

Evidence-Based Practice Initiative for Diabetic Foot Ulcers

Brittanie Smith

The George Washington University

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Diabetes is one of the most prevalent diseases in today's society. According to the American Diabetes Association (ADA) (2015), over 29 million Americans currently have diabetes and 1.4 million Americans are diagnosed with this disease each year. The diagnosis of diabetes is accompanied by the significant risk of complications. Complications include heart attack, stroke, kidney disease, vision problems, and tissue involvement, such as foot ulcers (ADA, 2015). Diabetic foot ulcers can lead to the amputation of extremities due to recurrent infections and non-healing wounds causing tissue necrosis (Sajid et al., 2015). Treatment options for diabetic foot ulcers include moist-to-dry dressing changes as well as wound vacs (Wukich et al., 2013). Wound vacs have been shown to provide more positive healing outcomes for diabetic foot ulcers compared to standard moisture therapy through the use of negative pressure in a closed system (Sajid et al., 2015). These negative pressure systems utilize a pump to provide constant suctioning of exudate to promote healing (Ravari et al., 2013). To improve healing outcomes for patients with diabetic foot ulcers, an initiative was designed around the use of wound vacs in place of standard moisture therapy for treatment in this population. This initiative would take place on two medical-surgical units at Sentara Norfolk General in Norfolk, Virginia. The PICO statement of focus is: In hospitalized patients with diabetic foot ulcers, does the utilization of wound vacs compared to standard moisture therapy improve healing outcomes? The substantial benefits of wound vac therapy prompts the initiative for reevaluating and possibly amending current standards of practice for diabetic foot ulcer treatment.

### **Background and Significance of the Problem**

The presence of an open wound provides the opportunity for complications, such as infection. It is estimated that more than 50% of diabetic foot ulcers contract an infection and one in six patients with infected diabetic foot ulcers die within one year of the infection (Sajid et al., 2015). In addition, infected diabetic foot ulcers are often the cause of lower extremity amputation with only 40% to 50% of amputees surviving 5 years post-amputation (Sajid et al., 2015; Wukich et al., 2013). Due to the significant complications that can arise from the development and presence of diabetic foot ulcers, examining current guidelines for treatment is necessary to ensure patients affected by this problem are receiving optimal care. According to Wukich et al. (2013), the ADA recommends regular debridement, moist wound dressing therapy, and pressure offloading for non-infected diabetic foot ulcers. For infected diabetic foot ulcers, the ADA recommends antibiotic therapy as appropriate, regular wound debridement, surgical intervention as necessary, irrigation, and possible negative pressure wound therapy (Wukich et al., 2013). As previously discussed, negative pressure wound therapy, implemented through the use of wound vacs, has documented benefits for healing diabetic foot ulcers more effectively than standard moisture therapy, thus reducing the chance of new or worsening infections (Ravari et al., 2013; Sajid et al., 2015). Despite the evidence-based superiority of wound vac use over standard moisture therapy for diabetic foot ulcers, the lack of consistent recommendations for the utilization of wound vacs supports a call to action for further research in this area.

The trigger for this initiative is driven by the clinical problem with the current recommended guidelines for diabetic foot ulcer therapy. Although wound vac therapy has demonstrated more favorable healing outcomes for diabetic foot ulcers, it is not recommended as first-line therapy for this diagnosis. An evidence-based practice (EBP) initiative was designed

to further explore the supremacy of this treatment method over current established recommendations by the ADA. Patients with diabetic foot ulcers and those patients with diabetes who are at risk of developing a diabetic foot ulcer would greatly benefit from this research.

### **Model for EBP Process**

In order to appropriately evaluate this EBP project, a model for implementation must be utilized. The chosen model that would serve as the framework for this initiative is the Iowa Model of Evidence-Based Practice to Promote Quality Care. This model was chosen for the initiative because it focuses on organizational change and collaboration among healthcare team members to utilize research and promote change (Doody & Doody, 2011). It was originally developed in 1994 by the University of Iowa Hospitals and Clinics to “serve as a guide for nurses and other health care providers” to utilize research in order to improve patient care (Titler et al., 2001, p. 498). The Iowa model concentrates on improving current practice measures related to problem-based and knowledge-based triggers through the evaluation and analysis of relevant research (Doody & Doody, 2011). There are several steps involved in the implementation of this model.

Doody and Doody (2011) list the steps in order of implementation: Selection of a topic, forming a team, evidence retrieval, grading the evidence, developing an EBP standard, implementing the EBP, and evaluation. The first step, selection of a topic, involves identifying the issue to be addressed (Doody & Doody, 2011). The second step, forming a team, requires the development of a team to gather and analyze relevant research for the chosen topic (Brown, 2014; Doody & Doody, 2011). The third step, evidence retrieval, involves collecting research

that addresses the problem and supplies appropriate evidence relevant to the initiative (Doody & Doody, 2011). The fourth step, grading the evidence, comprises of evaluating the gathered evidence to determine if change is warranted (Doody & Doody, 2011). The fifth step, developing an EBP standard, initiates the establishment of recommendations for change that will be implemented into practice (Doody & Doody, 2011). The sixth step, implementing the EBP, encompasses the execution of a pilot study to obtain sufficient evidence to support permanent change (Doody & Doody, 2011). The final step, evaluation, involves analyzing the findings of the pilot study to determine if the proposed change should be permanently employed throughout the organization (Doody & Doody, 2011). Each step builds upon the previous step as the initiative progresses and provides a sturdy platform for evidence evaluation as well as implementation.

### **Description of EBP Initiative**

In order to effectively utilize the Iowa model to evaluate the implementation of wound vac use on diabetic foot ulcers, the initiative process would follow the outlined model step-by-step. Step one, selection of a topic, has already been achieved through the identification of the clinical-based problem regarding diabetic foot ulcer treatment. The topic of the initiative would be to examine the effect of wound vac utilization on healing outcomes for hospitalized patients with diabetic foot ulcers compared to standard moisture therapy. The second step requires the formation of a team to compile relevant research for review (Brown, 2014; Doody & Doody, 2011). The team for this initiative would be comprised of several members of the healthcare staff in the hospital. These members would include two wound care nurses, a floor nurse from each of the two proposed units for the pilot study, a nurse educator from each of the units, and a

nurse manager from the two units as well. The wound care nurses are a vital part of the team as they would be in charge of initiating the use of the wound vac for therapy, providing education regarding wound vac care to staff, and collaborating with the ordering providers to utilize the wound vac. These nurses would also provide specialized input and support for the wound vacs as well as “discuss the practicality of guideline implementation” (Doody & Doody, 2011, p. 662). The floor nurses are included in the team because they would be caring for the patients undergoing wound vac treatment and can also provide education to other floor nurses. The nurse educators and nurse managers would assist with the execution of the pilot change on their units to provide necessary support and resources for successful implementation as these changes require upper level reinforcement to facilitate progress (Doody & Doody, 2011). Each member of the team lays the groundwork for effective change.

Gathering evidence for the third step would include all members of the research team. Every member would participate in brainstorming resources for adequate evidence and retrieving sufficient research findings for analysis (Brown, 2014; Doody & Doody, 2011). Evidence of successful wound vac implementation to treat diabetic foot ulcers has been discovered by previous research studies, such as the studies conducted by Ravari et al. (2013) and Sajid et al. (2015). The findings from each of those studies revealed that wound vac implementation resulted in shorter healing times for diabetic foot ulcers compared to standard moisture therapy (Ravari et al., 2013; Sajid et al., 2015). These findings would be beneficial to consider when contemplating the justification for change. The fourth step, grading the evidence, would involve every team member as well. The research would be separated into qualitative and quantitative data categories for more practical analysis (Brown, 2014; Doody & Doody, 2011). Specific

grading criteria would then be utilized to determine if the data provides adequate support for application (Brown, 2014; Doody & Doody, 2011). If there is sufficient evidence for change, the project would then progress to the next step. The fifth step, developing an EBP standard, would require the team to collaborate with one another to outline a set of recommendations for practice based on the analysis of the evidence that was gathered in the previous steps (Doody & Doody, 2011). These recommendations would list points discussing “practice guidelines, assessments, actions, and treatment as required” (Doody & Doody, 2011, p. 663). For this specific initiative, recommendations would include utilizing wound vacs for patients admitted with moderate to severe diabetic foot ulcers rather than standard moisture therapy as well as specific guidelines discussing dressing changes and proper assessment. These guidelines would include appropriate measurements to determine healing outcomes and how to adequately care for the wounds.

The sixth step, implementing the EBP, would require further collaboration with healthcare team members. These members would include ordering providers and other members involved in patient care, such as the remaining nursing staff not already participating in the initiative (Doody & Doody, 2011). The EBP would be initiated on two medical-surgical units and include patients admitted to the units within 24 hours of project initiation who have not yet started treatment and patients admitted throughout the pilot change. Six months before implementation, the wound care nurses would compile a list of patient data that included healing outcomes of patients with diabetic foot ulcers treated with standard moisture therapy. This data would serve as a baseline for comparison. One week prior to implementation, the nurse educators and nurse managers would meet with the nursing staff on their unit to discuss the change of practice, the process by which it would be implemented, and to address any concerns

or questions. In addition to the staff meeting, the wound care nurses would work with the nursing staff on each unit to provide two in-services over the course of the week before implementation, discussing the use of a wound vac, the mechanics of a wound vac, and the procedure for wound vac dressing changes. The designated nurse from each unit would serve as a resource for the nursing staff in addition to the nurse educator and wound care nurse once the change was employed.

The pilot change would follow a series of steps as well. First, once a diagnosis of a diabetic foot ulcer was made, the admitting provider would follow the standard orders of care and request a wound care consult. Second, the wound care nurse would assess the wound to determine appropriateness for wound vac implementation. Appropriate candidates would have a foot ulcer classified as a Grade two or above according to the Wagner Classification system. The Wagner Classification system is a tool that identifies the severity of diabetic foot ulcers based on six grades (Jain, 2012). Grades two and above indicate deep tissue involvement which would require intervention (Jain, 2012). If necessary, the wound care nurse would order the wound vac and initiate the treatment. Third, the wound care nurse would review the care necessary for the wound vac with the patient's nurse, mainly focusing on how to determine if the wound vac is functioning appropriately. After no longer than 72 hours, the wound care nurse would perform the first dressing change and measure the wound to assess for adequate evidence of healing. At that time, he or she would review dressing changes with the patient's nurse again to ensure continuity of care. The dressing would then be subsequently changed as needed by the nursing staff with a maximum of 72 hours between dressing changes for the duration of the patient's hospitalization or discontinuation of treatment (KCI, 2014; Sajid et al., 2014). Data would be



collected throughout the patient's hospitalization until discontinuation of the wound vac or discharge from the hospital, whichever event comes first. Compiled data would include ulcer measurements and Wagner grades, collected at each dressing change. This pilot study would continue for six months. Ulcer complications and readmissions related to ulcer activity would be recorded during this time as well.

The final step of the process, evaluation, would involve comparing the baseline data of the healing outcomes, specifically the grades and sizes of the ulcers at admission and discontinuation/discharge, for the patients treated with standard moisture therapy before the pilot change to the healing outcomes of the patients treated with the wound vac therapy. The team, led by the wound care nurses, would analyze this data to determine if wound vac therapy provided improved healing outcomes for patients with diabetic foot ulcers. The evaluation process would also involve identifying barriers or concerns regarding the pilot change (Doody & Doody, 2011). The nurse managers and nurse educators would be responsible for identifying improvements by meeting with the nursing staff and other healthcare providers to determine key concerns with the project. Once barriers have been identified and the results of the initiative have been analyzed, a decision to implement the change throughout the entire organization or to discard the project would be made.

### **Evaluation**

To determine the outcome of the initiative, several factors would be evaluated in the project. First, the baseline data collected six months prior to the pilot change would serve as a comparison for the effectiveness of each treatment method (Doody & Doody, 2011). This data would include the location of the ulcer, grade of the ulcer at admission and discontinuation/

discharge based on the Wagner Classification system, measurements of the ulcer at every dressing change during hospitalization and at discontinuation/discharge, complications occurring during the hospitalization directly related to the presence of a diabetic foot ulcer, and the occurrence of readmissions related to the development or presence of an ulcer. Complications to be included would be osteomyelitis, amputation, and ulcer recurrence (Epocrates, 2016).

Readmissions considered related to an ulcer would include any admitting diagnosis of a diabetic foot ulcer. Appropriate data to be collected during the initiative would exactly mirror the data collected at baseline. To standardize ulcer measurements, specific data would be recorded for every ulcer. The measurements of the ulcers would be gauged in centimeters and would include the length, width, and depth of the ulcer as well as the Wagner grade (Sajid et al., 2014). The validity of the Wagner Classification system is supported by its utilization in the studies of Ravari et al. (2013) and Sajid et al. (2015). Both of these studies employed the Wagner Classification system to determine the effectiveness of wound vac therapy compared to standard moisture therapy and both studies found a reduction in the grade of the ulcers involved in the studies. All of these measurements would be measured at admission, at every dressing change, and at discontinuation/discharge, and recorded in the patient's chart.

To analyze the data, the baseline data regarding the characteristics of the ulcers would be organized into a table that would display the location of the ulcer, the characteristics at admission, with every dressing change until discontinuation/discharge, and at discontinuation/discharge. The number and type of complications as well as the number of readmissions related to the presence of an ulcer would also be included in the table. The pilot change data would be organized in the same fashion as the baseline data so they may be easily compared. When

compared to baseline data, findings that would demonstrate success of the initiative would include a greater percentage of reductions in the size of the ulcers at discontinuation/discharge compared to admission, improved Wagner grade at discontinuation/discharge, a reduced number of complications throughout the pilot change, and a reduced number of readmissions at the end of the pilot change. Although the initiative takes into account numerous factors that can assess the outcome of this therapy, there are a few limitations.

The limitations for this project relate to healthcare staff and patient satisfaction. First, this initiative does not assess the satisfaction of the healthcare staff with the proposed change. While issues and concerns with the pilot change would be addressed in the process, the main focus of the project is on healing outcomes for patients, not the preferences of the staff regarding the change. In addition, the initiative does not focus on the satisfaction of the patients with the utilization of the wound vac over standard moisture therapy because the primary purpose of the change is to identify the physical effects of wound vac therapy on the wounds. However, the implementation of wound vac therapy has been shown to improve patient satisfaction in previous research (Ravari et al., 2013). Overall, the execution of wound vac therapy for diabetic foot ulcer treatment has proven to be significantly beneficial for patients and lays the foundation for a potential change in evidence-based practice.

### **Conclusion**

The occurrence of diabetic foot ulcers is a critical issue to address in healthcare due to its potential to induce grave complications and decrease quality of life for patients already facing a serious illness. Striving to improve the treatment options and guidelines for patients afflicted with this ailment is imperative as one of the most crucial goals in medicine is to provide optimal

patient care. Not only can evidence-based research improve patient outcomes, it can ignite a movement to explore other areas of practice that may need improvement as well. Evidence-based practice is a vital part of a safe and reliable healthcare system. These initiatives should be a top priority for all areas of medicine.

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