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# A Guideline to Screen for Diabetic Peripheral Neuropathy

Jolene Nawrocki

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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

A GUIDELINE TO SCREEN FOR DIABETIC  
PERIPHERAL NEUROPATHY

A Capstone Project Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Nursing Practice

Jolene Nawrocki

College of Natural and Health Science  
School of Nursing  
Nursing Practice

December 2017

This Capstone Project by Jolene Nawrocki

Entitled: *A Guideline to Screen for Diabetic Peripheral Neuropathy*

has been approved as meeting the requirement for the Degree of Doctor of Nursing Practice in College of Natural and Health Sciences in School of Nursing, Program of Nursing Practice

Accepted by the Capstone Research Committee

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## ABSTRACT

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Diabetes mellitus is one of the fastest growing diseases in the United States and worldwide. “The number of Americans with diagnosed diabetes is projected to increase 165%, from 11 million in 2000 (prevalence of 4.0%) to 29 million in 2050 (prevalence of 7.2%)” (Boyle et al., 2001). Diabetes mellitus is known to cause numerous complications--one of the most devastating and life altering being lower extremity amputation. Approximately 185,000 non-traumatic amputations occur in the United States each year (Amputee Coalition, 2017). The burden of diabetic complications including amputations is estimated to cost the United States upwards of \$245 billion per year (Amputee Coalition, 2017).

The purpose of this doctoral capstone was to identify a gap in care for detecting diabetic peripheral neuropathy and to provide a guideline to screen for diabetic peripheral neuropathy when prompted by an alert in the electronic medical record (EMR) of patients with diabetes during routine clinical visits. The guideline will help ensure best possible health outcomes to avoid amputations for patients with diabetes. Easily installed by informatics, the EMR alert will ensure implementation of the guideline by reminding the health care tech, Registered Nurse, or provider to check the patient’s feet during both episodic and preventative appointments.

## **ACKNOWLEDGEMENTS**

This capstone is dedicated to my committee members: Dr. Vicki Wilson, Dr. Kathleen Dunham, Dr. Crystal Berg, and Sherri Hess. I am indebted to you all for believing in me and helping me finish strong “across the finish line!” To Dr. Wilson for being so willing to come and be on my committee and for her continued support throughout the project; Dr. Dunham for her emails, texts, and calls and being readily available; Dr. Berg for her work emails and time in clinic and her support and caring for her patients through this project; and Sherri Hess for being so flexible, writing emails, and her continued support. I hope this guideline will be successful in many other departments of Denver Health, the Denver metro area, and possibly the U.S. nationwide. My hope is this guideline will also prevent many unattended amputations for the love of people keeping their feet.

## TABLE OF CONTENTS

CHAPTER I. BACKGROUND AND SIGNIFICANCE .....	1
Identification of Challenges, Problems, and Situations .....	3
Problem Statement/Purpose .....	4
Theoretical Frameworks .....	4
Literature Review.....	9
CHAPTER II. PROJECT DESCRIPTION.....	13
Project Objectives .....	13
Evidence-Based Project/Intervention Plan .....	16
Congruence of Organization’s Strategic Plan to Project .....	17
Projected Timeline .....	17
Resources .....	18
CHAPTER III. EVALUATION PLAN .....	20
Plan .....	21
Do.....	22
Study .....	22
Act.....	23
CHAPTER IV. RESULTS AND OUTCOMES .....	24
Objective One Outcomes .....	24
Objective Two Outcomes .....	28
Objective Three Outcomes .....	31
Objective Four Outcomes .....	32
Key Facilitators.....	33
Key Barriers .....	33
Unintended Consequences .....	34
Summary.....	34
CHAPTER V. RECOMMENDATIONS AND IMPLICATIONS FOR PRACTICE .....	35
Recommendations Related to Facilitators, Barriers, and Unintended Consequences.....	36

Ongoing Activities or Evaluations Outside the Scope of the Doctor of Nursing Practice Project .....	37
Recommendations Within the Framework of the Organization's Strategic Plan .....	37
Personal Goals and Contribution to Advanced Practice Nursing .....	38
Essentials of Doctoral Education for Advanced Nursing Practice .....	38
Five Criteria for Executing a Successful Doctor of Nursing Practice Final Project .....	40
Personal Note .....	41
REFERENCES .....	42
APPENDIX A. INSTITUTIONAL REVIEW BOARD APPROVAL AND STATEMENT OF MUTUAL AGREEMENT .....	45
APPENDIX B. BROCHURE .....	48
APPENDIX C. FLOW CHART .....	51
APPENDIX D. OLD FOOT SCREENING SHEET .....	53
APPENDIX E. CONSENT FORM TO PARTICIPATE IN HUMAN RESEARCH.....	55
APPENDIX F. JEAN WATSON'S CARING THEORY MODEL .....	58

## LIST OF TABLES

1.	Results of Delphi Survey Round One.....	29
2.	Results of Delphi Survey Round Two .....	30



## LIST OF FIGURES

1.	The Stetler model.....	6
2.	The plan-do-study-act framework.....	21
3.	Patients admitted with a diabetic foot infection or wound .....	25
4.	Patients with a primary care provider .....	25
5.	Patients with foot exam in last three months .....	26

## LIST OF ABBREVIATIONS

American Diabetes Association	ADA
Cardiovascular Disease	CVD
Center for Disease Control	CDC
Colorado Multiple Institutional Review Board	COMIRB
Cumulative Index to Nursing and Allied Health Literature	CINAHL
Doctor of Nursing Practice	DNP
Electronic Medical Record	EMR
Health Care Technician	HCT
Institutional Review Board	IRB
Low and Middle Income Countries	LMIC
Lower Extremity Amputation	LEA
Primary Care Provider	PCP
Registered Nurse	RN

## CHAPTER I

### BACKGROUND AND SIGNIFICANCE

Diabetes mellitus is a growing concern in the United States. The Centers for Disease Control and Prevention (CDC, 2017) report staggering and concerning statistics:

- Twenty-nine million people (9.3%) of the population in the United States have diabetes.
- Non-Hispanic, Black, Hispanic, and American Indian/Alaska Native adults are twice as likely to be diagnosed with diabetes than non-Hispanic White adults.
- Two hundred eight thousand people younger than 20 years were diagnosed with diabetes (Type 1 or Type 2) in 2012.
- “Nearly half of the individuals who have an amputation due to vascular disease, which includes diabetes, will die within five years” (Amputee-Coalition, 2017, p. 1).
- In 2012, 86 million adults aged 20 years and older had prediabetes.
- In 2012, diabetes and its related complications accounted for \$245 billion in total medical costs and lost work and wages. This figure was up from \$174 billion in 2007.

Diabetes mellitus is not only a growing problem in the United States but also in Colorado.

- In 2013, 1,769 amputations were recorded for different diagnoses.
- Lower extremity amputations (LEAs) accounted for 1,511 in 2013.
- More men had amputations compared to females in 2013 (1,206 versus 463, respectively; Amputee Coalition, 2017).

“These new numbers are alarming and underscore the need for an increased focus on reducing the burden of diabetes in our country,” said Ann Albright, Ph.D., R.D., director of CDC’s (2017) Division of Diabetes Translation: “Diabetes is costly in both human and economic terms. It’s urgent that we take swift action to effectively treat and prevent this serious disease” (p. 1).

This capstone focused on LEAs--a related diabetic complication. “Approximately 185,000 non-traumatic amputations are performed in the United States each year” (Amputee Coalition, 2017, p. 1). Even more alarming is the five-year survival rate of patients who undergo an LEA is less than that of breast, colon, and prostate cancer combined (Amputee Coalition, 2017). In addition to its deadly impact, amputations come at a substantial financial cost. The average cost of a lower extremity amputation is over \$70,000 (Day, 2014). Based on the volume of amputations performed each year, this puts the annual cost of LEAs at approximately \$1.3 billion. This is “a tremendous financial burden on the country” (Day, 2014, p. 1). Another staggering fact about lower extremity amputations is “55% will require amputation of the second leg within 2-3 years” (Pandian, Hamid, & Hammond, 1998, p. 1). So, why are amputations occurring at such an alarming rate when patients with diabetes have established care with a primary care provider?

## **Identification of Challenges, Problems, and Situations**

### **Challenges and Problems**

The patient population at a level one trauma medical center in a large inner city can be challenging. Patients face many social and economic trials including homelessness, poverty, means of reliable transportation, lack of insurance, English as a second language, health illiteracy, misunderstanding the severity of disease with which they are diagnosed, and lack of family or social support.

### **Situations**

Patients present to the emergency department or the urgent care clinic with severe diabetic foot infections. These foot infections are a result of their decision to wait for medical attention or to postpone establishing care. As a result, they frequently undergo surgical interventions including incision and drainages, wound debridement, and amputations. These procedures are often associated with hospitalizations that require long-term antibiotic therapy in hopes that medical care can save the remaining foot or limb.

Diabetic foot complications are typically only evaluated during planned primary care visits that are likely to occur only one or two times a year based on American Diabetes Association (ADA; 2017) guidelines. However, these same patients often visit the hospital several other times a year for episodic care. This creates an opportunity to develop a guideline for evaluating foot complications in patients with diabetes during non-primary care visits.

With existing medical records system in place, the opportunity already exists to easily flag or alert medical staff when patients with diabetes are coming in for care. This

alert would remind staff to check the patient's feet for peripheral neuropathy, nonhealing wounds, or any other complications that might be occurring.

### **Problem Statement/Purpose**

The purpose of this Doctor of Nursing Practice (DNP) scholarly project was to investigate why there is a gap in care, why amputations occur in patients with established primary care, and whether a guideline could help fill the gap in care and reduce the number of amputations in patients with Type 2 diabetes.

In a level one trauma medical center in a large inner city that serves a vulnerable population, the author identified a gap in care for patients undergoing amputations due to complications of Type 2 diabetes even when a primary care provider had been established with the patient. This raised several questions. Could it be that foot screenings were not being done enough? Was it because patients were not being educated on foot complications due to Type 2 diabetes? Could a guideline for screening for diabetic peripheral neuropathy decrease the number of lower leg amputations? Would an alert in the electronic medical record (EMR) be supportive of the guideline? Would the alert trigger the care provider team to check the feet of the patient who has diabetes when the patient comes in for an unplanned visit? Could a guideline and the alert in the EMR close the gap between unplanned and planned visits? Would this alert be accepted by the medical center's front-line caregivers?

### **Theoretical Frameworks**

The Stetler (2001) model was developed in 1976 by Cheryl Stetler and Gwen Marram at the University of Massachusetts. It has been "refined by Stetler 3 times, primarily while working in hospital settings" (Rycroft-Malone & Bucknall, 2010, p. 56).

This model was utilized in this capstone project due to the “criteria-based, decision-making steps” and “practitioner-focused model currently useful for both individuals and groups making a collective decision” (Rycroft-Malone & Bucknall, 2010, p. 51). The model’s purpose was to provide guidance for the careful thought or problem-solving process of determining:

- The applicability of research and additional evidence to a specific practice-related issue.
- The exact nature of the evidence to be applied and implications for its conversion into a usable form.
- The how-tos of effective implementation and evaluation of acceptable evidence in practice (Rycroft-Malone & Bucknall, 2010, p. 52).
- Use of research-as-a-process refers to use of individual components of the research method for routine problem-solving rather than for the conducting of research (Stetler, 2001, p. 272).

Figure 1 presents a visual representation of the Stetler (2001) model;

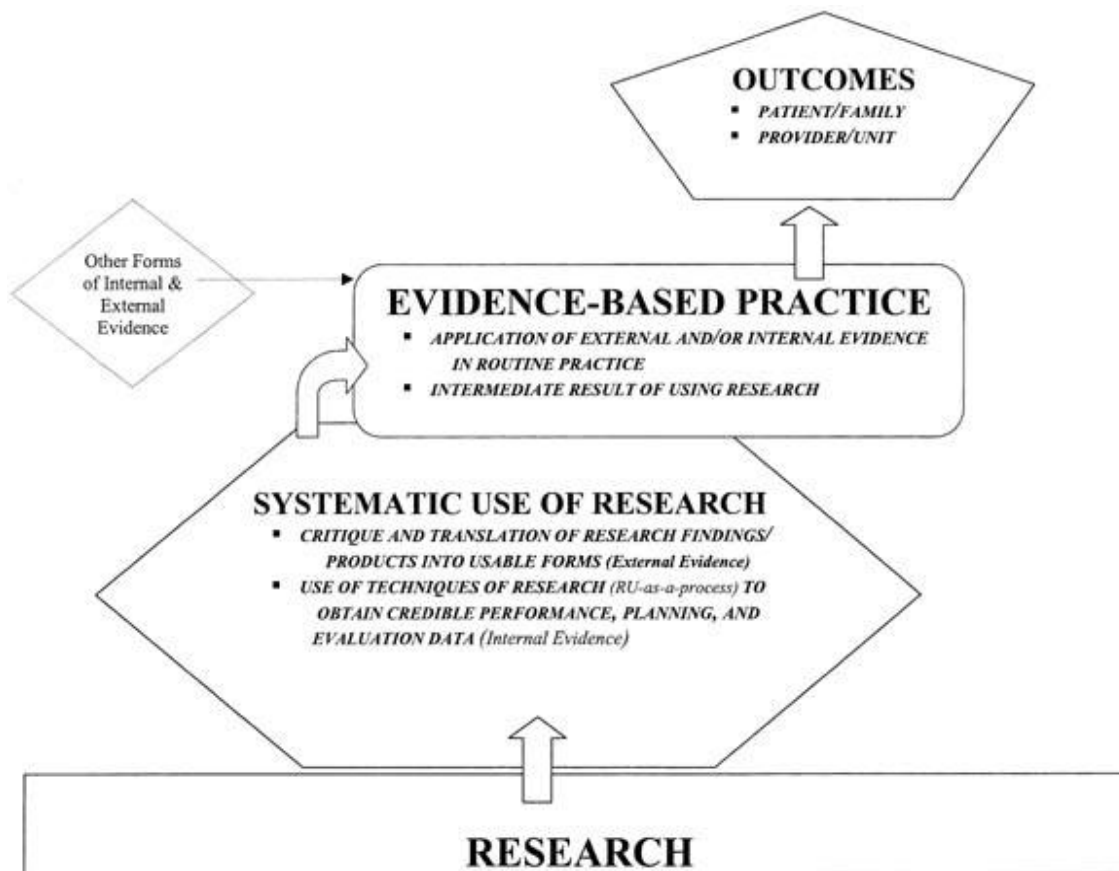


Figure 1. The Stetler model.

As discussed above, the model's decision-making steps guided this doctoral capstone:

- **Phase I: Preparation.** This phase outlined the importance of the capstone, the reason for the capstone, presentation of the capstone to capstone committee, and presentation to the Institutional Review Board of the University of Northern Colorado for approval.
- **Phase II: Validation.** This phase included reviewing literature on foot care, noninvasive screenings of diabetic neuropathy, risk factors for foot ulceration, infections causing amputations, and highest level of evidence



(e.g., CINAL, systematic reviews, websites, and randomized controlled trials).

- Phase III: Comparative Evaluation/Decision Making. The panel of experts and meeting with informatics were utilized with subject matter for implementing a smart phrase alert, developing questionnaires/surveys, and providing brochures/educational material to patients.
- Phase IV: Translation/Application. This phase included developing and implementing a clinical practice guideline for screening for diabetic feet at high risk of amputation and educating patients who have diabetes on the complications to the feet including foot ulceration, infection, and amputation.
- Phase V: Evaluation. Even though this guideline was not implemented, this phase consisted of measuring and comparing how many amputations were done three months prior to the guideline and three months after the guideline was implemented.

The reach, evaluate, adopt, intervention, and maintenance (RE-AIM) framework was used to evaluate the need for a guideline to screen for diabetic peripheral neuropathy in a level one trauma medical center in a major inner city. The RE-AIM's goal is "The development of efficacious interventions is clearly a priority among scientists interested in health promotion and the prevention of chronic diseases" ("Applying the RE-AIM Framework," 2017, para 1).

Reach: This capstone concentrated on reaching patients with Type 2 diabetes—those who already had primary care and were at risk for peripheral neuropathy--to

decrease the number of amputations. Upon the University of Northern Colorado (UNC) Institutional Review Board's (IRB) approval (see Appendix A), data were collected through chart reviews over a three-month period to identify the number of patients with diabetes with a primary care provider who had had an amputation and whether a comprehensive foot exam was done prior to the amputation.

Effectiveness: This part of the objective was to discover if the guideline could be used effectively in saving costs and, more importantly, decreasing the rate of amputations. Will providers see it as a tool? Will it be used in an episodic appointment?

Adoption: Adoption of the guideline was evaluated through a panel of experts who reviewed the guideline prior to the date of implementation. After approval of the experts, the guideline would be put in place in primary care clinics to help recognize when a patient has diabetic peripheral neuropathy or the beginnings of neuropathy.

Implementation: Implementation did not occur. Measuring the success of the guideline would be based on a decrease in amputations in the Type 2 diabetic population who also had established care. Completing a future chart review will aid in the measurement of success by seeing how much the guideline was being utilized, thus saving costs, conserving resources, and improving patients' quality of life.

Maintenance: The guideline is intended to provide flexibility based on individual needs of the patients. Since it is a guideline, providers can take portions or all of it to adjust to their needs as a provider and to the needs of the patient. One of the suggestions in the guideline might be how often we do monofilament testing. The American Diabetes Association (2017) recommends an annual comprehensive foot exam that includes sensation, pulses, examination of the skin, and checking for any wounds or pressure areas

of concern. Based on an algorithm, the guideline suggests a comprehensive foot exam quarterly or it might be based on how often the patient comes into see the primary care provider (PCP). It can also be used in an episodic appointment like urgent care.

The plan-do-study-act (PDSA; Sideris & Stosky, n.d.) framework for process improvement was part of the guideline's evaluation (see Chapter III). This framework shows the process of how the guideline would be effective in decreasing amputations by screening for diabetic peripheral neuropathy. Educating the patient on diabetic peripheral neuropathy complications is the beginning of a partnership with the provider and encourages the patient to take the lead role in his or her health.

### **Literature Review**

A comprehensive literature review to search for other guidelines to screen for diabetic peripheral neuropathy included Cochran Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Google Scholar. Keywords included in the search were *diabetic neuropathy*, *guideline to screen for diabetic peripheral neuropathy*, *amputations*, *complications of diabetes*, and *EMR alerts*. The search was for other guidelines used for screening diabetic peripheral neuropathy and recognizing the complications of diabetes. When the author was searching, one extensive guideline was found from a reputable source. It was a supplemental guideline developed by Frykberg et al. (2006). This guideline was quite long and had several illustrations and algorithms on various diabetic foot disorders including data on LEAs.

Overall, the articles reviewed were helpful in recognizing the need for screening for diabetic peripheral neuropathy and how this would decrease the amount of

complications. The articles were broken down into four main categories: prevention for patients in a lower socioeconomic class, decreasing hospital admissions, conserving resources, and EMR use in patient care. The articles were helpful in narrowing down the topic for the author on why a guideline for screening for diabetic peripheral neuropathy is so important.

### **Prevention for Patients in a Lower Socioeconomic Class**

Peterson and Virden (2012) discussed starting up a nurse-managed safety-net clinic and how preventative care saved on hospitalizations, infections, and amputations. Muirhead, Roberson, and Secret (2011) reviewed how foot care services among the homeless--who are at the greatest risk for feet problems--could decrease infection, wounds, and hospitalizations. In a study conducted by Adjel, Agyemang, Dasah, Kuranchie, and Amoah (2015) and funded by the staff development of the School of Allied Health Services, College of Health Sciences, University of Ghana, the authors noted, "The burden of diabetes is particularly high in low-and middle-income countries (LMIC) and imposes enormous problems on the health systems of these countries" (p. 818).

### **Decreasing Hospital Admissions**

Peterson and Virden (2012) also noted their safety net clinic had a 400% reduction in hospitalizations for diabetes mellitus foot complications. Their model of care was to increase access to quality health care and improve health related outcomes including patients with chronic diseases such as diabetes. Bryant and Beinlich (2003) noted, "Well documented foot care can prevent serious complications. ...Patients [need] to be educated and receive professional foot care" (p. 467).

## **Conserving Resources**

All the articles reviewed in this category underscored the cost savings provided by prevention when compared to episodic or emergent care. Day (2014) indicated, “\$1 invested in care by a podiatrist results in \$27 to \$51 of savings for the healthcare system” (p. 1). In a search for guidelines, PUBMED returned a guideline by Frykberg et al. (2006) that explained how billions of dollars were being spent not only on amputations but out-patient care added to the cost of the amputation and would exceed \$6 billion dollars annually (p. S-4). This number has most certainly increased since this capstone was written and the guideline would be implemented. These billions of dollars could be greatly reduced if screenings identified diabetic peripheral neuropathy, thus preventing ulcerations that turn into gangrenous infections. Adjel et al. (2015) discussed using an electronic reminder and alert: “A system which is able to identify high risk patients will significantly help in managing such patients, which will lead to reduced expenditure and better health care outcomes” (p. 821).

## **Electronic Medical Record Use in Patient Care**

The final articles reviewed were found using the key search words *EMR alerts*. Adjel et al. (2015) discussed how “the use of information technology in clinical practice has advanced quality of care, primarily through timely diagnosis and intervention, reduction of medical errors, and better communication within the health care team” (p. 818). Within a control group of “200 diabetic patients...the intervention group was given electronic reminders for their clinical appointments and their physicians were prompted with abnormal laboratory results for six months” (Adjel et al., 2015, p. 818). This article showed the usefulness of the technology and how “good clinical management” assisted in

reducing complications and “improved quality of life” (Adjel et al., 2015, p. 818). In a study conducted by Tolar and Balka (2012), there was a section that discussed screening patient populations and proactive care, which is perfect for setting up an alert for medical teams to screen for diabetic peripheral neuropathy. “The reminders can be used to support proactive or preventative care, in that they make doctors aware of actions to be taken for individual patients” (Tolar & Balka, 2012, p. 464).

## CHAPTER II

### PROJECT DESCRIPTION

#### Project Objectives

##### Objective One

The first objective was to identify a gap in care for detecting diabetic peripheral neuropathy. From informal observations and conversations with colleagues at a major trauma medical center that serves a vulnerable population, a gap appeared to exist in identifying patients with diabetic peripheral neuropathy in a timely manner. The reach, effectiveness, adoption, implementation, maintenance (RE-AIM) framework supported this objective. The goal of RE-AIM is “the development of efficacious interventions [and] is clearly a priority among scientists interested in health promotion and the prevention of chronic diseases” (“Applying the RE-AIM Framework,” 2017, para. 1).

**Reach.** For purposes of this DNP capstone, reach extended to patients with Type 2 diabetes at risk for peripheral neuropathy and subsequent risk of amputation who already had primary care. Data were collected from 11 medical charts to identify how many patients with Type 2 diabetes had a primary care provider and had undergone an amputation. Discussions with specific primary providers have driven the idea of the guideline focusing more on patients who have diabetes as well as high risk factors such as smoking, high cholesterol, renal disease, or cardiovascular insufficiencies.

**Effectiveness.** This part of the objective was intended to identify whether the guideline would be effective in saving costs and lowering the amputation rate of at-risk patients. Would providers see it as a valuable tool? Would providers use the guideline?

**Adoption.** The adoption phase of the guideline was evaluated through a panel of experts who reviewed the guideline and identified components that might need to be modified in order to drive adoption among primary care providers. The guideline would be put in place in primary care clinics to help recognize when a patient has a moderate to high risk diabetic foot. Eventually the guideline could possibly be used in an episodic or emergent event such as adult urgent care or an emergency department if the patient had not established a primary care provider or was being seen for another ailment.

**Implementation.** Implementation did not occur as part of this DNP capstone due to time and the enormous task of implementing a guideline in this trauma center. If implemented, outcomes would be measured by the success of the guideline based on its ability to reduce amputation rate during a pilot study of chart reviews and receiving statistics from the informatics department. If successful, this guideline would most certainly save costs and improve patients' quality of life.

**Maintenance.** The guideline is subject to flexibility based on individual patients, their needs, and goals of care. Because it is a guideline, providers can adopt parts or all of it to adjust to their needs and to the needs of the patient. One of the suggestions in the guideline might be how often monofilament testing is conducted. The American Diabetes Association (2017) recommends an annual comprehensive foot exam that includes sensation, pulses, examination of the skin, and checking for any wounds or pressure areas of concern. The guideline suggests a quarterly comprehensive foot exam.



It might also be based on how often the patient comes into see the provider or enters the hospital even if for episodic care.

### **Objective Two**

The second objective was to develop a guideline to screen for diabetic peripheral neuropathy based on the best evidence available from extensive literature reviews and the input from a panel of five medical experts through the Delphi survey (a podiatrist, an advanced practice provider, a nurse manager of the urgent care clinic, a nurse educator from the emergency department, and a doctor who works in one of the medical center's clinics). "Consensus methods such as the Delphi survey technique are being employed to help enhance effective decision-making in health and social care" (Hasson, Keeney, & McKenna, 2000, p. 1008). The following four questions were asked in the survey:

1. Would this guideline help in screening for diabetic peripheral neuropathy?
2. Do you feel an alert under the "Best Practice" would prompt caregivers to check the feet of a patient with diabetes?
3. Do you feel this guideline would be followed or used by the caregiver team?
4. What challenges do you perceive with implementing the guideline?

Five panel experts were presented with the guideline for review in round one and any changes were reviewed and possibly amended to the guideline for round two.

### **Objective Three**

The third objective was to explore the possibility of implementing an EMR alert. This objective entailed working with informatics and the EMR counsel team to implement an alert in the EMR. The alert would be part of the "Best Practice" tab in the EMR that would signal the provider, nurse, or health care tech to check the feet of the

patient with diabetes. The goal was to check a patient's feet twice a year at a minimum or possibly every visit to the medical center instead of the yearly check recommended by the ADA (2017).

#### **Objective Four**

The fourth objective was to evaluate initial findings and make appropriate modifications to the guideline. This objective was based on the RE-AIM framework and the launch of the guideline and algorithm. Unfortunately, this guideline was not launched at this time. However, the development of the guideline, the EMR alert, and the planning of the implementation were part of the project. Launching this guideline and the EMR alert were beyond the scope of this project as they would require a separate project and IRB approval. Also, due to the complex nature of this organization, it could take several months to implement.

#### **Evidence-Based Project/Intervention Plan**

This DNP capstone project was aimed at developing a clinical practice guideline based on research, evidence, and a panel of experts using Delphi surveys. The goal of the guideline was to help prevent amputations with early screening of diabetic peripheral neuropathy including working with the informatics department to create an alert when the patient being seen is diabetic. This alert would show up no matter why the patient was being seen, whether episodic or preventative, to remind the provider to check his/her feet.

The Stetler model was utilized because the model "has long been considered a practitioner-orientated model" (Rycroft-Malone & Bucknall, 2010, p. 52). The model uses five phases for implementing evidence-based practice: "preparation, validation, comparative evaluation/decision making, translation/application, and evaluation"

(Rycroft-Malone & Bucknall, 2010, p. 53). The RE-AIM framework was used to evaluate the need for a guideline at a level one trauma, inner city medical center. Lastly, two different rounds of Delphi surveys were used to ask a panel of experts their input on the guideline. The Delphi method uses “consensus methods, namely brainstorming” (Hasson et al., 2000, p. 1008) to make effective changes if needed. The resulting guide was not implemented due to the level of involvement and time required to institute in the level one trauma center.

### **Congruence of Organization’s Strategic Plan to Project**

The medical center’s strategic plan is to give as much as possible to their inner city underserved population as conservatively as possible. The institution recognizes and follows cost interventions due to the enormous amount of care given at a charitable level. Most reimbursements are at a reduced level under Medicaid and Medicare programs utilized at this medical center. Cost interventions are always respected and expected at the executive level because of the continuous concerns surrounding funding.

### **Projected Timeline**

The projected timeline for completion of this capstone project was as follows:

- Summer 2016--Phenomenon of interest approval
- Summer 2016--Literature review begun
- Summer 2016--Rough draft of proposal for project
- May 3, 2017--Defend proposal
- May 2017—IRB consideration
- June/July 2017-- UNC’s IRB approval and Statement of Mutual Agreement signed (see Appendix A); approvals were followed by meetings regarding

the EMR, chart reviews/audits, and development of clinical guideline and algorithm

- August 2017--Complete DNP capstone project presented to capstone committee.
- October 2017--DNP capstone defended and submitted to Graduate School.

This timeline was subject to change based on chairperson and committee advice to the author on completion steps for the capstone project.

### **Resources**

The author of this capstone invested much time and research into this intervention. The author met with informatics to request assistance with data gathering and medical chart reviews, which would aid in implementing the guideline. This alert would occur to check patients' feet, whether the appointment was episodic or preventative, if the patient was a high-risk diabetic. High risk factors included smoking, hyperlipidemia, hypertensive, and/or kidney disease. Meetings with the nursing research department helped the author understand the processes for navigating various areas including diabetic education, how to utilize the facilities research, and how to use the onsite e-library. In preparation for teaching the diabetic class, a PowerPoint was designed specifically for those sessions. The author spent her own time and money to design a brochure to distribute to patients in podiatry and at the diabetes class (see Appendix B). The author's gas to and from the medical center for meetings, classes, and research was expensed.

The chairperson was Dr. Kathleen Dunemmn and other committee members included Drs. Vicki Wilson and Chrystal Berg as well as Sherri Hess. Dr. Dunemmn

offered her wisdom and feedback weekly to help the author prepare for this capstone. She is a faculty member at the University of Northern Colorado and is the Director of the DNP program. Dr. Wilson was recruited by Dr. Dunemmn to participate on this author's capstone committee. Dr. Chrystal Berg is a podiatrist at a level one trauma medical center; she has experience working with the underserved population and has supported the author in making a guideline to better serve this patient population. Sherri Hess has her master's in nursing informatics and has supported this author in adding an alert to the EMR for the care team to look at patients' feet and screen for diabetic peripheral neuropathy.

### **CHAPTER III**

#### **EVALUATION PLAN**

With every new intervention, the author anticipated adverse responses throughout different disciplines and providers. With change comes resistance and many variables can be both positive and negative. Screening for diabetic peripheral neuropathy more than once a year (even though the ADA (2017) recommends once a year comprehensive foot exams) for an institution that has a demographic more vulnerable than most seems like it would not have many barriers. But with any new guideline, one needs a certain amount of buy-in and support.

A panel of five experts included a podiatrist, an advanced practice provider, a nurse manager of the urgent care clinic, a nurse educator from the emergency department, and a doctor who works in one of the medical center's clinics utilized the fundamentals of the plan-do-study-act (PDSA) framework (Sideris & Stosky, n.d.) to guide the evaluation (see Figure 2).

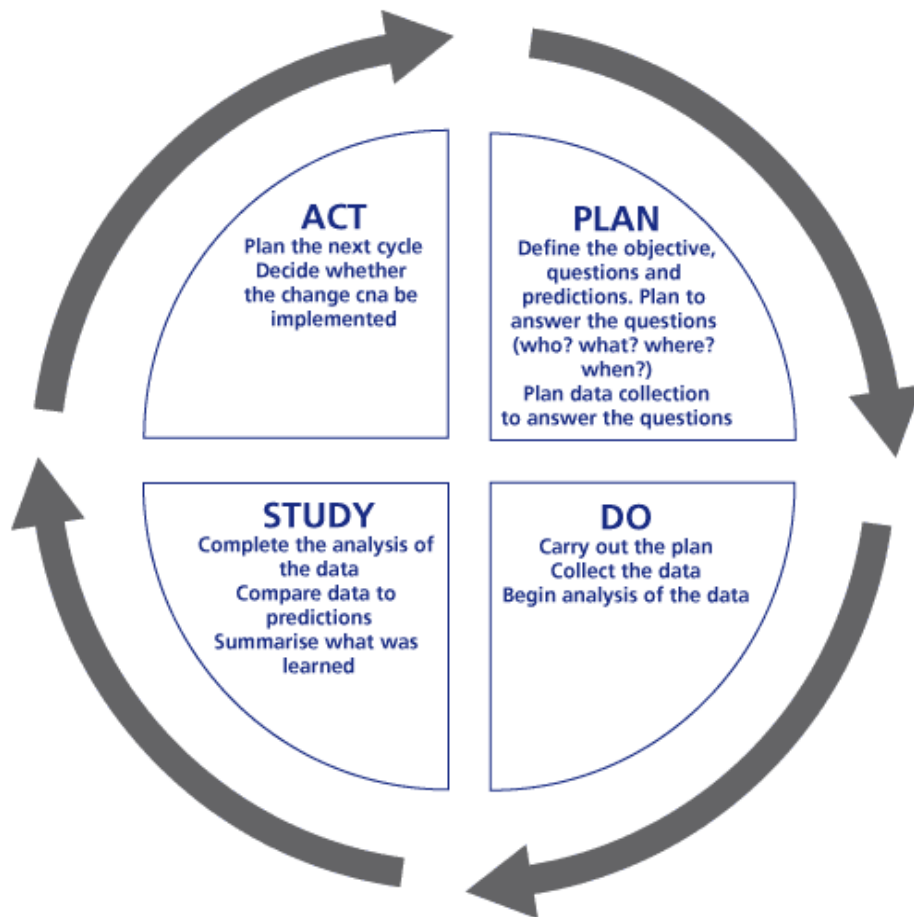


Figure 2. The plan-do-study-act framework (Sideris & Stosky, n.d.).

### Plan

The author of this paper started with a sample size of 11 patients who were admitted for amputation related to diabetic complications or ulcers. The author conducted a medical chart review of the patients who were inpatient and had a primary care provider (PCP). The information found was not used punitively but to show the importance of why a guideline was needed and screening was essential.

### **Do**

The RE-AIM (“Applying the RE-AIM Framework,” 2017) evaluation determined a consistent way to implement the guideline--first in primary care and then, if successful, in inpatient care for patients admitted without a primary care provider. Although the guideline was not implemented, the plan for implementation is described. First, the author presented a guideline to the panel of experts for their review and questions in round one via email. The panel was given a two-week timeline to respond. Using the feedback from the experts, the author implemented the changes into the guideline as needed, hopefully creating enthusiasm surrounding the potential cost savings and improving the quality of life for the patient with diabetes.

### **Study**

Research and chart reviews were done by the author. The findings were presented to the panel of experts during the two-week initial review of the guideline. This information was presented to show the growing need for the preventative screening. Communication to the panel was through email and include a PowerPoint showing the guideline, an algorithm, projected cost savings, and survey questions. Once the guideline was created and released, a follow-up study would be conducted three months after implementation by the author. This study would determine whether using the guideline to screen had decreased the amount of amputations and hospitalizations of patients who already had a PCP. These results would be collected and sent out to the panel of experts via email for review.



### **Act**

The results of the review were sent out to the panel of experts for evaluation over a two-week period. The final feedback would guide changes of the guideline if needed. The goal of the guideline was to save patients from wounds that could potentially turn into life changing amputations. It puts responsibilities on the patient to examine their feet and engages the provider to become a partner with the patient in avoiding diabetic complications. Involving the patient and discussing goals of health with the patient helps them feel empowered and gives them greater confidence and autonomy over their own healthcare. In addition, educating patients, and their loved ones, assists with compliance.

## **CHAPTER IV**

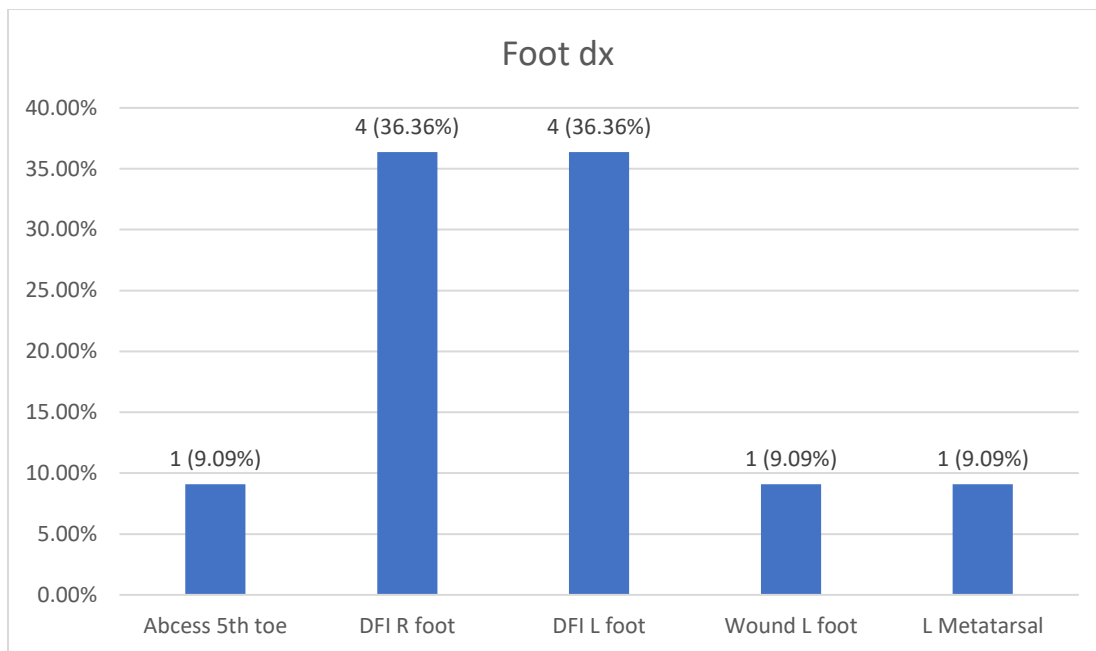
### **RESULTS AND OUTCOMES**

The purpose of this DNP scholarly project was to investigate why there is a gap in care, why amputations occur in patients with established primary care, and whether a guideline could help fill the gap in care and reduce the number of nontraumatic amputations in patients who have Type 2 diabetes. The first objective of this quality improvement project was to identify a gap in care for detecting diabetic peripheral neuropathy using the RE-AIM (“Applying the RE-AIM Framework,” 2017) framework. The second objective was to develop a guideline to screen for diabetic peripheral neuropathy. The third objective was to explore the possibility of implementing an EMR alert. The fourth and final objective was to evaluate initial findings and make appropriate modifications to the guideline.

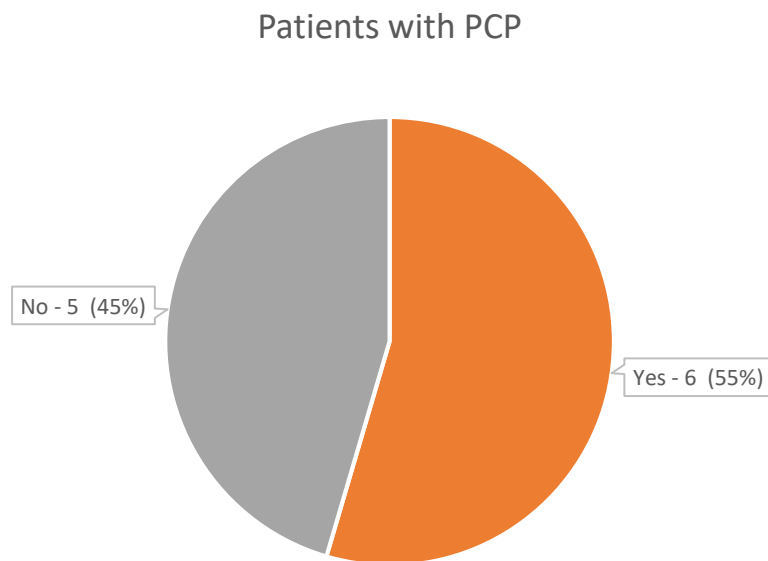
#### **Objective One Outcomes**

##### **Reach**

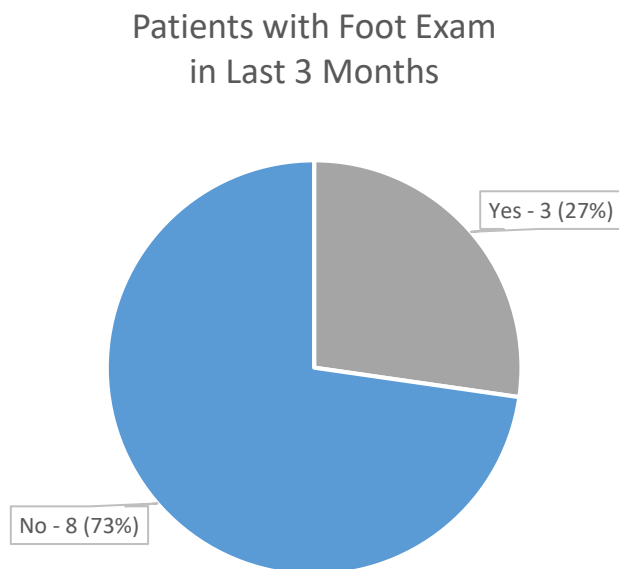
The first objective was to identify a gap in care for this patient demographic. A review was conducted in August of 2017 of 11 medical charts, which identified patients who were admitted with a diabetic foot infection or wound (see Figure 3), whether those patients had a primary care provider (see Figure 4), and if they had received a foot exam in the past three months (see Figure 5). All patients in the chart review were inpatient and had a nontraumatic amputation due to a diabetic foot infection or nonhealing wound.



*Figure 3.* Patients admitted with a diabetic foot infection or wound.



*Figure 4.* Patients with a primary care provider.



*Figure 5.* Patients with foot exam in last three months.

### **Effectiveness**

The intention of the guideline was to save costs and lower the amputation rate of this high-risk population through early detection via visual foot screening during each clinical visit. To look at the overall effectiveness, the rate of amputations would have been reviewed over a span of a three-month period post release of the guideline. As stated before, the effectiveness was not measured due to time constraints in implementing the guideline. The guideline--presented in the form of a flowchart (see Appendix C)--was based on feedback gathered using the Delphi survey method and covered more on education, prevention, and anticipatory guidance compared to the old foot screening sheet (Appendix D). In addition, the new flowchart utilized cardiology with possible involvement of an EMG specialist.

## **Adoption**

The guideline was evaluated by a panel of experts through two Delphi survey rounds executed by the author. Prior to the first round, the author sent out an informed consent to the panel of experts explaining the survey was completely voluntary (see Appendix E). The first round consisted of a series of questions directed to the panel of experts using Survey Monkey. Shortly after, a second round of questions was sent to the panel of experts along with a link to the guideline flowchart.

## **Implementation**

Implementation did not occur due to time constraints and roadblocks the author encountered when discussing the guideline with different disciplines at the level one trauma center. For example, during the survey process, one medical doctor inquired with the author about the topic of annual foot exams. He expressed his concern that conducting foot exams more than once a year would be challenging due to many other “pressing issues” that need to be addressed during clinical visits including polypharmacy, substance/opioid abuse, chronic disease management, cancer screening, and health care maintenance. He mentioned that appointments were often based solely on what specific needs the patient wanted to address. When the author suggested the guideline would fit right along with chronic disease management and health care maintenance, the doctor agreed but cautioned that these kinds of changes “get pretty complicated” due to the number of stakeholders affected. He suggested developing a guideline that could be utilized more often in a higher risk patient--patients who have other comorbidities such as hyperlipidemia, Hgb a1c > 9, and cardiovascular problems that coincide with a patient who is a “brittle” diabetic.

## **Maintenance**

Maintenance would be based on the guideline's flexibility to cater to the individual needs and goals of care the patient with diabetes projects or requests. As stated in earlier in this capstone, the ADA (2017) recommends a yearly comprehensive foot exam but the author recognized that annually was not enough for this patient population. The demographic of patients at this level one trauma center consists of poor, homeless, immigrant, and sometimes government officials. As a result, it is often challenging for patients to remain compliant due to many differentials including lack of finances, emotional stability, education, and English as a second language. Thus, a flexible guideline is needed to cater to patients' specific health needs.

### **Objective Two Outcomes**

The development of the guideline in the form of a flowchart (see Appendix C) was completed with the assistance of a panel of experts using the Delphi Survey method. Two rounds were conducted. The first round was done by an email sent out with a link to Survey Monkey with a consent that informed the members of the panel that this was strictly voluntary. Table 1 presents the questions and results for the first round. During round two, the panel reviewed the guideline/flowchart. Table 2 presents the questions, with results for the second round.

Table 1

*Results of Delphi Survey Round One*

Question	Results
1. In which discipline do you primarily work? MD, DO, APN, PA, Other, please indicate.	Disciplines included two MDs (including a podiatrist), a nurse educator, a nurse manager, and a Doctor of Osteopathy who conducts EMGs
2. What department do you work in?	Emergency Department, Adult Urgent Care Clinic, Internal Medicine Community Health Services, Physical Medicine and Rehabilitation, and Podiatry Department
3. Do you feel patients with diabetes receive adequate foot evaluation under current ADA guidelines (1x per year)?	Yes = 20%, No = 60%, Not Sure = 20%
4. If a clinical guideline were available to you and your organization to improve screening for diabetic peripheral neuropathy, do you believe this could decrease the rate of amputations?	Yes = 20%, Not Sure = 80%
5. How often should patients with diabetes get their feet examined?	Every encounter at Denver Health no matter what the reason (40%), Once a year (20%), Twice a year (20%), Quarterly (20%)
6. What do you think should be included in a clinical guideline that would screen for diabetic peripheral neuropathy? Responses were given in comments.	1. Sennes Weinstein exam, vascular exam, skin exam; 2. How to do assessment properly; 3. Would follow the ADA guidelines - visual inspection; monofilament sensation; pulses....Given there are so many competing priorities in primary care clinics (where I work), it is a judgment as to how much time can be spent screening for diabetic neuropathy. I think the yearly target is probably realistic. If we did it more often (such as every 3 months), this would be at the expense of other primary care priorities; 4. Visual exam of the feet; 5. Frequency of exam, documentation guidelines, follow up guidelines

Table 2

*Results of Delphi Survey Round Two*

Question	Results
<p>1. Based on collective feedback gathered from the previous survey, the author of the survey has developed a foot exam flowchart. In your opinion, does the flowchart contain most of the key components you would include on a flowchart to aid in foot exams? Yes, No, Please add comments</p>	<p>100% agree. Comments were as follows:</p> <ul style="list-style-type: none"> <li>• Content is good. I would organize slightly different.</li> <li>• Flow chart is a little difficult to follow</li> <li>• Only thing I was thinking was asking any new patients if they have gotten any of the New Diabetes Education with initial diagnosis. (i.e., foot care, keeping feet dry, making sure shoes are not too tight) to see where they are starting from regarding knowledge deficit. I like that you give information at end, but might be nice to see what they know coming in.</li> <li>• Yes, I think this flowchart includes most key elements. I would include text on the document which type of clinic this is for (e.g. ambulatory clinic). Another key is to note who performs this documentation - e.g. medical assistant versus nurse. We have gotten recent feedback that medical assistants can perform monofilament exam but is beyond scope assessment of skin integrity, pulses, foot deformity.....so, may be most consistent with scope of practice to have RN's doing this exam. Some small suggestions: 1) For 'pins and needles' would take out EMG option and defer to podiatry or PCP - e.g. may make sense to do other basic neuropathy labs and we do not always get EMG if consistent with DM neuropathy. 2) For diminished pulses, would make it more specific to refer to vascular clinic (as opposed to cardiology)</li> </ul>
<p>2. Do you believe the flowchart would be helpful in guiding foot exams conducted in an ambulatory clinic? Yes or No, Please add comments in the box below.</p>	<p>Yes—100%</p>
<p>3. When viewing the flowchart through a provider lens, do you believe the flowchart would serve as a useful screening tool to aid in the prevention of diabetic foot complications? Yes or No, Please add comments in the box below.</p>	<p>Yes—100%</p>
<p>4. Do you believe an Electronic Medical Record (EMR) alert would prompt providers, nurses, or health care technicians (HCT) to conduct more documented foot exams? Yes or No, please comment</p>	<p>Yes = 80%, No = 20%. Comments were as follows:</p> <ul style="list-style-type: none"> <li>• There are several alerts in place now that get routinely ignored.</li> <li>• These can tend to be overlooked, but could be helpful if educated about the importance of its use.</li> </ul>



### Objective Three Outcomes

Exploring the possibility of implementing an electronic medical record (EMR) alert was the third objective. With the alert could also come ways of keeping track of specific data on the patient with diabetes. In addition to documented foot exams, “best practice” or anticipatory guidance alerts could be beneficial to the provider and perhaps save the patient from an unwelcomed, nontraumatic amputation. Small changes such as those alerts could make a big difference in the life of the patient at risk for a diabetic foot infection that might lead to an amputation.

In their article entitled “Caring for Individual Patients and Beyond: Enhancing Care through Secondary Use of Data in a General Practice Setting,” Tolar and Balka (2012) discussed how doctors at this specific clinic

agreed about the importance of the reminders that are built into the EMR system, with the aim of supporting prevention and screening. ...[The] executive director concluded that the EMR has been helpful in guiding practice on an individual basis from early on in the clinic’s use of the system. (p. 465)

With the technological advances this trauma center has implemented over the last couple years--including installation of EPIC, it takes several committees to initiate changes. Dr. Fischer, who counselled the author, shared there are many stakeholders in the organization when it comes to making changes to the EMR system. Another roadblock the author encountered was several layers of complexity among different people in the EPIC department regarding implementing an EMR alert during the writing of this capstone. The medical doctor mentioned earlier oversees a committee that evaluates all system-wide suggestions for updates to the EMR.

The author’s hope was the trauma center and the ambulatory doctor who counselled the author would have embraced this idea of the EMR alert to serve as a tool

of reminder. Perhaps this reminder would assist in saving limbs and dollars in the near future. Due to the various levels of complexity and the time it takes to make specific changes to the EMR, these conversations will continue after this capstone is completed with hopes to keep working toward implementation at some point in the future.

### **Objective Four Outcomes**

The fourth objective was evaluating initial findings and making appropriate modifications to the guideline. This objective was not completed due to the guideline not being implemented at this time. Due to the extensive bureaucracy of this level one trauma center, it could take many months and possibly years to achieve implementation of this guideline and the release of an EMR alert. However, with the development of the guideline, EMR alert discussions continue and plans for implementation are further explored and examined throughout this capstone.

If implementation were to occur, it would start with educating a specific ambulatory clinic on the guideline, making sure new patients who are at risk for developing neuropathy, pre-diabetic patients, and those with an A1C of 5 or greater had at least an annual documented foot exam. Clinicians would be educated on how to utilize the flowchart on these patients, conduct the monofilament test, and make recommendations or draw labs as necessary. Just starting there could get the ball rolling on educating the patient on daily foot exams and providing them information on quarterly diabetic classes held at the trauma hospital.

Tracking a group of 20 patients with a new diagnosis of diabetes or prediabetes would be the first sample from a specific ambulatory clinic. These patients would be tracked from the initial documented foot exam where the guideline was used and

reevaluated three to four months later to see if there were any changes on their documented foot exam. Comparing the patient data with historical records would give the organization an idea whether or not implementation of the guideline was valuable. Even if just one toe was saved (a savings of \$70,000 on surgery alone), the author feels this would prove the guideline was a success.

### **Key Facilitators**

Factors that facilitated the collection of information on whether foot exams were being completed in primary care were (a) receiving permission through a privacy officer at the trauma center, (b) IRB approval, (c) communication through panel of experts using the Delphi survey, and (d) core members of the organization in different areas of the hospital who were key in a possible implementation of the EMR alert. The author drew the conclusion that there was much interest in developing an EMR alert but also appreciated the time it took to go through the many layers of the organization to implement change.

### **Key Barriers**

The first barrier encountered was the organization the guideline was designed for is an inner-city trauma center with multiple layers of bureaucracy. The author felt it was difficult at times to navigate through the various levels of review and approval. Secondly, implementing just the EMR alert alone would take too much time because of all the different committees involved in making changes to EPIC and the EMR. Finally, even though there were time constraints and limited availability, there was 100% response on both rounds one and two of the survey.

### **Unintended Consequences**

Conversations between a medical doctor, who is head of the ambulatory clinics, and the author led to further considerations regarding a possible EMR alert. The author believed the primary care provider should conduct the initial foot exam while the medical doctor suggested any RN, HCT, MA, NP, PA, or MD could implement the guideline and provide a baseline foot exam. The author appreciated the physician's suggestions and took them into consideration when developing the guideline.

Another unintended consequence was a meeting between the author and the Chief Nursing Officer of the trauma center, which led to the author applying solely to the University of Northern Colorado's (UNC) IRB versus both the University of Colorado's IRB (Colorado Multiple Institutional Review Board) and UNC's IRB. It was clear to the author the Chief Nursing Officer was concerned the guideline would not be implemented due to time constraints, which could have affected IRB approval.

### **Summary**

When looking at the objectives and the overall effectiveness of how a guideline could add value to ambulatory appointments and, eventually, emergent visits, it would seem to be a logical implementation. However, due to the barriers the author encountered at the level one trauma center, the guideline was not implemented at this time. When the objectives were coming together and the author was seeking IRB approval, it became apparent the many stakeholders, layers of bureaucracy, and other barriers to implementation stood in the author's way.

**CHAPTER V**

**RECOMMENDATIONS AND IMPLICATIONS  
FOR PRACTICE**

The problem statement for this DNP capstone was why amputations occurred in patients with established primary care and whether a guideline could help to fill a gap in care and reduce the number of amputations in patients with Type 2 diabetes. Information from the chart review revealed 9 of 10 patients who underwent a nontraumatic amputation had had no documented foot exam in the three months prior to the surgery. One patient had their feet examined in April in the emergency department and the amputation took place in July of the same year. Why did this happen? The chart review also uncovered that 8 out of 10 patients had primary care providers. This is an alarming finding. If all these patients had primary care providers, then where was the documented foot exam? Why did these nontraumatic amputations still occur? What was lacking? Where do we go from here?

A recommendation from this DNP capstone is a documented foot exam done quarterly through preventative appointments or when patients who have diabetes visit the emergency department or urgent care for episodic care could save the patient from a potentially life-threatening amputation. The guideline would direct this foot exam and would be catered to a patient's individual needs.

When researching articles that discussed existing guidelines, they all shared a common sentiment--diabetes is a “large burden upon the health economy” (Baker & Kenny, 2016, p. 234). Unfortunately, another common “devastating consequence of foot problems in people with diabetes” is it is “linked to an increased risk of death” (Baker & Kenny, 2016, p. 234). Thus, a collaborative effort between the patient with diabetes and the provider is imperative. If patients with diabetes understood the importance of daily foot checks and that this simple act could save them from heartache and loss including their life, compliance would improve.

These reasons alone are why the author chose this topic. Feet are not high on a provider’s list of priorities but if patients were educated enough to conduct foot exams on their own and notify their provider when there was a potential problem, these steps alone could save thousands and possibly millions of dollars on the healthcare economy.

### **Recommendations Related to Facilitators, Barriers, and Unintended Consequences**

As round one responses were compiled, it was clear to the author a guideline to prompt a quarterly foot exam was warranted. The panel of experts did not experience observing the patients the same way the author had experienced when they came to the preoperative department prior to an amputation. It is troubling as a nurse to know the amputation about to occur was 100% preventable if the patient would have been more compliant in his disease process and the patient’s primary care provider could have been more diligent in documenting frequent foot exams.

One panel participant, a medical doctor in an outpatient clinic, suggested the guideline first address patients with higher risk factors, i.e., patients with Hgb a1c >9, hyperlipidemia, smokers, and existing cardiovascular risk factors like hypertension, heart

failure, etc. Following additional discussions, the author agreed the guideline and foot exams should be prioritized accordingly. Another inquiry from the same panel participant questioned who should complete the foot exams. The medical doctor suggested perhaps the primary care provider should conduct the initial foot exam as a baseline for patient who had never had one and then the MA, HCT, or RN could conduct any follow-up exams thereafter. The author had a couple follow-up meetings with the podiatrist and committee member regarding how the guideline and the capstone were progressing and if there was anything they could do to assist the author of the capstone.

### **Ongoing Activities or Evaluations Outside the Scope of the Doctor of Nursing Practice Project**

The EPIC committee and those involved in making changes in the electronic medical record continue to meet quarterly. The author of the capstone is still in communication with the medical doctor who is part of these committees but due to various barriers, the author has been postponed when it comes to figuring out the “next steps.”

### **Recommendations Within the Framework of the Organization’s Strategic Plan**

Providing “Level One Care for All” is the main slogan of this level one trauma center. Along with this motto, this organization recognizes Jean Watson’s Theory of Caring (see Appendix F) by practicing this theory within their medical and nursing practice. Screening for any potential foot problems helps the patient feel “cared for” and aids in alleviating any costly problems in the future. The podiatry department of this level one trauma center was supportive of this capstone in hopes of decreasing nontraumatic amputations. The Assistant Chief Nursing Officer of the informatics

department was also supportive of this capstone in hopes of aiding in the implementation of an EMR alert for ambulatory and, possibly in the future, the Emergency Department or Adult Urgent Care Clinic. This alert would encourage more documented screenings of foot exams of patients with diabetes.

### **Personal Goals and Contribution to Advanced Practice Nursing**

The author's personal goal for writing this guideline was to lower the rate of nontraumatic amputations in the level one trauma center. Even if the guideline and the EMR alert were not implemented by the time this capstone was published and author had graduated, the author would like to continue trying to implement at least the EMR alert post-graduation. Just the alert alone might be enough to lower the rate of nontraumatic amputations by encouraging more foot exams in the diabetic population. The EMR alert's implementation is a personal goal of the author. The whole experience of writing this capstone has given the author a new perspective on what it takes to effect change in a teaching hospital and the many road blocks one encounters along the way.

### **Essentials of Doctoral Education for Advanced Nursing Practice**

Eight essentials integrated into this scholarly DNP capstone are from the American Association of Colleges of Nursing (2006). Essential I is scientific underpinnings for practice--this essential was achieved through the literature review. Essential II is organizational and systems leadership for quality improvement and systems thinking. Introducing a new guideline in an organization such as this level one trauma center can be difficult and challenging. The author found it was a challenge to navigate the bureaucracy of this organization due to all the layers one must go through to



implement a guideline. Essential III is clinical scholarship and analytic methods for evidence-based practice. Developing a guideline to help reduce nontraumatic amputations that occur in this level one trauma center has challenged the intellect of the author of this DNP capstone. The author feels like an expert in this area of preventing nontraumatic amputations and educates patients she might encounter who have diabetes on how to avoid amputations even now as a registered nurse in this medical center. Essential IV is information systems/technology and patient care technology for the improvement and transformation of health care. This essential was met through interaction with the EPIC team of the medical center to install an alert. This alert would be included within the EMR to encourage providers to conduct foot exams on the patient who has diabetes. After the initial exam has been initiated by the provider, then the HCT or RN could complete subsequent exams that should be done quarterly. Essential V is healthcare policy for advocacy in health care. The guideline was created to promote advocacy for high risk patients by encouraging preventative care and drawing attention to early indicators that might be otherwise ignored to avoid life-threatening amputations.

Essential VI is interprofessional collaboration for improving patient and population health outcomes. This guideline to help screen for diabetic peripheral neuropathy supports this essential. By conducting a foot exam, potential problems can be identified early and lower the rate of nontraumatic amputations, which is an overall diabetic health problem. Essential VII is clinical prevention and population health for improving the nation's health. Foot screening of patients with diabetes is a preventative measure and aids in preserving public health by protecting their feet. Due to the astronomical cost of diabetes in our country, prevention of nontraumatic amputations is

imperative. Diabetes is a growing public health concern and undertaking documented foot exams more than once a year is just part of lowering diabetic complications and their costs. Essential VIII is advance nursing practice. The author defines Essential VIII as “the implementation of research or other evidence into practice” (Waldrop, Caruso, Fuchs, & Hypes, 2014, p. 301). Advanced nursing practice at the doctoral level can promote change and evidence-based guidelines could assist in promoting positive outcomes in different disease processes. This essential shows a guideline or flowchart could be catered to an individual patient’s needs and a provider could help guide the next steps for what the patient’s options might be.

#### **Five Criteria for Executing a Successful Doctor of Nursing Practice Final Project**

The five criteria can be explained through a five-point system “represented by the acronym EC as PIE” (Waldrop et al., 2014, p. 301). The acronym represents the following: E= Enhance health outcomes, practice outcomes, or healthcare policy; C= Culmination of practice inquiry; P= Partnerships; I= Implement/apply/translate evidence into practice; E= Evaluates health care, practice, or policy outcomes. For this specific capstone, the *enhance* criterion was shown through how a guideline and an electronic medical record could help reduce the number of nontraumatic amputations by doing more than an annual foot exam. *Culmination* of practice inquiry was demonstrated through a guideline that could be used first in the primary clinic setting and possibly adopted into the emergent setting. Why the emergent setting as well as the primary clinic? Patients at this trauma center sometimes utilize the Emergency Department and Adult Urgent Care as their primary care clinic. *Partnerships* that were formed included the author of this capstone paper, the committee members, and a couple of members from the panel of

experts. These partnerships were forged with a goal of helping the greater good of the demographic population served at this level one trauma center.

*Implement/apply/translate evidence into practice* was accomplished through a chart review, showing a guideline to assist in foot exams in the patient who has diabetes is imperative (Waldrop et al., 2014). The review also showed that even though the American Diabetes Association (2017) recommended a yearly exam, this guideline recommended a quarterly check on the patient's feet or possibly every time a patient encountered a provider. Lastly, *evaluation of health care, practice, or policy outcomes* would be performed theoretically three to four months after the guideline would have been launched. This would be evaluated by another chart review to see if the number of nontraumatic amputations had decreased. This number might also have to be obtained from the statisticians of this trauma center who collect data for the surgery department.

### **Personal Note**

The author of this capstone would like to add a personal note to this paper. Checking people's feet on any level is humbling for both the provider and patient. A sacred moment. A moment of vulnerability. One of the reasons this capstone was so important to the author is the author believes taking care of feet is the ultimate example of Jesus Christ. Jesus, before His crucifixion at the well-known last supper, washed his disciple's feet. Imagine the Son of God washing your feet right before he would die a horrific death on a cross. For a lot of believers today, this is the ultimate show of humility.

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**APPENDIX A**

**INSTITUTIONAL REVIEW BOARD APPROVAL  
AND STATEMENT OF MUTUAL AGREEMENT**



*Institutional Review Board*

DATE: October 5, 2017

TO: Jolene Nawrocki  
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [1102174-2] A Guideline to Screen for Diabetic Peripheral Neuropathy  
SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVAL/VERIFICATION OF EXEMPT STATUS  
DECISION DATE: October 5, 2017  
EXPIRATION DATE: August 17, 2021

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or [Sherry.May@unco.edu](mailto:Sherry.May@unco.edu). Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.



Statement of Mutual Agreement  
University of Northern Colorado  
Doctorate of Nursing Practice Capstone Project

Jolene Nawrocki

July 17, 2017

The purpose of the "Statement of Mutual Agreement" is to describe the shared view between Denver Health and Jolene Nawrocki, DNP candidate from University of Northern Colorado, concerning her proposed capstone project.

**Proposed Project Title:** A Guideline to Screen for Diabetic Peripheral Neuropathy

**Brief Description of Proposed Project:** Quality Improvement project to develop a guideline to screen for diabetic peripheral neuropathy to lower the rate of amputations.

**Goal of Capstone Project:** To decrease the number of nontraumatic amputations of patients who have diabetes either type one or two and save medical costs and complications.

**Confidentiality of Patient Records:** No identifiable information will be used. The information collected is age and sex of patient with diabetes, if patient has PCP (not PCP name), A1C lab result if any, and if the patient had a foot exam in the past 3 months.

The designated Capstone Agency member will agree to student's medical chart review and if member would desire to see the final defense and remotely attend the meeting, he is invited remotely or on campus whichever he desires.

The DNP capstone project will include a final report, an abstract, potential publication, or oral presentation of the report. No personal identifiers will be included and all data will be reported in aggregate form. The author welcomes any comments or suggestions from the agency, but reserves the right to publish findings and analysis according to professional standards and principles of academic freedom. For any work of a scholarly nature, the Author agrees to follow the Agency preferences in how it is to be named or not in the final version.

\_\_\_\_\_  
Signature of DNP Student

7/18/17  
\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Privacy Officer/Agency Member

7/18/17  
\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of DNP Capstone Chair

\_\_\_\_\_  
Date

**APPENDIX B**

**BROCHURE**

Diabetes Mellitus is the leading cause of foot and leg amputations in America! BUT...

You can prevent diabetic foot complications with good routine foot care, treating wound early & aggressively, not smoking, controlling your blood sugar and pressure, wearing appropriate shoes and socks to prevent sores, and maintain an overall healthy lifestyle!

\*Adapted from Dr. Berg's PPT on Diabetic foot Education

Denver Health – Podiatry Department  
777 Bannock Denver, CO

## Diabetes & Your Feet

Why Should I worry about my feet now that I have Diabetes?





### Prevention

Your health care provider should perform a complete foot exam annually and look at your feet each visit.

Call your doctor if you have cuts, sores, feet pain, skin color changes, foot shape changes, or you feel pins and needles or numbing.

### Sensation & Neuropathy

Diabetic Neuropathy is nerve damage caused by diabetes. It can lead to painful sensations, loss of sensation, calluses, dry skin, changes in the shape of your foot, muscle cramps, or weakness and "clumsiness."

"An ounce of prevention is worth a pound of cure."  
Benjamin Franklin

### Circulation

Diabetics are at a greater risk of Peripheral Arterial Disease - arteries carry oxygen rich blood to your tissues, these can harden and narrow when you have diabetes resulting in unhealthy skin, ulcerations, pain and even gangrene.

Not smoking, controlling your blood sugars, treating your high blood pressure and exercise can prevent circulation diseases.

### Infections

Loss of sensation or poor circulation can cause you to get foot ulcerations or wounds. Wounds heal much slower in a diabetic and are more likely to get infected. If the wound has cloudy drainage, redness, pain, swelling, or bad odor go to the emergency department or urgent care as it is likely to be infected.

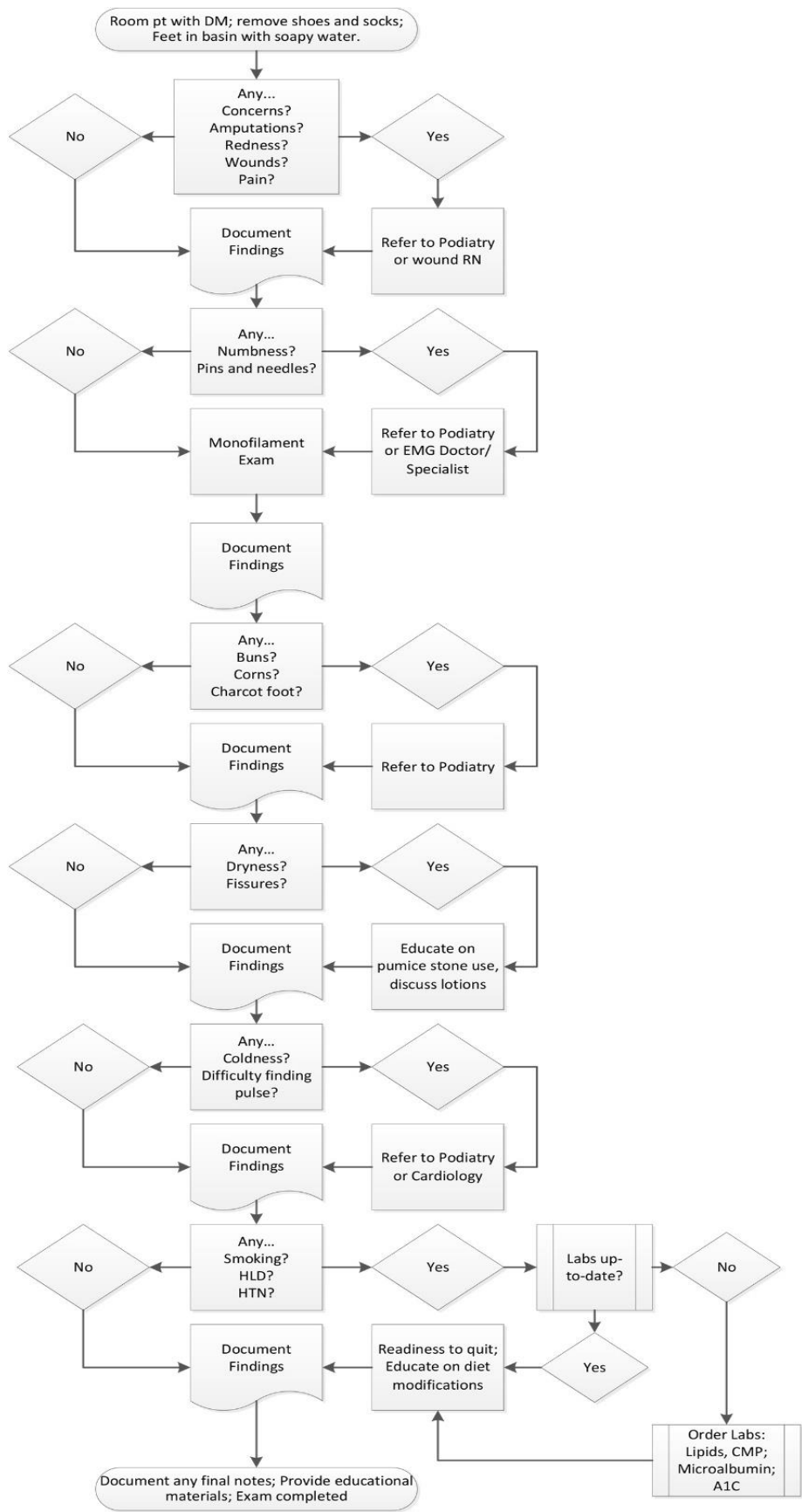
### Caring for Your Feet:

- Look at your feet everyday -between toes and the bottom of your feet
- Wash with mild soap & water daily
- Dry your feet thoroughly - especially between toes
- Always wear socks and shoes - diabetic socks if possible
- Protect your feet from extreme cold or hot
- You may care for your own calluses so long as you have good circulation and feeling to your feet

### Lotions

Diabetic neuropathy can result in dry skin especially in Colorado. Use of a urea or lactic acid cream is recommended if you have dry cracked skin - Flexitol, Kerasol, AmLactin. Sometimes dry itchy cracked skin is a sign of a fungal infection. Please see a health care provider if you suspected a fungal infection.

**APPENDIX C**  
**FLOW CHART**



**APPENDIX D**  
**OLD FOOT SCREENING SHEET**

Name, MR#, Pat#, DOB

## DENVER HEALTH OUTPATIENT ENCOUNTER RECORD Foot Screening

Use in conjunction with outpatient encounters

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ Time: \_\_\_\_\_  
MM DD YY

**SUBJECTIVE/OBJECTIVE**

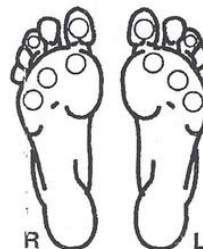
Instruct patient to remove shoes for a foot check

**ASK:**

1.  Yes  No Is there a history of a foot ulcer?
2.  Yes  No Is there a foot ulcer now?
3.  Yes  No Is there history of an amputation?
4.  Yes  No Can you see the bottoms of your feet? (If not, suggest using a hand mirror for home foot exams.)

**EXAM / Inspect:** Look top, bottom, and between toes.

5.  Yes  No Is there skin breakdown, redness, warmth, or drainage? If yes, refer to provider **NOW**.
6.  Yes  No Is there a toe deformity (hammer toe, cross-over toe)?
7.  Yes  No Is there an abnormal foot shape? (bunions)
8.  Yes  No Are the toenails long, thick or ingrown?
9.  Yes  No Is there heavy callous build-up?
10.  Yes  No Is the skin thin, fragile, shiny and hairless?



**EXAM / Sensation:** Note the level of sensation (feeling) in the circles:

+ = Can feel monofilament - = can not feel monofilament

**EXAM / Pedal Pulses:** Fill in the blanks

with a "p" (present) or an "A" (absent).

Posterior tibial Left \_\_\_\_\_ Right \_\_\_\_\_

Dorsalis pedis Left \_\_\_\_\_ Right \_\_\_\_\_

	ASSESSMENT/PLAN
	Diabetes
	<input type="checkbox"/> <b>Low Risk:</b> All "No" answers and no loss of sensation or pulses
	<input type="checkbox"/> <b>Moderate Risk:</b> Answers "Yes" to questions #8 and/or #9 and no loss of sensation or pulses.
	<input type="checkbox"/> HCP make podiatry RN appointment.
	<input type="checkbox"/> <b>High Risk:</b> Any "yes" answer to loss of sensation or pulses.
	<input type="checkbox"/> Provider refer patient to Podiatry for follow-up if appropriate.
	<input type="checkbox"/> <b>Immediate Risk:</b> Answers "Yes" to question #5
	<input type="checkbox"/> HCP notify provider. Provider to page podiatry now if appropriate.
	<b>PATIENT AND FAMILY EDUCATION:</b>
	Foot care education sheets reviewed. <input type="checkbox"/> E20-139 Foot Care Pictorial
	<input type="checkbox"/> E20-802 Foot Care tips
	Instruct patient:
	<input type="checkbox"/> To check their feet <u>daily</u> and come in right away if cuts, blisters, Red spots, swelling or open areas or sores are found.
	<input type="checkbox"/> "Foot Screen" should be repeated in 1 year for all diabetic patients.
	<input type="checkbox"/> Remove shoes and socks at each visit.

Care Provider Signature/Title Date (mm/dd/yy) Time (00:00) (Pager & Provider #)

F60-228 (10/09)

Attending Signature/Title Date (mm/dd/yy) Time (00:00) (Pager & Provider #)



**APPENDIX E**  
**CONSENT FORM TO PARTICIPATE IN**  
**HUMAN RESEARCH**

**CONSENT FORM FOR HUMAN PARTICIPATION IN RESEARCH**  
**UNIVERSITY OF NORTHERN COLORADO**  
**Level One Trauma Center in Denver, CO**

**INFORMED CONSENT – NO SIGNATURE DOCUMENT**

Project Title: A Guideline to Screen for Diabetic Peripheral Neuropathy

Student Researcher: Jolene L Nawrocki, BSN, RN, DNP-S

Research Advisor: Kathleen N. Dunemn, PhD, APRN, CNM, School of Nursing

Co-Research Advisor: Vicki Wilson, PhD, MS, RN, School of Nursing

Committee Member: Chrystal Berg, DPM

Committee Member: Sherri Hess, MSN, ACNO

Expert Consensus: A Delphi Study

The purpose of the following Doctor of Nursing Practice Capstone Project is to develop a Guideline to Screen for Diabetic Peripheral Neuropathy based clinical information and chart reviews. Evaluation and chart reviews will be conducted to see where the gap in care is and why amputations are still occurring.

The Delphi Method is a structured communication tool or technique that utilizes a questionnaire format to survey a panel of experts (within the field of study under investigation), using two rounds of questioning. Information gathered from the Literature Review regarding why a guideline to screen is imperative to prevent nontraumatic amputations. The first round of questions will relay general information regarding current recommendations from the American Diabetes Association (ADA) in checking patients who have diabetes feet. Responses gathered from round one will be used in development of the clinical practice guideline. A second round of questions will then be conducted in evaluation of the proposed guideline in applicability to practice at Level One Trauma Center in Denver. Responses gathered from the first and second rounds of questioning will be anonymously shared in the author's capstone.

The Delphi Method, originally developed in the 1950's, has been used in healthcare, as well as other industries and is of value when there is uncertainty or lack of empirical knowledge to achieve general consensus. It is an effective tool to assist in protocol changes as it requires integration of expert review and opinion even in the presence of disagreement. It is anticipated that two rounds will be necessary for completion of this capstone project. All Delphi surveys will be sent and returned electronically with a private e-mail account only accessible by the DNP student. It is estimated that each participant will spend approximately 10-15 minutes in completion of survey questions within each round of the Delphi process.

**Participation is voluntary** and all responses collected from the surveys will be kept **anonymous**. The data collected will be kept on a password protected thumb drive that will have restricted accessibility; information collected will be available only to the DNP

student and her Research Advisor. There are no anticipated risks to participants. This is a quality improvement project to prevent amputations by screening for diabetic peripheral neuropathy.

You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in a loss of benefits to which you are otherwise entitled. If you have any questions, please contact one of the undersigned.

Having read the above document and having had an opportunity to ask any questions, please complete the questionnaire “Phase One: Delphi Study Round One Questionnaire” if you would like to participate in this research. By completing and returning the Delphi questionnaire, through the Survey Monkey website, it will be assumed that you have communicated consent in participation. Please print and keep this form for future reference.

If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado, Greeley, CO 80639; Phone 970-351-1910.

This informed consent will be e-mailed and accompany each round of the study.

Student Researcher: Jolene Nawrocki, BSN, RN, DNP-S  
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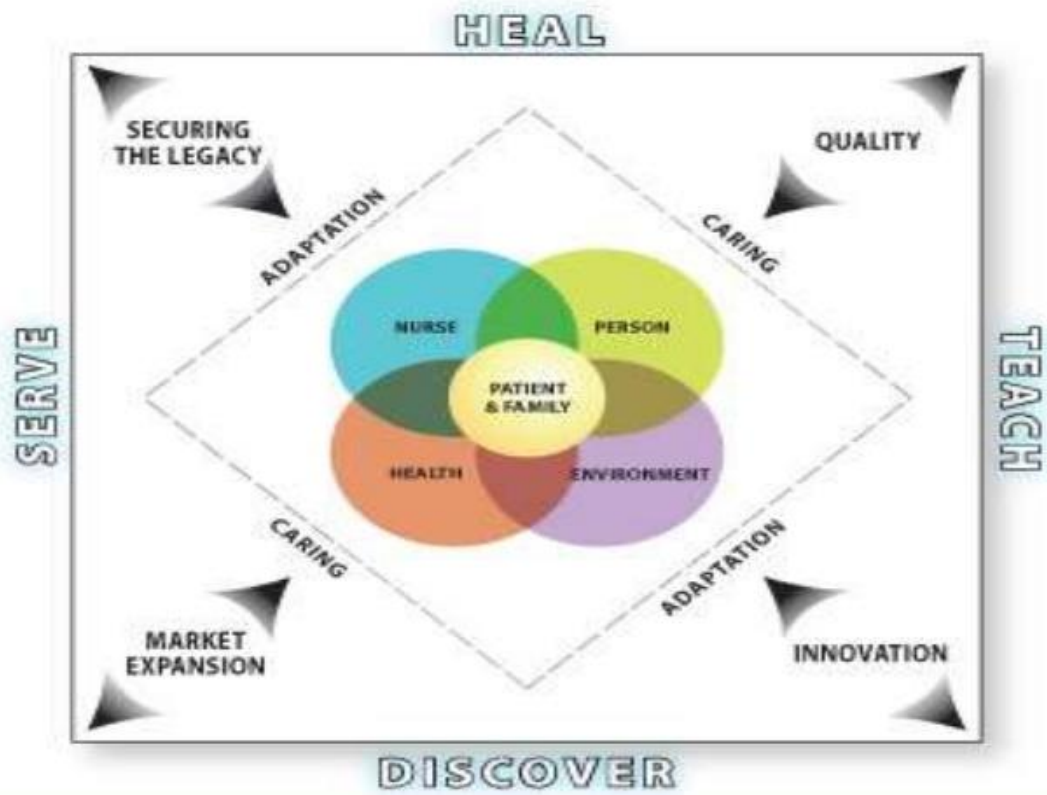
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**APPENDIX F**

**JEAN WATSON'S CARING THEORY MODEL**



Obtained from website: <https://image.slidesharecdn.com/watsontheory-140331072621-phpapp02/95/watson-theory-30-638.jpg?cb=1396250906>