Gay Varecka

Name of Faculty Project Advisor

\_\_\_\_\_  
Date

DEPARTMENT OF NURSING

### Abstract

The purpose of this study was to develop a wound care referral algorithm for primary providers at a Long Term Acute Care Hospital, and the use of this algorithm to increase the prompt referrals of patients with complex wounds to specialty care by 10%. This study used a model of program evaluation called objective-based evaluation, in which the objectives were evaluated by the creation and use of a wound care referral algorithm in a laminated card and tracking the number of referrals to the Wound Nurse Practitioner in a tracking log. The data analysis was the evaluation of the raw number of referrals made to the Wound Care Nurse Practitioner before and after the use of the wound care referral algorithm. A referral algorithm was created and implemented, a tracking log used to measure the number of referrals made to Wound Nurse Practitioner, but the number of referrals did not increase by 10%. However, the use of an algorithm proved to be a best practice that helped define the appropriate use of resources, human and otherwise.

## Systems Change Project: Wound Care Referral Algorithm

### Background

Major strides have been made regarding the treatment of patients with chronic illnesses, including skin care and chronic wounds. Yet, nearly 1% of the general population and 3.5% of elders (over age 65) have venous ulcers and an estimated two and a half million people with diabetes will develop a foot ulcer in their lifetimes (Bluestern, & Javaheri, 2008). Primary providers for the chronically ill patient have a gap in knowledge regarding the care and treatment of chronic wounds and are not familiar with the available resources. This primary provider lack of knowledge results in “added healing time, pain, infection and need for debridement” (Beitz, Fey & O’Brien, 1998, p.265); therefore, less than ideal care for the patient with a chronic wound, because “most often physician’s involvement in wound management has been dependent on the individual physician’s level of interest” (Bryant & Nix, 2007, p.25). This lack of involvement on the part of the primary provider usually leads to a delayed diagnosis and treatment of chronic wounds and underutilization of wound care specialty services. These delays result in increased pain and discomfort for the patient, and increased financial costs such as hospitalizations, increased length of stay, delayed treatment, and the use of more costly treatment modalities (Beitz, et al., 1998).

In the past ten years, there has been an increased awareness of the difficulties in treating patients with complex wounds. Worldwide multidisciplinary teams - also called wound care teams- have been created to treat these patients. Wound care teams are available to help support the care of complex patients with chronic wounds and offer, “evidence-based wound management, control of wound related costs and quality improvement activities” (Bryant & Nix, 2007, p.25).

Wound care teams vary in their membership from facility to facility. Some facilities include as members: the “ medical director, certified wound care nurse, physical therapist, nurse manager, dietician, social worker, utilization review specialist, occupational therapist, speech therapist” (Bryant & Nix, 2007, p.29). In this Systems Change Project (SCP), the wound care team is comprised of the wound care Nurse Practitioner/ Certified Wound, Ostomy and Continence Nurse, general surgeon and a plastic surgeon. All other specialties mentioned above are available, and are consulted on a need basis.

At the long-term acute care (LTAC) hospital where this project was implemented, in order to take advantage of the wound care team’s knowledge, referrals were needed to be initiated by the primary providers, asking the wound care specialists to help treat their patients with complex and chronic wounds. Ideally, referrals will occur early in the care cycle, soon after admission, and immediately after the identification of a patient’s wound, which unfortunately does not always happen at admission. Therefore, the primary care provider needs to be alert to the presence of chronic wounds and able to identify such wounds. A wound care referral algorithm can be a useful tool in the hands of a primary provider. No such a tool can be found in the literature.

The purpose of this SCP was to develop and evaluate a wound care referral algorithm (WCRA) for primary providers at a long-term acute care hospital. In addition, “clinicians have a moral and ethical responsibility as patient advocates in optimizing the treatment plan and promoting the prevention of chronic, non-healing wounds” (Hall & Schumann, 2001, p.265).

The expected outcome of this SCP was that the use of this algorithm would increase the number of prompt referrals of patients with complex and/or chronic wounds to the wound care team. This increase in referrals will eventually reduce the morbidity and mortality of the patients

with complex wounds. An increased number of referrals of patients with complex and/or chronic wounds to the wound care team will also help decrease health care costs due to better utilization of resources, because otherwise “untrained individuals will make the treatment –availability/ cost effectiveness judgments” (Bolton, Van Rijswijk, & Shafer, 1996,p. 30). This “responsible stewardship strengthens the covenant between human beings and the environment” (Kalb, 2009).

### **Project Objectives**

- Creation of a wound care referral algorithm for primary providers that includes identification, categorization, and appropriate referral guide for the wound care team.
- Use of the wound care referral algorithm as a tool to increase the number of appropriate referrals to the wound care team by ten percent.

### **Theoretical Sources Guiding Project**

This SCP took place in a long-term acute care setting in which the patient population has multiple complex needs, including chronic wounds. A variety of specialties must interact and collaborate for comprehensive care of these patients, with Nurse Practitioners (NPs) being used as providers of specialty care. According to nurse theorists Litchfield and Jonsdottir (2008), advanced practice nurses within specialty fields and practices are often heavily influenced by the medical model of assessment-diagnosis-prescription. This is also true in the specialty area of wound care where science is driving new diagnostic methods and treatments, and nurse practitioners work closely with surgeons as their collaborating physicians. However, nurse practitioners – through their nursing background - help to keep the focus on what Litchfield and Jonsdottir (2008) refer to as the essential concern of nursing, the “humanness of health circumstances” (p.88).

In wound care, NPs often manage patients with chronic wounds, and such management requires multiple visits over a period of time. After multiple encounters between the NPs and the

patient, a helping relationship develops through trust and mutual understanding. NPs become insightful “into how the predicament came about and what it meant for life ahead for family, work and play” (Litchfield & Jonsdottir, 2008, p.88). In these situations, NPs are able to take actions that help guide patients toward healing, as well as how to maneuver in the complex health care system the United States public faces today.

NPs guide treatments and prevention strategies through active listening. NPs also help integrate the medical diagnostics and knowledge into a plan of care that facilitates the healing of clients’ wounds. The results of blending medical and nursing knowledge, helps to form a relationship between patient and NP that enhances both of their lives. The terms collaboration and multidisciplinary teams become actualized when clients and healthcare interact in a respectful way conducive to betterment of patients’ lives.

In a long-term acute care facility, multidisciplinary teams are the norm, with many experts caring for a patient. There are teams that specialize in aspects of each client’s care, including Nurse Practitioners in wound care. However, the gatekeeper of the client’s care is the Primary Provider (PP). The PPs are often experts in either internal medicine or family practice and are responsible for inviting other experts to help in the care of their clients. An area of expertise that the PP lacks is wound care knowledge, making him or her novices in wound care; for this reason, referring the complex wound care of a patient to an expert seems to be the best practice (Bryant & Nix, 2007). This is when the wound nurse practitioner comes to care for patients with complex wounds, as an expert consultant.

According to Patricia Benner, nurse theorist, a novice is a person without background experience of the situation and needs to be given context- free rules and objective attributes to guide his/her performance. A person can be at the same time of a novice level in one area and an



expert in another. An expert is someone who has an intuitive grasp of a situation, i.e., “able to identify the region of the problem and without losing time considering a range of alternatives diagnoses and solutions” (Brykczynski, 2006, p. 146). Benner also describes clinicians working in varied clinical settings as living in different worlds and recognizing and responding accordingly to the patient’s different clinical needs (Brykczynski, 2006).

The use of a wound care algorithm in a long-term acute care setting helps to fill the gap in knowledge for the primary provider regarding wound care. The use of the algorithm is not intended to make the primary provider an expert in wound care but to highlight the need for care by an expert who can easily be added to the team of experts already caring for the patient.

This Wound Care Referral Algorithm seeks to focus on the ethical view of a *Viable Global Ethic*, commonly mentioned in the literature when dealing with the framework of globalization (Crigger, 2008). The Viable Global Ethic view includes five distinct qualities: *Inclusion and Balance, Balance of Community and Individual, Use of Reflexivity, Openness to New Approaches to Human Rights, and Realistic View of Business and Technology*. According to Crigger (2008) the “goal of global ethics is to encourage individuals, communities and society as a whole to promote human flourishing and better health for all people” (p.21).

According to the first quality, *Inclusion and Balance*, a variety of disciplines involved in the care of a patient ensure that the less powerful person, in this case, the patient has his/her voice heard. The use of a wound care algorithm will facilitate the transition from the primary provider as solely responsible for the care of the patient to the wound care team. The use of a conscientious expert wound care provider helps to ascertain that the patient’s needs and wants are taken in consideration when looking at treatment costs, resources, and ability of patient to care for his/her wound.

*Balance of Community and Individual*, the second quality of global ethics looks at the ethical principle of autonomy. Autonomy is considered to be the ethics of affluence and consideration has to be given to the cost/benefit ratio of treatments in view of extreme poverty and limited resources present in our society. The act of involving the patient in the decision making process helps ensure that the patient's dignity is protected by exerting the principle of autonomy. The patient, when given clear and appropriate recommendations, can then decide which type treatment will best suit his or her needs. Expert wound care involves the patient in decision making of treatment choices that lead to better quality of life for the person with a wound, and at the same time includes judicious use of resources, which benefits the community as a whole.

The third quality of a viable global ethic, *Use of Reflexivity*, includes the ability to look at something from the other person's point of view. In this case, the Wound Care Referral Algorithm seems to be a Triple Crown winner. The tri-fold benefits include the patient who benefits from expert care, the expert wound care provider benefits from the ability to decrease in morbidity and mortality of their patients, and the primary providers benefit from better patient outcomes and ability to spend more time in their own area of expertise.

*Openness to New Approaches to Human Rights*, the fourth global ethics quality, reflects the thinking that a person has the right to a life span that is not cut short or accompanied by a reduced quality of life. The Wound Care Referral Algorithm helps the patient achieve a better quality of life by involving early on, expert advice that can reduce the morbidity and mortality related to the poor treatment of wounds (pain, unnecessary amputations, sepsis, and death).

The last quality associated with global ethics has to do with a *Realistic View of Business and Technology*, as related to everyday injustices such as access to care based on the ability to

pay, and technology reflecting the exotic treatments available for those who can afford them. Inherently, wound care involves expensive new treatments and technologies that tout their ability to close wounds faster always come with a high price tag. On the other hand, the use of an expert in wound care, who is aware of the high cost of treatment and takes into consideration the patient's situation, can be a valuable asset. Simple and cost effective treatments can sometimes be used in lieu of more expensive ones, and prevention of complications has been proven a value-added commodity in our society. Wound care experts can provide cost-effective treatments in a time of limited health care resources.

Wound care experts diagnose and treat wounds more efficiently and inexpensively than primary providers due to their unique set of knowledge and skills, leading to prevention of complications and resolution of a wound. Appropriate wound care referrals to a wound care team, especially if done early on in the care of a patient with wounds, usually results in cost effective treatment. The use of a Wound Care Referral Algorithm is an educational tool that calls attention of primary providers to early identification of wounds in their patients and a guide to help with the decision to refer to a wound care team when appropriate. The dissemination of a wound care algorithm to the larger community of providers may ascertain that a larger number of individuals, who are not aware of specialty wound care, will have access to these specialty services.

### **Literature Review Analysis and Synthesis**

Literature searches were conducted using the Medline and CINAHL databases from 1989 to 2009, concentrating on English language and full text articles. Key phrases used were 'wound care costs', 'cost of wound care', 'specialized wound care', 'wound care algorithms'. A total of 25 studies were identified. This proposed study concerns itself with the formulation of a wound

care referral algorithm in order to help fill the gap in knowledge of primary providers regarding wound care and creation of appropriate referrals to the wound care team.

**Wound care knowledge and wound outcomes.**

Ashton and Price (2006) surveyed clinicians in the United Kingdom (U.K.) and compared different clinicians wound healing knowledge and practice with each other. This non-experimental cross-sectional design in the form of a self-administered self-study questionnaire was sent to 238 nurses and doctors from specialized (burns/plastics and spinal injuries) and non-specialized (general medicine and care of the elderly) clinical areas of an acute care hospital, with a low response rate of 31.09%. The self-administered questionnaire aimed to provide an overview of clinician's knowledge of the wound healing process, to determine whether they were transcribing this into their practice and to establish which profession is responsible for deciding treatment plans. This study found clinician's knowledge from both the specialized and non-specialized group, was "primarily sourced from colleagues and personal experience, with journals and courses favored by the specialized clinician" (Ashton & Price, 2006, p.25). The non-specialized clinician's identified their pre-graduate training, which they rated as less than adequate, and the assistance of a tissue viability nurse as good sources of information. This study was the first to include medical providers and highlights that their educational provision continues to be limited and that decisions regarding wound care should be made by the multidisciplinary team based on combined knowledge, experience and current research.

Beitz, Fey & O'Brien (1998) stated that the clinician's competence in wound care management is directly related to the quality of wound care education received in school. They indicate that most medical-surgical textbooks present brief descriptions of wound care and prevention of pressure ulcers and overall content is incomplete or inaccurate. In addition,

“clinicians have a moral and ethical responsibility as patient advocates in optimizing the treatment plan and promoting the prevention of chronic, non-healing wounds” (p.299).

Other studies have found that caregiver expertise or level of wound care knowledge directly affects healing outcomes (Arnold & Weir, 1994), as well as reducing cost of treatments. Furthermore, Speech, Berquist & Frantz (1995) stated specific education in wound care affects decision accuracy; skilled professionals understand what to expect in the progression of wound care. The expert in wound care also is able to recognize earlier a “less than optimal response to treatment” (Bolton, Van Rijswijk & Shafer, 1996, p.37) and utilize other treatment options that may be beneficial to the patient.

Donnelly and Shaw (2000) described the development of a dedicated multidisciplinary complex/chronic wound care service in Belfast, Ireland, and suggested patients with long-term chronic wounds benefit from a dedicated multidisciplinary team. Smith (2006) interviewed Dr. Roy DeFrancis, a podiatrist from Western New York, who helped develop a wound care center. Dr. DeFrancis stated, “The patient benefits from the multidisciplinary approach available” (Smith, 2006, p.98) because as “a sole practitioner, it’s difficult to address all complications... a synergy develops among the attending specialists that serve the patient well” (Smith, 2006, p.98). Beitz, Fey & O’Brien (1998) believe that a multidisciplinary team and the patient must develop a comprehensive plan of care that includes treatment options and prevention of future complications.

### **Wound care costs.**

Bolton, Van Riswijk and Shafer, (1996) stated, “research related to cost-effective wound care is limited” (p.30), which seems to continue to be the case over a decade later. A large number of studies relating specifically to the assessment, treatment and cost of pressure

ulcers are available. Beckrich and Aronovitch (1999) examined the estimated costs of treating a pressure ulcer in medical versus surgical hospitalized patients. They found that 30-40% of patients undergoing surgeries of 3 hours or longer and developed pressure ulcers, contributed to the overall cost of care from US \$125.00 to US\$ 23,000.00 per patient. In 2001, Kerstein, et al., examined the cost and cost effectiveness of venous and pressure ulcer protocols of care. This study found that wound care costs extend beyond the sole cost of products, but type of wound and modality of care played an important role in the cost-effectiveness of the care given.

Another aspect of wound care costs is the knowledge of the health care professional regarding treatment cost versus treatment efficacy. It is important to recognize that expert wound clinicians recommend a research-based wound care practice, otherwise untrained individuals will use inexpensive products with the primary goal of cost-effectiveness and neglect added healing time and pain for the patient due to their choices of treatment ( Hall & Schumann, 2001). “Cost effectiveness is more than the cost of products or the cost of labor (caregiver time), it is the cost of producing the desired outcome” (Bolton, Van Riswijk and Shafer, 1996, p. 30).

### **Wound care teams.**

The desired outcome in wound care varies from patient to patient depending on the goals of treatment and prevention established by the patient and the health care team. However, in 1995, Himel stated, “the standard of care for chronic wounds includes a multi-disciplinary approach to the patient as a whole” (p. 71A). The term multidisciplinary “ was chosen because it focuses more on equal collaboration of all health care disciplines and represents a single functioning unit” (Gottrup, 2003).

In the past, different specialties cared for different types of wounds, i.e. dermatology cared for patients with a venous leg ulcer, plastic surgery cared for a patient with a pressure ulcer

and internal medicine cared for a patient with a diabetic foot ulcer. This approach proved to be filled with inadequacies and a multidisciplinary approach of care that includes collaboration among various disciplines became established. The multidisciplinary approach to wound care led to the establishment of wound care teams and centers, nationally and internationally in order to achieve outcomes that cannot be achieved without collaboration (Gottrup, Nix & Bryant, 2007).

Whiting and Parnell (2007) described how the United Kingdom's general practitioners (GPs), the equivalent of family practice physicians in the United States, prefer to treat patients with chronic illnesses and concentrate on the disease processes rather than deal with patients with wounds. Referrals of patients with wounds are made to wound care clinics from various sources such as GPs, acute hospital wards and district nurses. The wound care clinics approach is said to be comprehensive in assessment and health promotion areas and establishes links with podiatry, dermatology, plastic and vascular surgery teams (Donnelly & Shaw, 2000). These wound care clinics have also proven to be cost effective, in the savings range around \$ 170,000 pounds sterling /yr (US \$283,119.00 today).

In the United States (US), during the last decade, wound care teams have become the model of care because when successful, there is a "consistent delivery of efficient, organized, and evidence-based patient care" (Gottrup, Nix & Bryant, 2007, p. 37). Smith (2006) describes the experiences of one physician in the US that embraced the multidisciplinary wound care approach in his practice. Dr. DeFrancis stated "as a sole practitioner it's difficult to address all complications" and "if the patient benefits from the multidisciplinary approach available in the wound clinic setting, so does the practitioner" (Smith, 2006, p. 98).

**Algorithm.**

Algorithms are used in many health care areas to help clarify treatment guidelines, promote best practices and as an attempt to help non-specialists to properly manage patients with wounds and make appropriate referrals when needed ( Alsbjorn, Gilbert, Kazmierski, Monstrey, Palao, Roberto, Van Trier and Voinchet, 2007).

Wound care algorithms have been used extensively by the Agency for Healthcare and Quality, especially related to guidelines in the treatment of pressure ulcers (USDHHS, 1994). The Veterans Administration podiatry service in Cleveland, Ohio, developed an algorithm to connect the elderly diabetic veteran population with podiatry services and medicine department to facilitate appropriate referral, admission, and management of diabetic foot ulcers (Robbins, Nicklas and Augustine, 2006).

Whiting and Parnell, (2007) used a referral flowchart to visually describe how referrals are made to the wound care clinic. The referral flow, or algorithm, starts with the ambulant patient with wound acute/chronic/complex being directed to the wound clinic and being examined by wound care experts, in this case the Tissue Viability Nurses and when deemed necessary to a wider multi-disciplinary team.

Gottrup (2003) describes the organization of a wound healing center in Denmark, where a multidisciplinary team treats patients with all types of wounds. He describes how referrals are made to the center and the possible treatment course with visual schematics of decision-making trees, or algorithms. This format clearly defines which possibilities the patient with a wound may see for treatment: private practitioner, which in turn refers to the multidisciplinary wound healing team; the multidisciplinary wound healing team directly; or the wound healing center (Gottrup, 2003, p. 454).



As explained above, better patient outcomes for patients with wounds come with collaboration between medicine specialists and wound care teams. The use of a referral algorithm is one way to help ensure proper management of patients with wounds, including appropriate referral guidelines. At the long-term acute care hospital where this project was implemented, in order to take advantage of the wound care team's knowledge; referrals need to be initiated by the primary providers, asking the wound care specialists to help treat their patients with complex and chronic wounds. Ideally referrals will occur early in the care cycle and immediately after the identification of a patient's wound. A wound care referral algorithm can be a useful tool in the hands of a primary provider, and because no such a tool can be found in the literature, one is being developed for this study.

### **Project Design**

#### **Evidence based project/implementation**

A quantitative quasi-experimental design was used to study if the use of a wound care referral algorithm (WCRA) makes a difference in the number of referrals made to the wound care team at a long-term acute care hospital. A baseline measure was obtained, i.e., the number of current referrals made to the wound care team. The collection of data was done in a prospective survey method.

The use of evidence-based practice was demonstrated by utilizing current standards of care for identification and treatment of chronic wounds.

The implementation of the study occurred in a Pilot study format with the completion of the following steps:

1. Development a Wound Care Referral Algorithm based on a review of the current literature. (see Appendix A)

2. Creation of a log to track incoming referrals from primary providers (see Appendix B)
3. Refinement of the log
4. Present providers with the Wound Care Referral Algorithm
5. Track the number and appropriateness of referrals after the distribution of the Wound Care Referral Algorithm. The information from the tracking log will be aggregated by categories describing wound types and the number of referrals made for each category.

### **Timeline**

- November 2009- January 2010- Development of Wound Care Referral Algorithm.
- October 2009- Creation of a log to track incoming referrals from primary providers.
- January 2010- Refinement of tracking log and use of the log.
- February 2010- St Catherine's University IRB submission and approval.
- March 2010- Long-term acute care hospital IRB approval.
- March 2010- After IRB approval, use of the log to establish baseline data.
- April 2010- Presentation of the Wound Care referral Algorithm to primary providers.
- May-to July 2010- Track the number and appropriateness of referrals after the distribution of the Wound Care Referral Algorithm.

### **Resources- personnel, technology, budget.**

The total cost of the development of the Wound Care Referral Algorithm was US \$8,485.00.

All these expenses were paid in kind. The majority of the expenses were incurred by the investigator who donated her time to the project. Minor expenses were incurred by the facility where the study took place (See Appendix C).

### **Return on investment (ROI)**

The benefits of this project include the development of the Wound Care Referral Algorithm and early referral of patients with complex and/or chronic wounds to a specialized wound care team, and less pain and suffering for the patient with a complex and/or chronic wound. This increase in referrals will eventually reduce the morbidity and mortality of the patients with complex and/or chronic wounds. An increase in referrals will also decrease health care costs due to better utilization of resources and the use of evidence based wound care when treating patients. The assumption is that there will be a reduced hospital length of stay; however this variable is not the focus of this study and therefore will not be quantified.

The market of wound care in this systems change project is composed of this investigator, the wound care Nurse Practitioner (NP), supplying the LTAC's primary providers with a WCRA. Therefore, the wound care NP is the supplier in this market. The demand for wound care NP services will come from the primary providers, who will delegate their patients with complex wounds to the care of the wound care NP. The primary providers are paid by the patient's health insurance company to provide care to patients enrolled in their health care plan.

Ultimately the health insurance companies and the patients who are enrolled in these programs offered by the health insurance companies are the demand in this market.

The strategy used in this system change project, is to increase the demand of the wound care NP services by a change in the tastes of the buyers in the LTAC market, in this case the primary providers. This change in taste is accomplished by freely distributing and advertising the

WCRA to the primary providers. The final outcome is to increase the number of referrals made by the primary providers to the wound care NP by 10%.

Additional benefits of this system change project are as follows:

1. The patient benefits from receiving specialty care that will help heal his/her wounds faster, while decreasing the patient's morbidity and mortality, level of pain, as well as future co-pays and other expenses related to wound care treatment in the future.

2. The primary providers at the LTAC benefit from delegating the care of their patients' wounds to the wound care NP by freeing up their own time to care for other patients. This added free time to care for other patients can eventually be translated into monetary compensation, as providers are able to bill for specific services provided to patients.

3. The wound NP benefits from increasing her referral base, therefore adding to the number of billable hours her services provide to the LTAC. This eventually translates into job security as providers that are able to bill for their services, and produce cost savings by avoiding costs of inefficient care (inappropriate use of wound care supplies).

4. The health insurance companies benefit the avoided costs of inappropriate use of wound care supplies (costly dressings), as well decreased morbidity and mortality of their clients (patients) when given appropriate cost-effective wound care.

The specific cost of wound care can be very difficult to determine (Bolton, Van Rijswijk, & Shafer, 1996). Different studies have examined specific types of treatments and cost-effectiveness of one particular treatment over another. Literature regarding the actual cost of treating specific types of wounds is more difficult to find. However, the costs associated with one specific type of wound has been well studied, pressure ulcers (Schuurman, Schoonhoven,

Defloor, et al., 2009). It is well known that the care and/or development of pressure ulcers during a hospital stay increase the length of stay (LOS), especially in the intensive care unit (Schuurman, Schoonhoven, Paul, et al., 2009). This increase in the length of stay causes an increase the cost of care for that patient. In this study, the assumption is that there will be a reduced hospital length of stay of one day for patients who receive specialized care for their wounds by the wound care NP (See Appendix B).

This System Change Project, or more specifically this Wound Care Referral Algorithm, can easily be applied to short- term acute care hospitals or ambulatory care clinics. The cost of the development of the algorithm has already been absorbed by the pilot study. Two hours of the investigator can make the algorithm more broad based to the health care system, adjusting to where the referrals will be made to. A Web-based version of the algorithm can easily be prepared for dispersion to all health care providers in this health care system. The algorithm can be sent out via a corporate e-mail to all providers in this system. This health care system already has an established wound clinic and a Wound Ostomy Continence service ready and capable of absorbing an increase in number of referrals to their services.

### **Evidence of site support**

- a. St. Catherine University and Health East gave IRB approval for the study to be completed.
- b. Long-term acute care setting willingness to participate in the study, offering administrative support for the study.
- c. Providers' willingness to participate in the study by reviewing and utilizing the wound care referral algorithm.

**Ethical considerations**

Another ethical issue was the researcher's conflict of interest in which the researcher and the Wound Care NP were the same. One way used to help solve this dilemma was the use of the institution's IRB approval system. Although the study was deemed to pose minimal risk to the subjects, the providers utilizing the WCRA, informed consent was obtained.

The investigator's intentions after the completion of this System Change Project, if successful, were to establish the use of the Wound Care Referral Algorithm as a standard tool to help primary providers in the care of patients with wounds at the aforementioned LTAC. If continued success ensued, the investigator plans to make a few modifications on the WCRA and disseminate it to other parts of the institution and perhaps other organizations that could benefit from the knowledge acquired during the completion of this SCP.

It is this investigator's belief that patients with chronic wounds receive better care when care is directed by someone more knowledgeable about their particular needs. Specialty care incurs more expenses, time and cost of specialty treatments can be high, but it is also this Nurse Practitioner's belief that specialized care helps to decrease morbidity and mortality for patients with complex health issues in the end.

**Data Analysis**

The data analysis of this SCP consisted of the evaluation of the raw number of referrals made by the primary providers at the study site to the Wound Care Nurse Practitioner before and after the use of the wound care referral algorithm.

### Referrals Analysis Table

Month	Number of Referrals	Average Census/year			Number Referrals 2010	Percentage referrals 2010
		2008	2009	2010		
May	55	108	107	103	55	53.4%
June	46	104	103	92	46	50%
July	30	99	102	82	30	36.6%

This study used a model of program evaluation called objective-based evaluation, “which uses objectives written by the creators of the program and the evaluators. This approach includes an emphasis on and an evaluation based on the stated program goals and objectives” (Titler, 2009, p.289).

The study’s objectives were evaluated by the creation and use of a wound care referral algorithm in a laminated card and the increased number of referrals to the Wound Care Service by 10%, as shown in a tracking log.

This project was evaluated by the investigator along with guidance from the advisor from St Catherine’s University and the site mentor.

The baseline data of this project was recorded in a tracking log of wound care referrals to the wound care Nurse Practitioner (WNP) that occurred via personal contacts with providers and written orders in patients’ charts. This log was kept by the WNP as she goes along with her daily work routine.

### Discussion of Findings

This SCP had two objectives. The first – creation of a wound care referral algorithm for primary providers - was met and implemented (see attachment A). However, the second objective - using the wound care referral algorithm as a tool to increase the number of appropriate referrals to the wound care team by ten percent was not met.

There are several explanations for this. First, census was lower than average (see Appendix D). There was a registered nurse strike led by the Registered Nurses union during the time this project took place. During this time period the local media encouraged the public to cancel all elective procedures that were to take place during the strike, creating a climate of fear of the hospitals during this time. Additionally, it is possible that other facilities were keeping patients longer than expected to maintain their daily census and caring for their own wound patients.

As stated in the literature review, algorithms are used in many health care areas to help clarify treatment guidelines, promote best practices and as an attempt to help non-specialists to properly manage patients with wounds and make appropriate referrals when needed (Alsbjorn, et al., 2007). Once again, the use of an algorithm proved to be a best practice that helped define the appropriate use of resources, human and otherwise. Costs of wound care can be controlled by ensuring that the patient with a complex wound (right patient) is seen by the right provider (wound care specialist), whom in turn provides the patient with the right treatment at the right price at the right time.

It is evident from the data that the WCRA resulted in most of the referrals made to the wound care team were appropriate. The types of referrals present in the WCRA were: vascular Ulcerations, pressure ulcers, autoimmune wounds, and undiagnosed. For the purpose of this discussion, undiagnosed wounds were classified as skin assessments, incontinence associated dermatitis (IAD), and burns. Some patients presented with more than one wound and were therefore placed in more than one category in the algorithm. The great majority of referrals were for patients with surgical wounds in need of evaluation, and treatment of pressure ulcers.

Vascular ulcerations were less common, however that is an expected finding because most of



these can be treated on an outpatient basis. The most severe vascular ulcerations usually become surgical cases and would therefore be included under a surgical category if they are in a LTACH environment. Autoimmune wounds also are not very common and that is reflected in the data, only one case during the study time.

Patients with burns are also treated at burn centers for a long period of time and are not a common population found at a LTACH setting. The number of patients requiring IAD consults reflects the need for more education of the staff of the LTACH on the use of an established and highly publicized IAD algorithm. The IAD algorithm describes with photos and definitions the appropriate treatment for the different levels of skin breakdown due to incontinence (see Appendix E). The referrals described as Skin Assessment perhaps reflect the literature review that aforementioned the lack of formal education of physicians regarding wound care. It is the belief of this NP that when unsure of a diagnosis and/or presence of minor skin breakdown, physicians defaulted to referring patients to the Wound Care team.

### **Conclusions**

Although the use of the WCRA did not increase the number of the number of appropriate referrals to the wound care team by ten percent, overall the WCRA was well accepted by providers. Very little feedback was noted by the investigator however the referrals to the wound care team seem to continue to flow steadily until the current time. The suggestions made by the wound care team are well received and appreciated by the providers generating the referrals.

As many other Doctorate of Nursing Practice projects, this systems change project sought to make changes in the practice of Nurse Practitioners and other providers when referring patients to Wound Care experts. It was apparent that the change has taken root and was received

at this LTACH as a tool to help in the management of patients with complex wounds amongst other numerous problems.

### **Recommendations**

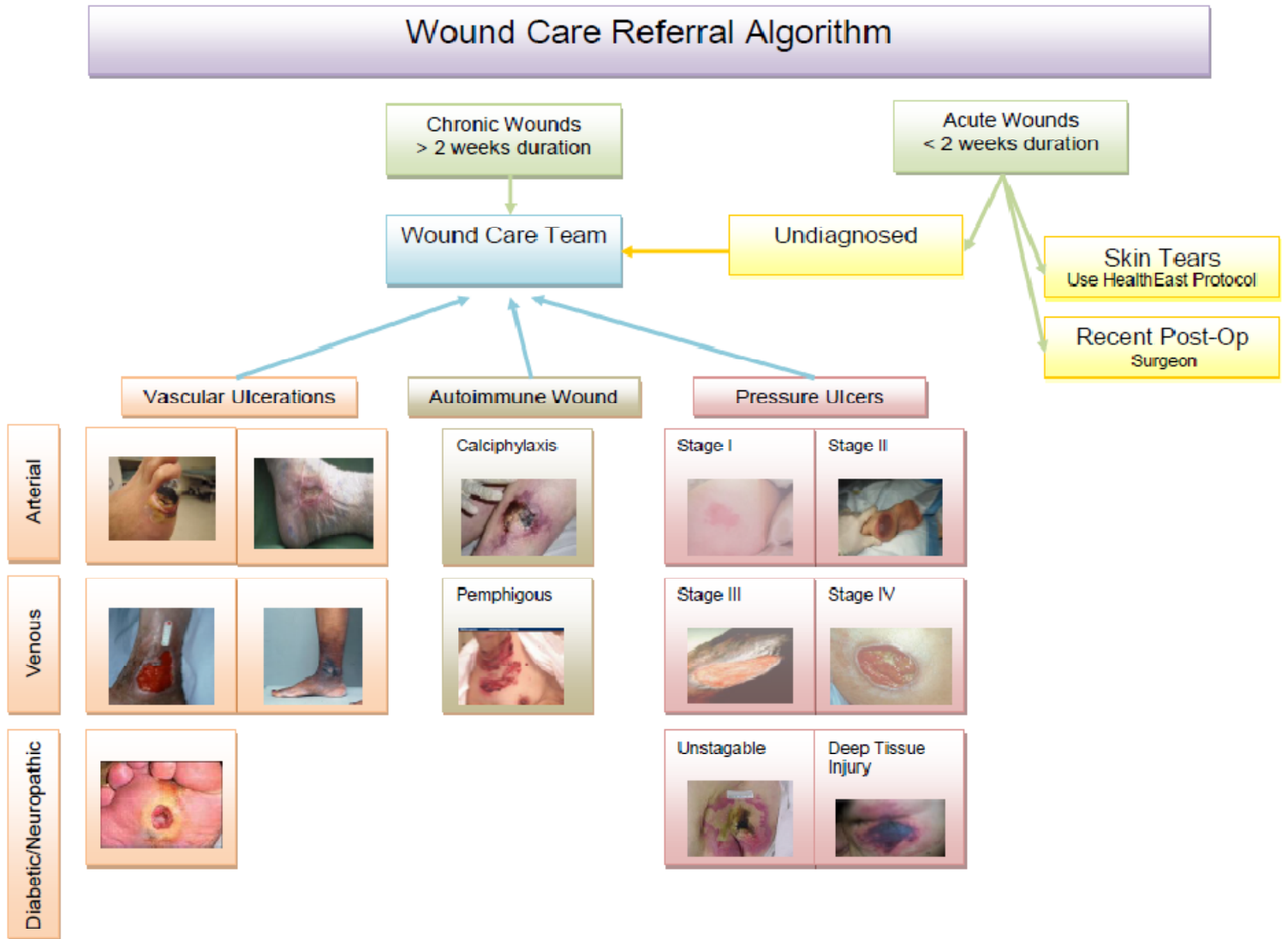
The impact of the WCRA has been so far, very localized, limited to this particular LTACH where this study took place. The most significant finding of this study was the appropriateness of the referrals made to the wound care team when the algorithm was utilized. The ease of use of this algorithm that included pictures and proper classification of wounds can help ensure that patients receive the proper care for their wounds. This leads one to conclude that the use of the algorithm was a success and therefore has the potential of being transferred to other institutions in the same care system, such other acute care hospitals, locally to other LTACHs and long-term care facilities.

This WCRA could also be disseminated to educational facilities on several levels of nursing education from licensed practical nurses, registered nurses and nurse practitioner programs. This WCRA could yet be a tool in the arsenal of other Providers in practice particularly in the areas of internal medicine, family practice and gerontology. Some surgical specialties may also derive use of this WCRA once the wounds become chronic due to poor outcomes from surgery. Several medical specialties are not aware of the Nursing specialty of Wound, Ostomy and Continence care that deal with chronic wounds on a daily basis.

In the future a simple modification to the WCRA could be made such as adding on the reverse side of the algorithm, the specific contact information for each facility where the algorithm is used. Perhaps it could also be useful to add the Incontinence Associated Dermatitis algorithm to the current WCRA under the heading of Acute Wounds.

Higher quality of care and better patient outcomes for patients with wounds comes with collaboration between medicine specialists and wound care teams. The use of a referral algorithm is one way to help ensure proper management of patients with wounds, including appropriate referral guidelines.

APPENDIX A



**APPENDIX B**

Referral Data Collection Tool					Date: _____					
Provider	Diabetic/ Neuropathic	Foot Ulcers	Venous Ulcers	Gangrene	Pressure Ulcers				Pyoderma Gangrenou m	Other s
					I	II	III	IV		
<b>Internal Medicine Clinic</b>										
A										
B										
C										
<b>Hospitalists</b>										
A										
B										
C										
<b>Other Specialties</b>										
A										
B										
C										
<b>Nursing Units</b>										
A										
B										
C										

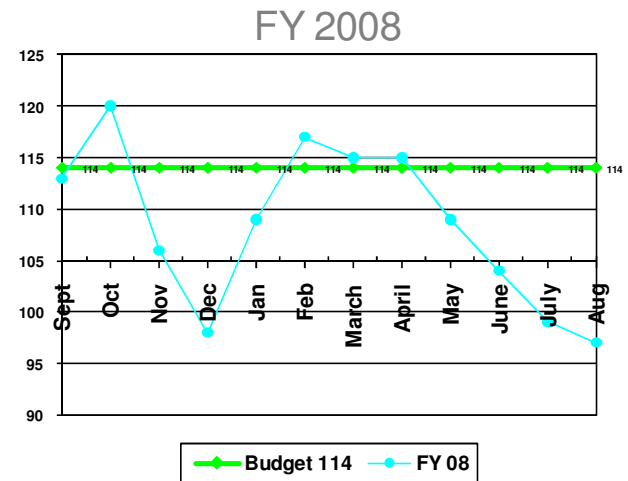
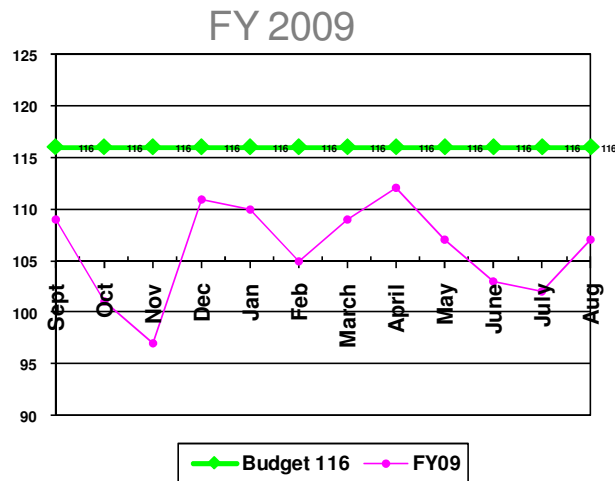
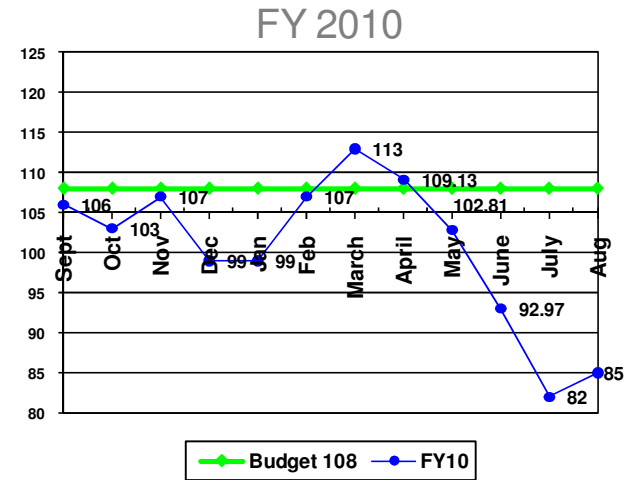
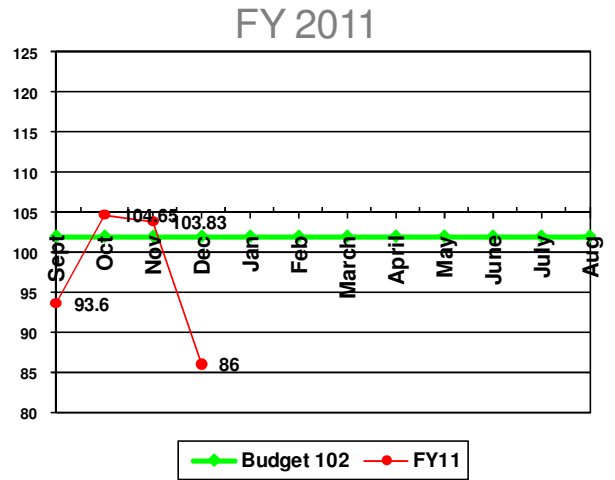
## APPENDIX C

## Wound Care Referral Algorithm Budget

Categories		Actual #	Cost	Justification	Time frame
<b>Personnel</b>	Investigator \$43.00/hr	80	\$ 3,440.00 (in kind)	Development of Wound Care Referral Algorithm	Nov 2009- Jan 2010
		20	\$860.00 (in kind)	IRB process , Consent Forms signed by providers	Feb-Mar 2010
		03	\$129.00 (in kind)	1-1 interactions with providers	Apr-Jul 2010
		80	\$3,440.00 (in kind)	Analyzing results, writing final SCP	Nov 2010- Jan 2011
		12	\$516.00 (in kind)	1-1 w/providers to sustain use of algorithm	Aug- Dec 2010
	Administrative Assistant \$16.00/hr	03	\$ 48.00 (in kind)	Computer generation of algorithm	Apr 2010
<b>Supplies</b>	Lamination of algorithms	25	\$25.00 (in kind)	Pocket algorithm to be distributed to providers	May 2010
	Possible 2 <sup>nd</sup> printing of algorithms	25	\$ 30.00 (in kind)	Future need for algorithms for providers	To be determined
<b>Total Cost</b>			\$8,485.00 (in kind)	Total cost of Wound Care Referral Algorithm SCP	Nov 2009 – Jan 2011

APPENDIX D

Average Daily Census (Monthly) by Fiscal Year



G:\Bethesda Admissions\AvgDailyCensusGRAPH-3.ppt

## APPENDIX E

### INCONTINENCE-ASSOCIATED DERMATITIS SEVERITY (IADS) INSTRUMENT SCORING FORM

***Instructions:***

1. Identify the worse type of skin damage for each of the 13 body locations.
2. Record one number that describes the worst level of skin damage for each body location.
3. Possible range of scores = 0 - 52.
4. Total the 13 numbers to identify the IADS score (score will decrease with improvement).

<b>DATE:</b>		<b>REDNESS</b>			<b>RASH</b>	<b>SKIN LOSS</b>	
		None <b>(0)</b>	Pink <b>(1)</b>	Red <b>(2)</b>	Present <b>(3)</b>	Present <b>(4)</b>	
1	Perianal skin						
2	Crease between buttocks						
3	Left lower buttock						
4	Right lower buttock						
5	Left upper buttock						
6	Right upper buttock						
7	Genitalia (labia/scrotum)						
8	Lower abdomen/suprapubic						
9	Crease between genitalia and thigh						
10	Left inner thigh						
11	Right inner thigh						
12	Left posterior thigh						
13	Right posterior thigh						
<b>TOTAL</b>							<b>SCORE</b>



**THE INCONTINENCE ASSOCIATED DERMATITIS AND ITS SEVERITY (IADS) INSTRUMENT**

**LOCATION**

The 13 body locations of IAD

1. Perianal skin
2. Crease between buttocks
3. Left lower buttock
4. Right lower buttock
5. Left upper buttock
6. Right upper buttock
7. Genitalia (labia/scrotum)
8. Lower abdomen/suprapubic
9. Crease between genitalia and thigh
10. Left inner thigh
11. Right inner thigh
12. Left Posterior thigh
13. Right posterior thigh



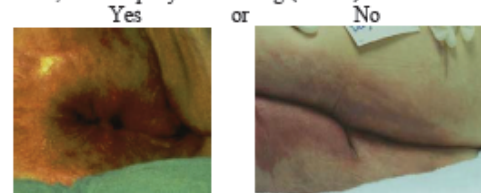
**REDNESS**

The options are none, pink, red, and bright red. IAD in darker pigmented skin may actually have a purplish hue to the bright red skin damage.



**SKIN LOSS**

Skin is moist, as the top layer is missing (eroded).

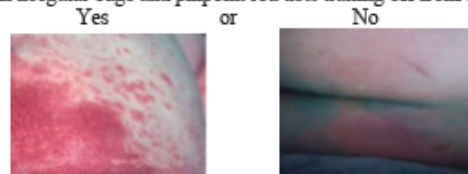


Pressure Ulcer NOT IAD



**RASH**

An area of redness with an irregular edge and pinpoint red dots trailing off from edge.



### References

- Alsbjorn, B., Gilbert, P., Hartmann, B., Kazmierski, M., Monstrey, S., Palao, R., Roberto, M.A., Van Trier, A. & Voinchet, V. (2007). Guidelines for the management of partial-thickness burns in a general hospital or community setting—recommendations of a European working party. *Burns* 33(2), 155-160.
- Ashton, J. & Price, P. (2006). Survey comparing clinician's wound healing knowledge and practice. *British Journal of Nursing*, 15(19), 18-26.
- Beckrich, K. & Aronovitch, S. (1999). Hospital-acquired pressure ulcers: a comparison of costs in medical vs. surgical patients. *Nursing Economics*, 17(5), 263-271.
- Beitz, J., Fey, J. & O'Brien, D. (1998). Perceived need for education vs. actual knowledge of pressure ulcer care in a hospital nursing staff. *Medsurg Nursing*, 7(5), 293-299.
- Bluestern, D. & Javaheri, A. (2008). Pressure Ulcers, prevention, evaluation and management costs. *American Family Physician*, 78(10), 1186-1194.
- Bolton, L., Van Rijswijk, L., & Shafer, F. (1996). Quality wound care equals cost-effective wound care: A clinical model. *Nursing Management*. 27(7), 30, 32-33, 37.
- Brykczynski, K. (2006). Patricia Benner. From novice to expert: Excellence and power in clinical nursing practice. In Y. Alexopoulos & K. Heberd, *Nursing theorists and their work* (pp.140-166). St Louis, Missouri: Mosby.

- Crigger, N. (2008). Towards a Viable and Just Global Nursing Ethics. *Nursing Ethics*, 15(1), 17-27.
- Donnelly, J. & Shaw, J. (2000). Developing a multidisciplinary complex wound care service. *British Journal of Nursing*, 9(19), 50-55.
- Gottrup, F. (2003). Organization of wound healing services: the Danish experience and the importance of surgery. *Wound Repair and Regeneration*, 11(6), 452-457.
- Gottrup, F., Nix, D & Bryant, R. (2007). The multidisciplinary team approach to wound management. In Bryant, R. & Nix, D. (Eds) *Acute and chronic wounds: current management concepts* (pp. 23-38). St. Louis: Mosby Elsevier.
- Hall, P. & Schumann, L. (2001) Wound care: meeting the challenge. *Journal of the American academy of Nurse Practitioners*, 13(6), 258-268.
- Himel,H.N. (1995). Wound healing: focus on the chronic wound. *Wounds*,7(Supplemment A), 70A-77A.
- Kalb, K. (2009). *Nursing for social justice: promoting human dignity 24/7*. St. Catherine University. St Paul, MN.
- Kerstein, M., Gemmen, E., Van Rijswijk, L., Lyder, C., Phillips, T., Xakellis, G. Golden, K., & Harrington, C. (2001). Cost and cost effectiveness of venous and pressure ulcer protocols of care. *Dis manage health outcomes*, 9(11), 651-663.
- Robbins, J. M., Nicklas, B. J. & Augustine, S. (2006). Reducing the rate of amputations in acute diabetic foot infections. *Cleveland Clinic Journal of Medicine*, 73(7), 679-683.
- Smith, G. (2006). Working at wound clinics (and making clinics work). *Podiatry Management*. June/July: 97-101.

Titler, M. (2009). Program evaluation. In Mateo, M., & Kirchhoff, K. (Eds.). *Research for advanced practice nurses: from evidence to practice* (pp.287-328). New York: Springer.

Whiting, L. & Parnell, C. (2007). Developing wound care clinics. *Primary Healthcare*, 17(4), 26-27.