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Implementation of a Risk Stratification Foot Screening Tool at a Free Outpatient Clinic: A Quality Improvement Project

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Implementation of a Risk Stratification Foot Screening Tool at a Free Outpatient Clinic

A Quality Improvement Project

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A DNP project submitted in partial fulfillment of the requirements for the degree of

Doctor of Nursing Practice

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Approval Page with Signatures

This is to certify that the DNP Project Final Report by

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has been approved by the DNP Project Team on

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for the Doctor of Nursing Practice degree

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Abstract

Background: Foot conditions and disorders are prevalent concerns for the medically underserved population, that can manifest through chronic illnesses like diabetes, peripheral vascular disease, and hypertension, especially if these conditions go undetected or unmanaged for periods of time. This population is faced with complex challenges and are at risk of illness due to inequities and disparities in access to health care services. They are known to suffer from poor health and can be reluctant to seek healthcare except in crisis. Walking is a common mode of transportation among underserved individuals and increased risks of physical injury, poor hygiene, and inadequate footwear have been cited as contributing factors to the development of foot problems. Without timely identification and appropriate treatment foot and ankle problems are a concern; they can cause significant discomfort and pain and may escalate from a minor problem to a very serious one, or lead to infections and amputations (Mullins et al., 2022). Comprehensive foot examinations are essential in detecting foot pathologies in order to sustain movement and quality of life. The purpose of this evidence-based quality improvement project was to implement a risk stratification screening tool for all foot examinations, implement a follow up appointment system based on risk score and provide patient education on self-foot care within a free clinic setting. Based on findings, risk scores would be determined to be low, medium, or high risk and have recommended follow up care based on the risk score.

Methods/Interventions: The Model for Healthcare Improvement was followed for the planning, implementation, and evaluation of this project. A foot screening tool already in use at the clinic was modified to include a risk stratification tool. The tool was developed by the DNP team and approved for use by the internal quality improvement committee at the clinic. Data was assessed over a 12- week period, to determine the percentage of foot exams performed, risk

stratification assigned to each patient, number of referrals and follow up appointments made compared to a review of foot exams performed prior to the initiation of the risk stratification tool.

Results: During 12 weeks of implementation, a total of 54 foot screenings were completed; 32 screenings using the original form with no risk stratification score and 22 using the revised form. Of the 32 patients screened, only 4 patients were referred to the medical provider for a follow-up appointment. 22 patients were screened using the revised form that assigned a risk stratification score to each patient. Of those screened, 7 (31%) were found to be low risk, 13 (59%) medium risk and 2 (9%) high risk. The results identified that 68 % of patients received a follow up appointment within 1 week based on significant screening findings versus 12.5% of patients where no risk score was assessed.

Conclusion: These results showed that implementing the risk stratification foot screening tool was clinically significant for the clinic, as it allowed for the screening and detection of foot conditions of patients as well as recommendations for follow-up care. Implementation of this tool helped to increase the amount of follow up appointments with a healthcare provider compared to using the foot screening tool with no risk stratification score. The tool helped to streamline follow up appointments based on risk score, which ensured that more patients were seen in a timely manner to prevent the progression of foot complications and disease.

Key words: *Foot screenings, foot examination, foot screening tool, diabetic foot examination.*

Phase 1: Problem Identification, Development of Clinical Question, and Evidence Review

Background and Significance of Problem

Bridgeport is the largest and most populous city in Connecticut with a population of 147,989 in 2023 (Seaberry et al., 2023). Located in Fairfield County, one of the wealthiest counties in the country, Bridgeport's median household income is one of the lowest in the state . In 2021, the city's poverty rate was 21.8%,which is nearly double both the national and state average. Socioeconomic disparities often tend to correlate with health outcomes. Factors such as stable housing, employment, literacy ,environmental hazards, and transportation all impact access to care, physical and mental health outcomes, and overall quality of life. At-risk or vulnerable populations include the elderly, residents with incomes below 200% of the federal poverty level, residents in urban core areas, racial or ethnic minorities such as Black non-Hispanics, Hispanics, American Indians, Asians and other non-White groups, residents of rural areas, persons who do not have insurance, homeless populations, non-English speakers, lesbian, gay, bisexual and transgender residents and immigrants (Stratton, Hynes, & Nepaul, 2018).

Income and employment status often drive differences in access to healthcare, the affordability of life-saving medicines, and the ability to purchase other goods and services, including high-quality housing and nutritious food (McMaughan, et al., 2020). Vulnerable individuals are less likely to seek preventive care as recommended. It is a more common occurrence that chronic diseases will go unnoticed within these populations until they are acute requiring emergency care. Consequently, the burden of disease alongside poor disease management negatively impacts health outcomes (Chien et al., 2020).

Description of the Local Problem with National Context

During the last few decades, it has been recognized that marginalized groups in this country have significantly poorer health outcomes due to limited access to medical care, health disparities, and multiple comorbidities. Medically underserved communities are specific populations that have a shortage of primary healthcare services or otherwise face unmet healthcare needs. People who are medically underserved have a higher prevalence of physical health problems, including respiratory illnesses, musculoskeletal disorders, chronic pain, malnutrition, and infectious disease (D'Souza et al., 2022). Chronic illnesses such as diabetes, hypertension, poor dental hygiene, skin, and foot conditions are reported as higher compared to the general population.

Environmental factors such as warm and wet conditions combined with poor hygiene, ill-fitting footwear and constant movement are prime factors for the development of debilitating foot problems. Foot pathologies can cause discomfort or pain, and in some cases can lead to sepsis, amputation, or death. Given that walking is the prime mode of transport for most medically underserved individuals, podiatry problems can compound all the other difficulties they face. Additionally, many foot conditions can lead to serious problems if left untreated, which impacts negatively on the individual, as well as increase costs to the health system (To, Brothers, & Van Zoost, 2016).

With the increase in the underserved population, there is a greater need for healthcare services, mostly in the form of easily accessible clinics offering a wide range of healthcare services. Routine health screening is considered to be one of the keys to reducing healthcare burdens associated with chronic diseases. Organizations such as the community resource center for vulnerable populations located in this locality, work to provide support and healthcare

resources to the medically underserved. Through its partnership with a community residential facility, clients and community guests have access to free healthcare services including dental , mental health services, physical therapy and medical screenings. This facility provides a healthcare delivery model that seeks to address the complex health concerns of the uninsured and underserved populations.

Medical screenings such as blood pressure checks, A1C checks and foot screenings at the clinic are primarily performed by first professional degree (FPD) nursing students in their final year of their degree. The clinic facilitates a community health clinical rotation year-round for nursing students from local universities under the supervision of a university clinical instructor. Free clinics act as safety nets for the U.S. medical system by providing free primary medical care to underserved populations who would otherwise seek medical care through emergency and urgent care settings (Rupert et al., 2022). Having students perform screenings helps to provide free health care services to the approximately 5% of uninsured individuals in the state and helps educate and empower the next generation of nurses to care for that population via a service-learning mechanism (Mann, Orris, & Traube, 2020).

Foot screenings are one of the most popular services provided at the clinic. Each foot screen consists of a foot bath and comprehensive foot examination utilizing a foot screening tool and concludes with free socks being offered and brief education for the client. According to the findings of the screening, patients can then be referred to a primary care provider on site for additional services such as nail trimming, local wound care, and callous removals. With the current screening tool in use, there is no system in place at the clinic to dictate when a patient should be referred to the provider on site according to the findings or when a patient should have a follow up appointment. The aim of this project is to improve the current foot screening service

by implementing the utilization of a foot screening tool that will help to identify levels of risk in patients and the need for follow-up care or monitoring.

Focused Clinical Question to Guide Evidence Search

To ensure that the free outpatient clinic is providing the best care to its patients, a comprehensive search of literature guided the review of the following clinical question:

In urban patients that utilize free foot examinations (P), does the implementation of a risk stratification foot screening tool (I) compared to current practice (C) lead to the identification of patients with foot problems (O) within a 3-month period?

Methods for Gathering External and Internal Evidence

External Evidence

To answer the selected PICOT question, a literature search was conducted. The following databases were searched: PubMed, CINAHL, and the Cochrane Database of Systematic Reviews. Keywords searched included: foot screening, foot examination, foot problems in underserved population, foot screening guidelines, and diabetic foot screening. Exclusion criteria included articles older than 2014. Inclusion criteria included English language and articles from 2014-2024. Search methods and results are described in Appendix A. The Rapid Critical Appraisal (RCA) Tools from Melnyk & Fineout-Overholt (2019)were used to critically appraise the selected articles (Appendix C).

Internal Evidence

An organizational review of policy and procedures for performing routine foot exams and care was performed prior to the implementation of the risk stratification tool. Currently the clinic uses a foot screening tool that assesses a patient's history of diabetes, history of smoking, neuropathy status with monofilament and turning fork testing, foot shape, extremity pain,

presence of open wound or laceration, claudication, and edema. After patients are screened, FPD students document their findings on the form and indicate the follow-up interventions needed. Forms are then reviewed by the clinical instructor for the day. With this current practice at the clinic, there was no system in place to dictate when a patient should be seen by a provider or how soon a follow-up appointment be made. There is also no referral system in place if a patient needed to be seen by a podiatrist for specialty care.

Evidence Appraisal Summary, Synthesis, and Recommendations

Appendix A displays the search strategy for this project. A total of ten articles that focus on foot screenings were pulled from the literature and critically appraised. RCAs were done on each article and an example is located in Appendix B. The Evidence Table for Systematic Review, which contains pertinent information from each article that was selected, is found in Appendix C. Four out of the ten articles were systematic reviews with the other articles being a mixture of Level II, III,IV and VI evidence (Appendix D). The articles searched provided the outline for this quality improvement project, which is the need for foot screenings to be performed in both diabetic and non-diabetic underserved patients.

Foot screening recommendations. Studies for the development of foot screenings and tools utilized recommendations from larger institutional bodies like the American Diabetes Association (ADA), the International Working Group for the Diabetic Foot (IWGDF), the International Diabetes Federation (IDF), and the Scottish Intercollegiate Guidelines Network (SIGN).The literature highlights that foot management programs provide an inexpensive preventative measurement in communities and educating providers to use a user-friendly foot screening tool reduces the rate of ulcers, re-ulcerations and foot amputations, especially in diabetic patients (Persaud et al., 2018).

The structured literature review identified that many assessment criteria within current guidelines support that loss of sensation, absent foot pulses, deformity, including Charcot, and history of previous foot ulcer were all individually validated as core identifiers of increased mortality or morbidity. This core set of risk factors may be useful in providing simplified, minimum criteria for identifying patients at risk (Guttormsen et al., 2020).

According to The International Working Group on the Diabetic Foot (IWGDF) which produces evidence-based guidelines on the prevention and management of diabetic foot disease, there are five key elements that underpin efforts to prevent foot ulcers: 1). Identifying the at-risk foot. 2). Regularly inspecting and examining the at-risk foot. 3). Educating the patient, family, and health care professionals. 4). Ensuring routine wearing of appropriate footwear. 5). Treating risk factors for ulceration. Successful efforts to prevent and treat diabetic foot disease depend upon a well-organized team that uses a holistic approach in which the ulcer is seen as a sign of multi-organ disease and that integrates the various disciplines involved. Effective organization requires systems and guidelines for education, screening, risk reduction, treatment, and auditing. (Schaper et al, 2020).

Foot screening in the underserved population. Mullins et al. (2022) demonstrated in their study that reaching and intervening on foot and ankle problems in underserved populations who may not seek care on their own, could be achieved through a publicly funded health service using simplified pathways to access care, including outreach. In addition to the long- and short-term benefits of the immediate podiatric treatment, building trust and connections through footcare may provide an entry point into accepting other health and welfare services.

The foot care integrated model developed in the study by Mullins et al.(2020), facilitates actual foot care practice that meets the needs of the underserved populations. The predicted

clinical foot care model helps identify high-risk groups for early screening and detection of foot problems. This model is supported by the use of simplified foot assessment and outcomes risk to increase the identification of increased morbidity and mortality in practice. Skin and nail pathologies (68.1%), inadequate footwear (51.9%) and biomechanical issues (44.1%) were the most common presentations found in this study.

D'Souza et al. (2022) reiterate in their study that there is a pressing need for early screening and detection by health care professionals and enhanced foot care services to reduce foot problems and improve foot care wellness of vulnerable people. Addressing foot-related care is a necessary step in promoting health, preventing illness, and improving access to health services among the vulnerable population. Community and health services often overlook the foot care needs, particularly in people experiencing homelessness, which leads to increased utilization of emergency services and deterioration in their health. Since people experiencing homelessness are underrepresented in health service research, little is known about their unmet healthcare needs.

The foot problems identified across studies represented a wide range of acute conditions and manifestations of chronic diseases. The high prevalence and severity of foot conditions can be attributed to a variety of physical, psychosocial, and service provision factors. Homeless individuals have an increased risk of physical injuries and repetitive minor trauma. Poor foot hygiene, sleeping on the streets, and living in crowded environments such as homeless shelters increases exposure to pathogens and increases risk of acquiring infections. Medical conditions such as frostbite, gangrene, and trench foot can occur due to lack of shelter and prolonged exposure to moist and cold environments (To, Brothers, & Van Zoost, 2016).

Most of the literature reported on the value and effectiveness of foot screenings due to the increase in identification of risk factors leading to deformities and neurovascular complications. Evidence appraised suggests the importance of history, physical foot exam, the assessment of lower extremity circulation, sensation testing at least annually for those with diabetes or other known risk factors.

Phase 2: Project Planning

Project Goals

The aim of this project was to improve the foot screening service offered at a free outpatient clinic by implementing a risk stratification scoring system. Specific project goals included:

1. To implement an evidence-based risk stratification scoring system with foot screenings to identify the level of risk according to findings at a free outpatient clinic.
2. To evaluate the number of patients screened and identify the number of patients in each risk category.
3. To implement follow-up appointment guidelines according to risk score.
4. To implement patient education according to risk stratification score.

Project Team and Roles

The project mentor is a doctoral prepared family nurse practitioner who serves as the current medical director and treats both adult and pediatric patients at the clinic. The project academic advisor is a doctoral prepared family nurse practitioner and works as a volunteer healthcare provider at the clinic. Both team members are also mentors for this DNP project. The founder and administrator of this facility is a doctoral prepared family nurse practitioner, psychiatric nurse practitioner, and who also served as a facilitator for this project.

Framework

The methodology for this project was the use of the Institute for Healthcare Improvement Model. The Institute for Healthcare Improvement (IHI, 2021) uses the Plan, Do, Study, Act (PDSA) cycle to assist in improvement work. The PDSA framework was used to guide policy changes and address the project goals. The PDSA cycle starts the process with three questions: (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? (3) What change can we make that will result in improvement?

During the "plan" stage of this project, the aim was to assess pre-implementation foot screening practices, looking at patients screened using the original screening form with no risk stratification score. Using current evidence-based guidelines and recommendations, the new foot screening tool was developed and revised by members of the DNP team to include a risk stratification score of low, medium, or high based on screening findings (Appendix G). The DNP student project leader was able to evaluate the generalizability and sustainability of the screening tool. The overview of this project was discussed with major stakeholders, allowing for staff feedback.

During the "do" phase, the DNP student project leader participated in orientation for the first professional degree nursing students who were starting their clinical rotation at SHC. The new screening tool was implemented alongside the original tool, with both tools being used congruently to screen patients. With the implementation of the new tool, the goal of this project was to compare how many patients are being identified as "at risk", a breakdown of each risk group, and major findings among patients screened. The number of follow-up appointments being made because of this identification was also examined. The PDSA cycle was used to reevaluate the workflow and use of the screening tool during this project.

Data Collection and Analysis Plan

The DNP student was onsite weekly during the implementation phase to perform foot screenings utilizing the new screening tool and to oversee the project. The DNP student collected and compared data from foot screenings performed utilizing a risk stratification score compared to forms with no risk score within a 12-week time frame. The DNP student reviewed data collected, and data provided by the data analyst. All data collected from each screening form was organized into spreadsheets with patient information deidentified and being protected per organizational policy.

Description of the setting and population

This facility is a free outpatient clinic located in Bridgeport, Connecticut that provides free healthcare , dental , mental health services, and medical screenings to patients of all ages. It delivers holistic barrier-free healthcare to the underserved, uninsured and disadvantaged in partnership with local universities. The target population for this project are adult patients that utilize healthcare services. The clinic has one full-time nurse practitioner who serves as the medical director, and nurse practitioners who volunteer weekly. First professional degree nursing students from local universities complete clinical hours as volunteers at the clinic under the guidance of their clinical instructors. In 2023, approximately 922 patients were seen for medical visits at the clinic; this total includes foot screenings that were performed.

Key Stakeholders, Staff, and Buy-in

Key stakeholders for this project included patients that utilize the clinic for medical services, staff, including the founder and administrator, medical officer, nurse practitioners, members of the quality improvement committee, clinical support staff and administrative staff. To gain buy in, an open dialogue about the implementation of the project was conducted with all key stakeholders. Feedback on the proposed practice change was solicited, promoting staff buy

in. Project oversight was provided at Sacred Heart University by DNP academic project faculty advisor.

Barriers to Implementation and Sustainability with Mitigation Plan

Table 1 outlines potential barriers to implementation that this project might have and the different strategies to overcome each barrier.

Table 1. Possible barriers and strategies to overcome these barriers.

Barriers	Strategies to Overcome Barriers
Nursing students not performing a thorough foot examination and not completing screening form.	Education on new screening forms and performing foot examinations will be provided during required orientation prior to starting clinical rotation at the clinic.
Resistance to change from current form. The new form takes more time to completed.	Educate staff and students that the new form is very similar to the old form, but the main difference is that a risk score is assigned to each patient.
Patients are reluctant to schedule follow-up appointments based on risk score.	Educate patients about the importance of making follow up appointments within the suggested timeframe to ensure that they receive the care that they need.
Time constraints are also another barrier. There could be high client volume on any given day because the clinic also accepts a lot of walk-ins.	Try to screen as many patients as possible daily. If there is a high patient volume on that given day, patients should be rescheduled to be seen as soon as possible on another day.
Patients are often non-complaint with follow up appointments.	Have the secretary give patients appointment cards. Call patients when patients are no-show for follow up appointments.

Project Timeline

Appendix F displays the DNP Project Roadmap with dates.

Resources/Budget

Table two displays the anticipated costs for this project.

Table Two: Estimated Project Costs.

Expense	Cost
Human	
Project Manager	5% of annual salary of $100,000
Materials	
Paper for screening form	Copy paper (8x11) -$40
Technology	
PowerPoint Presentation (Microsoft Office)	$114.99
Foot care supplies:	
Foot soap	1 gallon bottle - $10
Foot brushes	25 pk -$ 12
Pumice stones	200 pk- $30
Tuning fork	3 pk -$15
Monofilament	100pk- $50
Alcohol prep pads	1 box of 200- $5
Disinfectant spray	4 gallon - $100
Gloves	1 box of 250 -$22
Paper towel	1 box - $50
Total Estimated Cost	**$448.99**

Ethical Review and Project Approvals

Per the Sacred Heart DNP program policy, the differentiation between a quality improvement project or research project checklist was completed (Appendix E). This project meets the full criteria for a quality improvement project, focusing on systems change and only measures data related to system improvement. Per Sacred Heart University policy, this project must be submitted to the Institutional Review Board (IRB) for review. The project was reviewed by SHU IRB and given exempt status on October 29, 2023 (Appendix J).

This DNP student presented the project proposal to the Chief Medical Officer(CMO), founder/administrator, and members of the Internal Quality Improvement/Risk Management (QA/QI/RM) committee for review and approval to conduct this project. At this presentation, approval to conduct the project was granted from these key stake holders on October 11, 2023.

This DNP student has successfully completed and obtained certification of CITI training in: Health Information Privacy and Security, Responsible Conduct of Research, Conflict of Interest and Students conducting no more than minimal risk research (Appendix I).

Phase 3: Implementation

Implementation of Project

A 12-week project implementation phase was initiated in December 2023. The Plan-Do-Study-Act cycle was applied in the various phases of this project and is outlined below.

Plan

During the "plan" stage of this project, the DNP student engaged with key stakeholders including formal leadership, the clinic medical director, and the project advisor to review current evidence and recommendations on foot screenings. A project plan including detailed steps for change with educational materials, timelines, and deadlines was developed. After attending the clinic's orientation for first professional degree nursing students, the current foot screening being utilized in practice was reviewed. The current screening process performed by nursing students was examined and data regarding rates of foot screenings was obtained by this DNP student investigator. A new screening form, with risk assessment score was developed by the DNP project team, utilizing evidence-based practice guidelines for foot screenings. Risk scores were categorized as low, medium, and high (Appendix G).

Table 3 displays each of the three risk groups and what findings on the screening form would correlate with that group.

Table 3. Risk Stratification category and findings.

Risk Group	**Finding**
Low	• History of smoking, • Abnormal foot shape • History of callusing • Lower extremity pain • Abnormal foot hair growth • History of smoking (not currently smoking for >5 years)

Medium	• History of Diabetes (Type I and Type II) • Current smoker • Nail changes (appears fungal) • Cold feet • Burning feet • Edema • Paresthesia (monofilament score <10 in either foot) • Skin texture appearance (thin and shiny) • Claudication
High	• History of open foot ulcer • Current ulcer • Current blister or laceration • Elevated temperature in foot

A follow up appointment timeline according to risk score was developed by DNP team. Established follow up recommendations for this project are:

- Low risk: Routine foot care at least yearly, follow-up appointment within a year.
- Medium risk: Follow-up appointment with a provider within 1 week of the screening.
- High risk: Follow-up appointment with a provider the same day or within 24 hours of the screening.

Do

This phase began with providing an educational session to first- professional degree nursing students and their clinical preceptors. The educational session included a PowerPoint presentation developed on the foot screening process. The implementation process began with the use of the revised foot screening form with risk assessment score by the DNP student investigator and the original foot screening tool being used by first-professional degree nursing students. An approved patient education handout on self-foot care was also incorporated and given to patients after each screening, (Appendix G) . During the project implementation, recruitment efforts began to increase the number of patients participating in screenings. Patients

were recruited from the adjoining community pantry or from the meal dining room. Screening days were extended to Monday-Friday. This DNP student actively participated in performing foot screenings during the implementation phase and coordinated with the clinic secretary to ensure that follow-up appointments are made appropriately according to risk stratification score.

Study

In the Study phase of the project, the plan is to reflect on what occurred and to make changes for further improvement. Over the course of 12 weeks, weekly audits were conducted by the DNP student to evaluate the findings for both the original tool and new screening tool with risk scoring. The data was entered into a spreadsheet, which was only accessible by the DNP student, the Practice Mentor, and the DNP faculty. This data was password protected to ensure patient confidentiality. Data analysis includes statistical analysis and graphs to depict the data in a visual format. The data examined were the number of patients screened, findings from each screening, risk assessment score assigned to each patient, interventions performed, and follow-up appointments made.

Act

The PDSA model allows for continual assessment and changes in the intervention. During this phase, the DNP student project leader addressed the findings, the policy and process based on the data collected from the first PDSA cycle. Based on the feedback, the DNP student worked with staff to revise the process using the PDSA cycle to promote the sustainability of a foot screening tool utilizing a risk stratification score with all patients.

Phase 4: Project Evaluation

Results

This project aimed to improve the current foot screening process at this free clinic by implementing a foot screening form which incorporated the assignment of a risk stratification score based on screening results. A total of 54 foot screenings were completed during the course of this project; 32 screenings using the original form with no risk stratification score and 22 using the revised form. Of the 32 patients screened, using the original form with no risk score, 4 patients were referred to the provider on site for interventions such as nail clipping, callous removal, or nail fungal treatment or referral to an outside Podiatrist and 28 patients had no follow-up intervention or appointments made. Of those patients screened, 7 were identified as diabetics (both type I and type II) and 12 as current smokers.

There were a total of 22 patients screened using the revised form that assigned a risk stratification score to each patient. Of those screened, 7 (31%) were found to be low risk, 13 (59%) medium risk and 2 (9%) high risk. All patients screened with the revised form were given follow up appointments based on risk score and both high risk patients were seen same day by the provider. Of all patients screened with the revised form , follow up appointments were made for 15 patients within two weeks of their screening. 5 patients were identified as diabetic and 5 as current smokers.

Figure 1: Risk stratification score findings after implementing revised form.

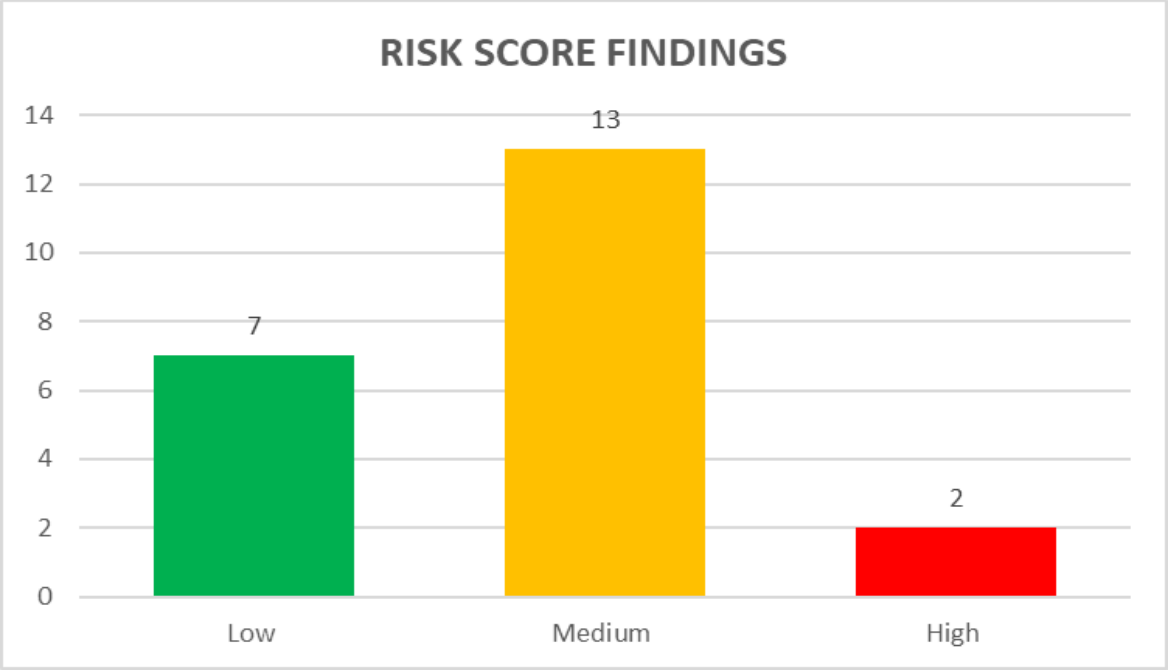
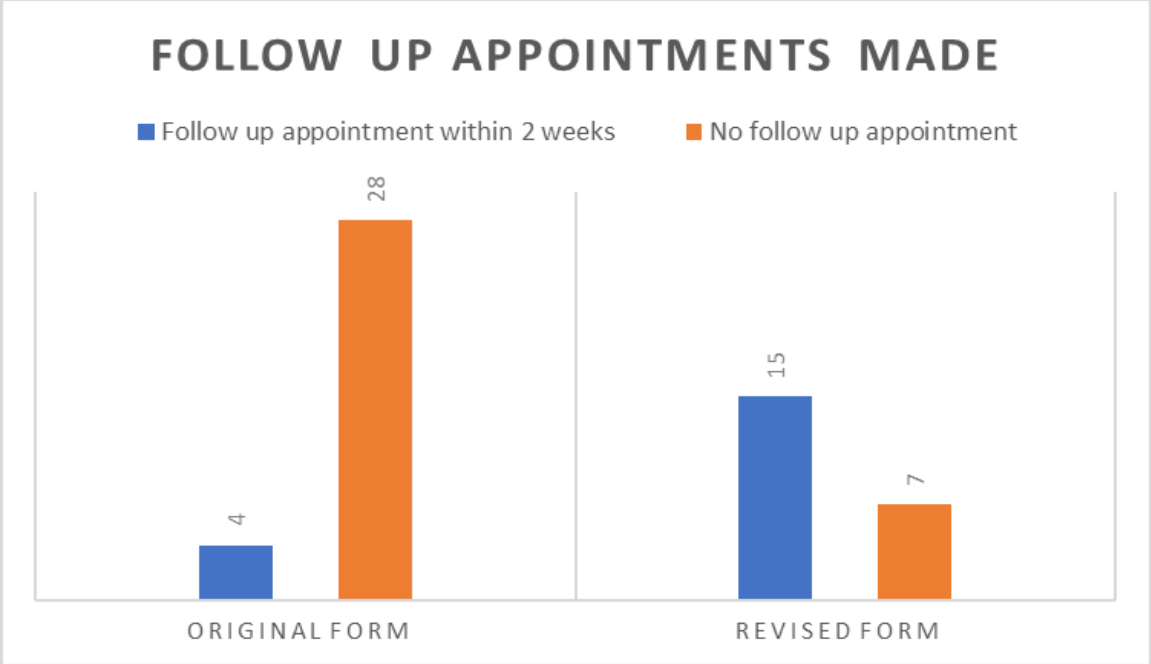


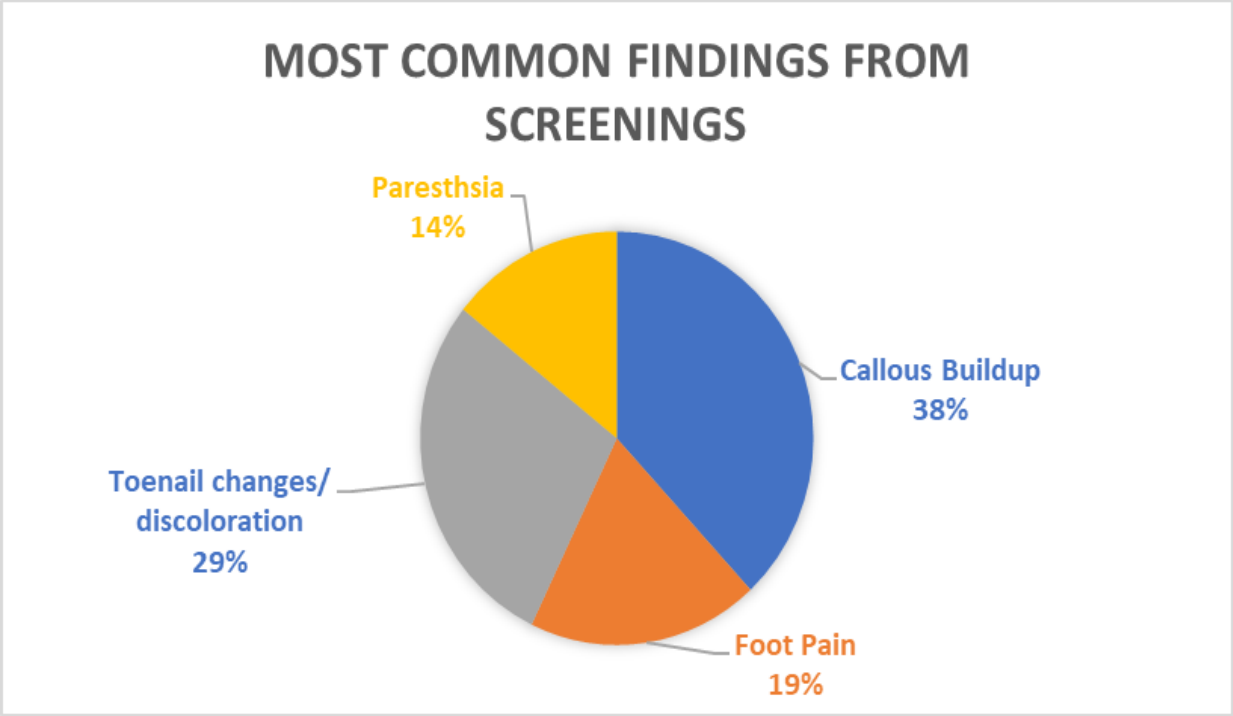
Figure 2: Comparison of follow up appointments made between original form and revised form.



The four most common findings discovered among patients screened were: callous buildup (38%), nail discoloration and changes (29%), foot pain (19%) and paresthesia (14%).

Many patients had multiple concurrent findings, with 36% of patients having 2 or more abnormal findings in different screening categories. With the revised form that was implemented for this project, patients were given the opportunity to acknowledge the findings of the foot screening by signing the form. After the screening was completed and risk stratification score assigned, the score was then discussed with the patient and a follow up appointment made. Patients were also given a foot care educational handout to highlight the basics of proper foot care and the importance of following up with their medical provider (Appendix H).

Figure 3: Common foot pathologies found using revised screening form



Goals and Achievement

By implementing a revised screening form with risk stratification score, this project aimed to help identify patients who are at risk for developing foot complications and to intervene in the progression of foot disease by streamlining follow up care. This project facilitated the identification of 13 patients deemed to be medium risk and 2 patients deemed to be high risk. All patients screened with the revised form were given follow-up appointments to be seen by the provider, with 68% of those appointments occurring within 2 weeks of the screening. All patients screened were provided with patient education to reinforce self-foot care and to emphasis the importance of doing so.

Process Evaluation

During the implementation of this project, all screenings using the risk stratification tool were performed by this DNP student. The DNP student was on site at the clinic 1 to 2 days per week during the 12 week implementation period. The new screening tool added minimal additional time to the foot screening process. Evaluation of this process shows that it might be helpful to have a second screener on hand to record the findings on the form while another is performing the physical examination .

Phase 5: Dissemination, Sustainability, Recommendations

Dissemination Plan

This project summary will be disseminated through internal and external means. Project results were summarized and disseminated to key stakeholders of the practice site. The final written DNP project paper will be uploaded to the Sacred Heart University's Repository; this will allow dissemination of findings to students and professional colleagues to use as supporting

evidence in future quality improvement projects. A poster presentation of the study and findings will be presented at the Sacred Heart University College of Nursing on April 12, 2024.This DNP student is also considering submitting the abstract of this project to the American Foot Care Nurses Association for their annual conference in the spring and the Connecticut APRN Society.

Key Lessons Learned

Lessons learned from the successful implementation of the screening form with risk stratification score is that it is effective in identifying patients who are at risk for foot disease and provides a more streamlined process for patients to get timely follow-up appointments to help prevent disease progression, improve patient quality of life as well as decrease morbidity and mortality. Streamlining follow up appointments based on risk score ensures that patients are seen in a timely manner. Continued education is essential to the success of this screening tool. First professional degree nursing students are taught how to complete foot assessments and how to document findings on the screening form during their orientation before beginning their clinical rotation at SHC. Clinical instructors should provide close oversight of the students doing these screenings and each completed form should have a final review from the instructor. This will help to provide guidance to the students when performing the screening and will clarify any questions or concerns to ensure that screening forms are being properly completed.

Sustainability Plan

The revised screening form should be continued to be used in practice at the clinic because it has proved to be beneficial in identifying patients of certain risk and helps to ensure timely medical follow up. Recommendations for sustainability include continued education on the use of the revised screening form, especially as new students start their clinical rotation each

semester. Another plan to ensure sustainability is to have the screening forms completed electronically and directly into the patient's electronic health record instead of being done on paper and then uploaded to the chart. This change will enable screenings to be a part of the patient's medical records and be accessed in real time by medical providers. Staff and students will be given continuous opportunities to provide feedback on the screen process and ways to improve the patient experience. The screening program will continue to be monitored by the clinic's Quality Assurance/Quality Improvement/Risk Management (QA/QI/RM) committee.

Summary of Recommendations

Efforts to increase preventive healthcare utilization among high-risk populations includes identifying key barriers to healthcare access and services. These populations are at an increased risk for poor health outcomes, so the use of preventive healthcare services, such as screening, testing, and vaccinations are vitally important to prevent and treat illnesses. The literature indicates that early preventative interventions which includes screening for loss of protective sensation and examination of the feet together with patient education is needed to decrease the prevalence of foot pathologies. A standardized foot screening protocol is important and can prevent costly complications and debilitating and life-threatening conditions. This quality improvement project permitted this DNP student project leader to improve patient and healthcare outcomes by implementing a screening tool with risk score. This practice change showed the importance of preventive care for patients and the impact of an improved process for detecting abnormal foot findings.

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Appendix A

Search Term and Search Results by Database: Cochrane Database of Systematic Reviews

Search Terms	Number of hits	Number of title & abstract reviewed	Number of full text articles reviewed	Number of articles selected for this review without duplicates	Total number of articles used for evidence
Foot screening tools	103	10	6	3	2
Diabetic foot screening	258	25	10	5	4
Foot risk classification score	34	6	3	2	1
Foot examinations	156	12	6	3	1
Foot screenings at free clinics	11	2	2	1	1

Search Term and Search Results by Database: PubMed

Search Terms	Number of hits	Number of title & abstract reviewed	Number of full text articles reviewed	Number of articles selected for this review without duplicates	Total number of articles used for evidence
Foot screening tools	65	6	3	1	1
Diabetic foot screening	120	7	5	2	1
Foot risk classification score	19	8	3	2	1
Foot examinations	132	9	5	1	1
Foot screenings at free clinics	5	1	1	1	1

Search Term and Search Results by Database: CINAHL complete

Search Terms	**Number of hits**	**Number of title & abstract reviewed**	**Number of full text articles reviewed**	**Number of articles selected for this review without duplicates**	**Total number of articles used for evidence**
Foot screening tools	75	6	3	2	0
Diabetic foot screening	97	8	5	3	2
Foot risk classification score	28	8	3	2	1
Foot examinations	115	5	4	3	0
Foot screenings at free clinics	12	0	0	0	0

Appendix B

Rapid Critical Appraisal for Article 2

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

Project Title: Risk Stratification Foot Screening Tool

Date: August 2023

PICOT Question: In urban patients that utilize free foot examinations (P) does the implementation of a risk stratification foot screening tool (I) compared to current practice (C) lead to identification of patients with foot problems (O) within a 3-month period?

Article citation (APA): Coppola, A., Montalcini, T., Gallotti, P., Ferrulli, A., Pujia, A., Luzi, L., & Gazzaruso, C. (2023). A comprehensive therapeutic patient education may improve wound healing and reduce ulcer recurrence and mortality in persons with type 2 diabetes. Canadian Journal of Diabetes, 47(1), 73-77.

Indicate the level of the study you are appraising: Level II

Recommendation for article inclusion in the body of evidence to answer your question: Click here to enter text.

Overview

1. Purpose of study, including research question(s) or hypotheses: The impact of a comprehensive therapeutic patient education (TPE) on the prognosis of diabetic foot ulcer (DFU) has not yet been evaluated in the literature. The purpose of this study was to determine whether TPE is a predictor of outcome in type 2 diabetes patients with DFU.
2. Design/Method: Randomized controlled trial
3. Sample: 583 consecutive individuals with a recent and single DFU. They were treated and followed for 42.8±23.3 months. Patients were divided into 2 groups. The TPE group

included subjects who had been receiving regular sessions of a comprehensive TPE, including a specific foot care education (FCE), for at least 12 months before DFU occurred (n=129). The non-TPE group comprised the remaining subjects (n=454). All 583 patients received intensive FCE during the treatment period.

4. Setting: Outpatient department at the Diabetic Foot Unit of the Clinical Institute Beato Matteo, Vigevano,Italy.

Quality of the Study

Validity: Are the results of this study valid?

1. Did the systematic review/meta-analysis address a focused clinical question?

☒Yes ☐No ☐ Unknown

   a. What was the focused clinical question?To evaluate whether therapeutic patient education is a predictor of diabetic foot outcomes.

2. Was the search for relevant studies detailed and exhaustive?

☒Yes ☒No ☐Unknown

   Comment:

3. Did the systematic review/meta-analysis include RCTs? ☐Yes ☒No

   a. Was criteria used to select articles for inclusion? ☐Yes ☒No

   b. What were the criteria for inclusion? ☐Yes ☒No

   c. Random assignment to treatment groups? ☐Yes ☒No

   d. Analyzed in assigned groups? ☐Yes ☒No

   e. Complete follow-up of subjects? ☒Yes ☐No

   f. Blind? ☐Yes ☒No

g. Double-blind? ☐Yes ☒No

Comments: Click here to enter text.

4. Did the systematic review/meta-analysis include non-RCTs?

☐Yes ☒No ☐Unknown

a. Was criteria used to select articles for inclusion? ☐Yes ☒No

b. What were the criteria for inclusion? Click here to enter text.

c. Analyzed in assigned groups? ☐Yes ☐No

d. Complete follow-up of subjects? ☐Yes ☒No

e. Blind? ☐Yes ☒No

f. Double-blind? ☐Yes ☒No

5. Were the included studies appraised to be highly quality by the authors?

☐Yes ☒No ☐ Unknown

Comments: Click here to enter text.

6. Were the methods consistent from study to study?

☒Yes ☐No ☐Unknown

a. Were the populations in the included studies comparable? ☒Yes ☐No

b. Were the outcomes, interventions, and exposures measured the same way in the groups being compared in the included studies? ☒Yes ☐No

Comments: Click here to enter text.

7. Were the results consistent across the included studies?

☒Yes ☐No ☐ Unknown

Comments: Click here to enter text.

8. Was there freedom from conflict of interest? ☒Yes ☐No ☐ Unknown

- Sponsorship/funding agency
- Investigators

Comments: Click here to enter text.

9. Was the date range of the cited literature current? ☐Yes ☒ No ☐Unknown

    a. What date ranges were included? Click here to enter text. to Click here to enter text.

    b. If older literature was included, why? Click here to enter text.

    Comments: Click here to enter text.

Reliability: Are these valid study results important?

10. What were the main results of the systematic review/meta-analysis?

    a. For each individual study:

        i. Statistical Significance (*p* value): Click here to enter text.

        ii. Confidence Interval and/or Standard Deviations: Click here to enter text.

        iii. How precise was the intervention/treatment? Diabetes duration and glycated hemoglobin were significantly lower and eGFR, ABPI and TcPO2 were significantly higher in the TPE group than in the non-TPE group. The percentages of patients with micro-/macroalbuminuria, previous CVD, previous DFU, previous amputation, VDFU, NVDFU, limb revascularization and osteomyelitis were significantly higher in the non-TPE group than in the TPE group, whereas the percentage of NDFU was higher in the TPE group. The average time elapsed between the appearance of DFU and the first visit to the diabetic foot centre was significantly greater in the non-TPE than in the TPE group. The TPE group showed a significantly higher percentage of healed ulcers and a significantly lower percentage of major amputations, minor amputations and persistence of active ulcers. Among the 464 patients with healed ulcers, a higher percentage of

subjects with ulcer recurrence was seen in the non-TPE group than in the TPE group. Mortality was also significantly higher in the non-TPE group.

1. **Narrow/wide?** Click here to enter text.

b. **For the summary statistic?**

i. **Statistical significance (*z* statistic):** Click here to enter text.

ii. **Were the studies heterogeneous?** ☐Yes ☒No

iii. **Confidence Interval:** Click here to enter text.

iv. **Effect size:** Click here to enter text.

v. **Did it favor the intervention?** ☐Yes ☒No

vi. **Did it favor the control?** ☐Yes ☒No

Comments: Click here to enter text.

11. **Were the results clinically significant?** ☒Yes ☐ No ☐Unknown

a. Were the following reported: NNT, NNH, OR, RR? ☐Yes ☒No

Comments: Click here to enter text.

12. **Were potential confounders identified?** ☐Yes ☒ No ☐Unknown

a. **Were the potential confounders discussed in the relationship to the results?**

☐Yes ☒No

Comments: Click here to enter text.

13. **Were adverse events identified?** ☐Yes ☒ No ☐Unknown

Comments: Click here to enter text.

<u>Applicability/Generalizability: Can I apply these valid, important study results?</u>

14. **Can the results be applied to my population of interest?** ☒Yes ☐No ☐Unknown

a. Is the treatment feasible in my care setting? ☒Yes

☐No

b. Do the outcomes apply to my population of interest? ☒Yes ☐No

c. Are the likely benefits worth the potential harm and costs? ☒Yes ☐No

d. Are the subjects/participants in this study similar to my population of interest?

☒Yes ☐No

e. Were all clinically important outcomes considered? ☒Yes

☐No

15. Will you use the study/article in your practice to make a difference in outcomes?

☒Yes ☐No ☐Unknown

a. If yes, why would you do this & how? The outcomes of this study are clinically relevant to my current practice.

b. If no, why would you not include the results to make a difference? Click here to enter text.

Strength of Study

Level of study: ☐ I ☒II ☐III ☐IV ☐V ☐VI ☐VII

Quality of Study: ☐High ☒Medium ☐Low

Strength = Level + Quality

What is the strength of this study? The present study first shows that a structured and comprehensive TPE, including FCE, can improve the global prognosis of people with DFU. In addition, TPE seemed to be more effective than the specific FCE delivered to the patients in the study. Our data show that TPE was significantly and independently associated with wound

healing and may be a valuable tool for avoiding ulcer recurrence in patients with healed DFU. In addition, TPE may significantly reduce mortality in patients with DFU.

What is your recommendation for article inclusion in the body of evidence to answer your question?

☒Include this article in the body of evidence (place article on evaluation and synthesis table)

☐Do NOT include this article in the body of evidence

Additional comments: This article serves as a great piece of evidence in support of my quality improvement project.

Appendix C
Evidence Summary Table

PICO Question: In urban patients that utilize free foot examinations (P) does the implementation of a risk stratification foot screening tool (I) compared to current practice (C) lead to identification of patients with foot problems (O) within a 3-month period?

Citation	Purpose	Sample/Setting	Intervention	Major Variables Studied and Their Definitions	Findings	Level of Evidence /Quality	Quality of Evidence: Critical Worth to Practice
Article 1							
Allen, M. L., Van der Does, A. M. B., & Gunst, C. (2016). Improving diabetic foot screening at a primary care clinic: A quality improvement project. African Journal of Primary Health Care & Family Medicine, 8(1). https://doi.org/10.4102/phcfm.v8i1.955	This project was aimed at educating health care workers (HCWs) in a primary health care clinic to increase diabetic foot screening practices.	It is estimated that there are around 300–350 patients with diabetes at the clinic.	A quality improvement project was conducted. HCWs' needs were assessed using a questionnaire. This was followed by focus group discussions with the HCWs, which were recorded, transcribed and assessed using a general inductive approach. An intervention was designed based on common themes. Staff members were trained on foot screening and patient information pamphlets and screening tools were made available to all clinic staff. Thirty-two consecutive diabetic patient folders were audited to compare screening.	Health care workers (HCWs)	HCWs' confidence in conducting foot screening using the diabetic foot assessment questionnaire improved markedly after training. Diabetic foot screening practices increased from 9% in 2013 to 69% in 2014 after the first quality improvement cycle. A strengths, opportunities, aspirations and results (SOAR) analysis showed promise for continuing quality improvement cycles.	Level VI: Quality improvement project	This quality improvement project aimed at HCWs has dramatically improved diabetic foot screening at this clinic. The results showed significant improvement in foot screening practices by the HCWs.

Article 2							
Coppola, A., Montalcini, T., Gallotti, P., Ferrulli, A., Pujia, A., Luzi, L., & Gazzaruso, C. (2023). A comprehensive therapeutic patient education may improve wound healing and reduce ulcer recurrence and mortality in persons with type 2 diabetes. Canadian Journal of Diabetes, 47(1), 73-77.	Aim of the present randomized controlled trial is to evaluate the impact of individual Patient therapeutic education (PTE) on the occurrence of macrovascular complications in newly diagnosed type 2 diabetic patients when compared to usual care (UC) and group PTE.	Six hundred newly diagnosed type 2 diabetic patients will be enrolled.	The patients will be randomly assigned to one of these three groups: individual PTE, group PTE and UC. A comprehensive and complete PTE will be delivered to all the patients: PTE will include eleven themes.	Patient therapeutic education (PTE) Usual care (UC)	The present trial can give precious information on the features for the most effective PTE. The objective of this study was to assess the impact of individualizing patient therapeutic education in type 2 diabetes patients. The results showed decreased mortality and incidence of diabetic complication	Level II: Randomized controlled trial.	Primary composite endpoint of the study is occurrence of vascular complications, including cardiovascular death, non-fatal coronary disease, non-fatal stroke peripheral artery disease.
Article 3							
Crawford, F., Cezard, G., Chappell, F. M., & PODUS Group (2018). The development and validation of a multivariable prognostic model to predict foot ulceration in diabetes using a systematic review and individual patient data meta-analyses. Diabetic medicine: a journal of the British Diabetic Association.	Diabetes guidelines recommend screening for the risk of foot ulceration but vary substantially in the underlying evidence base. The purpose of this study is to derive and validate a prognostic model of independent risk factors for foot ulceration in diabetes using all available individual patient data from cohort studies conducted worldwide.	The 10 studies contained data from 16 385 participants.	We conducted a systematic review and meta-analysis of individual patient data from 10 cohort studies of risk factors in the prediction of foot ulceration in diabetes. Predictors were selected for plausibility, availability, and low heterogeneity. Logistic regression produced adjusted odds ratios (ORs) for foot ulceration by ulceration history, monofilament insensitivity, any absent pedal pulse, age, sex and diabetes duration.		The authors found three risk factors were common among guideline recommendations and predictive of future ulcerations: a history of foot ulcers, inability to feel 10g monofilament, and absence of any pedal pulse.	Level I: Systematic review/ meta-analysis	This prognostic model of only three risk factors, a history of foot ulceration, an inability to feel a 10 g monofilament and the absence of any pedal pulse, compares favorably with more complex approaches to foot risk assessment recommended in clinical diabetes guidelines
Article 4							
D'Souza, S , M., Mirza, N. A., & Nairy Karkada, S. (2021). Development of a foot care model to determine the risk of	This study highlights the need for a collaborative shared model to understand homeless adults' foot care needs	65 homeless adults were examined in British Columbia, Canada, in 2019-2020.	This study employed a descriptive, cross-sectional research design to assess the foot care of homeless people and develop recommendations for clinical practice.	Purposive sampling was used to recruit adults who were homeless and	Foot assessment is not well-covered by homeless health services and should be implemented as	Level III: Cross-sectional study	The study sample size was small and limited to homeless people living in shelters and on the streets. The study size was reduced from 109 to 65 owing to non-response or incomplete data; this reduced

foot problems among homeless adults in Canada. Health & Social Care in the Community, 29(5), e214-e223.	that could be used as a decision-making support tool for foot care recommendations and referrals.			could describe their foot care experiences. Visits to community agencies aimed to establish perceptions regarding homeless people's needs. G* power was used to calculate the sample size requirement of 109 participants, assuming a 0.15 effect size for the mean difference between homeless and general groups, a 95% confidence interval and a 0.05 two-sided alpha significance level. The final sample size was 65	part of the standard medical review of homeless patients. Furthermore, foot assessment should be conducted by healthcare professionals, rather than relying on the standard practice of service users' self-report. Finally, foot care should be based on tailoring assessments and interventions for the individualized needs of homeless service users. Future research must seek ways to integrate homeless individuals' voices in the development, implementation, and evaluation of foot care service		the expected power from 0.85 to 0.80 and increased the required effect size from 0.15 to 0.20.
Article 5							
Fayfman, M., Schechter, M. C., Amobi, C. N., Williams, R. N., Hillman, J. L., Alam, M. M., Rajani, R. R., Ziemer, D. C., Kempker, R. R., & Umpierrez, G. E. (2020). Barriers to diabetic foot care in a disadvantaged	Barriers to proper foot care were explored in this population using a qualitative approach with focus group discussions (FGD). performed to supplement FGDs	Forty participants (90% Black) were enrolled.	Participants were recruited from clinics at a safety-net hospital in Atlanta, Georgia and stratified into two groups: diabetic foot ulcer (DFU) and minor amputation (below ankle). The FGDs addressed patient experience in receiving care with a goal of understanding: foot care knowledge, barriers to care, and preferred educational methods. Surveys were performed to supplement FGDs.		Dominant themes emerging from FGDs were: 1-Patients reported adequate understanding of recommended foot care practices; 2-Personal barriers to self-care included lack of motivation, high cost, poor insurance coverage of supplies, and difficulty limiting activity for proper offloading; 3-Hospital system	Level VI: Qualitative assessment	

population: A qualitative assessment. Journal of diabetes and its complications, 34(12), 107688. https://doi.org/10.1016/j.jdiacomp.2020.107688					barriers included difficulty making timely appointments and reaching a provider to arrange care; 4-Access to footcare-related information and services improved with greater disease severity.		
Article 6							
Guttormsen, K., Tilbury, J., Khurana, R., & Huyton, D., (2020). Application of simplified diabetic foot assessment in an acute medical unit. The Diabetic Foot Journal, 23(2), 40-46.	This project aimed to assess whether the introduction of local training in simplified assessment and structured management of the diabetic foot increased risk assessment in vulnerable patients by non-specialist practitioners	A prospective audit was performed using traffic light criteria based on a structured. literature review and national guidance. The absolute risk reduction (0.26) and relative risk reduction (0.43) indicated a significant improvement in foot assessment following training, with a number needed to treat of 3.8.	This project aimed to assess whether the introduction of local training in simplified assessment and structured management of the diabetic foot increased risk assessment in vulnerable patients by non-specialist practitioner	Loss of protective sensation (LOPS)	The proportion of patients assessed by non-specialist practitioners significantly increased following training, resulting in a 26% absolute and. 43% relative risk reduction	Level VI: Quality improvement project	The provision of local teaching to support structured management plans in addition to removing the need for equipment improved the uptake of diabetic foot risk assessments and identification of lower limb pathologies by non-specialist practitioners.
Article 7							
Mullins, R. M., Mannix, R. E., Marshall, N. J., & Lewis, V. J. (2022). Responding to foot health needs of people experiencing homelessness: the role of a publicly funded community-based podiatry service.	This paper describes a podiatric service specifically for people experiencing homelessness, which includes a fixed site as well as outreach services. The service operates as part of the Homelessness Team program at Cohealth, a	Of these, 156 were attending for the first time and 139 were returning clients. People who used the service were predominantly rough sleeping (45.2%), with 32.2% in unstable or insecure	The study used routinely collected data. Every person who was seen by the podiatrist in the Cohealth Homelessness Team in 2019, whether on site or on outreach, was included in the study (n = 295).	All data collected at the podiatry clinic in 2019 were analyzed to develop a profile of the clients using the service, look at the types of	Skin and nail pathologies (68.1%), inadequate footwear (51.9%) and biomechanical issues (44.1%) were the most common presentations. People sleeping rough were particularly likely to present with biomechanical issues (50.8%), acute wound care needs (17.4%) or traumatic injury (10.6%). Most people	Level III: Prospective non-experimental comparative study	The key strength of the study was that it provided insight into the foot and ankle health care needs of people who are often not recognized in health services research. The study was able to report on a large number of clients because the service is located in the central business district where many people sleeping rough live

Journal of Foot and Ankle Research, 15(1), 1-11.	large community health service in Melbourne.	housing and 22.6% recently housed.		problems clients presented with, how they found out about the podiatry service and whether they had connections with other parts of the community health service.	presented with more than one issue (mean = 2.4), and new clients (mean = 2.53) and those rough sleeping (mean = 2.69) had more issues than others. Outreach was the most effective way to reach clients in the most difficult circumstances (48.9% of those in unstable housing, 34.8% of rough sleepers). Most of the clients (81.4%) had connections with other services offered by Cohealth, such as social work or physiotherapy.		
Article 8							
Nguyen et al. (2019) Effectiveness of a theory-based foot care education program in improving foot self-care behaviors and foot risk factors for ulceration in people with type 2 diabetes.	To evaluate the effectiveness of a theory-based foot care education intervention program (3STEPFUN) for people with type 2 diabetes at low risk of developing a foot ulcer.	119 participants	From 119 participants, 60 participants in the control group received usual care and a foot care brochure. Those in the intervention group received (1) a small group intensive education and hands-on skills session; (2) a foot care kit and documents; and (3) three regular booster follow-up phone calls over 6 months.	Improved preventive foot care behavior. Decreased prevalence of foot risk factors for ulceration	The intervention group had significantly improved outcomes compared to the control group over 6 months in the following aspects: improved preventive foot care behavior ($p = 0.001$); and decreased prevalence of foot risk factors for ulceration (i.e. dry skin, corns/ callus) (OR: 0.04, 95% CI 0.01 - 0.13, $p < 0.001$).	Level I: Quasi-experimental design	The study's findings provide evidence of 3STEPFUN on improving foot self-care behavior and preventing minor foot problems. Further study with formal RCT design and longer follow-up time to examine the effects on decreasing foot ulcer incidence is recommended.
Article 9							
Schaper, N. C., van Netten, J. J., Apelqvist, J., Bus, S. A., Hinchliffe, R. J., Lipsky, B. A., & IWGDF Editorial	The aim of this study is to describe the basic principles of prevention, classification, and treatment of diabetic foot disease, based on the six		The International Working Group on the Diabetic Foot (IWGDF) recommends that a foot examination be carried out for risk stratification to identify patients at		We also describe the organizational levels to successfully prevent and treat diabetic foot disease according to these principles	Level I:Systemic review	Successful efforts to prevent and treat diabetic foot disease depend upon a well-organized team that uses a holistic approach in which the ulcer is seen as a sign of multi-organ disease and that integrates the various

Board (2020). Practical Guidelines on the prevention and management of diabetic foot disease (IWGDF 2019 update). Diabetes/metabolism research and reviews, 36 Suppl 1, e3266. https://doi.org/10.1002/dmrr.3266	IWGDF Guideline chapters.		risk for developing foot ulcers grouped into five categories and recommend screening frequency for each category.		and provide addenda to assist with foot screening.		disciplines involved. Effective organization requires systems and guidelines for education, screening, risk reduction, treatment, and auditing.
Article 10							
To, M. J., Brothers, T. D., & Van Zoost, C. (2016). Foot Conditions among Homeless Persons: A Systematic Review. PloS one, 11(12), e0167463. https://doi.org/10.1371/journal.pone.0167463	Foot problems are common among homeless persons, but are often overlooked. The objectives of this systematic review are to summarize what is known about foot conditions and associated interventions among homeless persons.	Of 333 articles screened, 17 articles met criteria and were included in the study. Prevalence of any foot problem ranged from 9% to 65% across study populations.	The review was guided by methodology outlined by the PRISMA statement (S1 Checklist). [7] A systematic search strategy was developed to identify articles that reported foot problems among homeless populations. A protocol of the review has not been previously published.			Level 1: Systemic review	

Appendix D

Levels of Evidence Synthesis Table

PICO: In urban patients that utilize free foot examinations (P) does the implementation of a risk stratification foot screening tool (I) compared to current practice (C) lead to identification of patients with foot problems (O) within a 3-month period?

Article	1	2	3	4	5	6	7	8	9	10	
Level I: Systematic review or meta-analysis			X					X	X	X	
Level II: Randomized controlled trial		X									
Level III: Controlled trial without randomization				X			X				
Level IV: Case-control or cohort study					X						
Level V: Systematic review of qualitative or descriptive studies						X					
Level VI: Qualitative or descriptive study, CPG, Lit Review, QI or EBP project	X										
Level VII: Expert opinion											

LEGEND

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4. D'Souza, S , M., Mirza, N. A., & Nairy Karkada, S. (2021).
5. Fayfman, M., Schechter, M. C., Amobi, C. N., Williams, R. N., Hillman, J. L., Alam, M. M., Rajani, R. R., Ziemer, D. C., Kempker, R. R., & Umpierrez, G. E. (2020).
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7. Mullins, R. M., Mannix, R. E., Marshall, N. J., & Lewis, V. J. (2022).
8. Nguyen et al. (2019).
9. Schaper, N. C., van Netten, J. J., Apelqvist, J., Bus, S. A., Hinchliffe, R. J., Lipsky, B. A., & IWGDF Editorial Board (2020).
10. To, M. J., Brothers, T. D., & Van Zoost, C. (2016).

Outcomes Synthesis Table

Intervention	1	2	3	4	5	6	7	8	9	10
Foot screening/examination	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Assessed for foot risk	**E**	**E**	**NE**	↑	**NE**	↓	**NE**	↑	↑	**E**
Foot care behavior	**NE**	↑	**NE**	↑	↑	↑	↑	↑	**E**	↑
Patient education	↑	↑	↑	**NE**	↑	↑	**NE**	↑	**NE**	↑
Diabetic foot exam	**NE**	**E**	↓	**NE**	↑	**NE**	**NE**	**NE**	**NE**	**NE**

Key: NE = not evaluated; X=evaluated; ↑ =increased ; ↓ =decreased

LEGEND

1. Allen, M. L., Van der Does, A. M. B., & Gunst, C. (2016).
2. Coppola, A., Luzi, L., Montalcini, T., Giustina, A., & Gazzaruso, C. (2018).
3. Crawford, F., Cezard, G., Chappell, F. M., & PODUS Group (2018).
4. D'Souza, S , M., Mirza, N. A., & Nairy Karkada, S. (2021).
5. Fayfman, M., Schechter, M. C., Amobi, C. N., Williams, R. N., Hillman, J. L., Alam, M. M., Rajani, R. R., Ziemer, D. C., Kempker, R. R., & Umpierrez, G. E. (2020).
6. Guttormsen, K., Tilbury, J., Khurana, R., & Huyton, D., (2020).
7. Mullins, R. M., Mannix, R. E., Marshall, N. J., & Lewis, V. J. (2022).
8. Nguyen et al. (2019).
9. Schaper, N. C., van Netten, J. J., Apelqvist, J., Bus, S. A., Hinchliffe, R. J., Lipsky, B. A., & IWGDF Editorial Board (2020).
10. To, M. J., Brothers, T. D., & Van Zoost, C. (2016).

Appendix E

Quality Improvement Checklist

Differentiating Quality Improvement and Research Activities Tool

Question	Yes	No
1. Is the project designed to bring about immediate improvement in patient care?	X	
2. Is the purpose of the project to bring new knowledge to daily practice?	X	
3. Is the project designed to sustain the improvement?	X	
4. Is the purpose to measure the effect of a process change on delivery of care?	X	
5. Are findings specific to this hospital?	X	
6. Are all patients who participate in the project expected to benefit?	X	
7. Is the intervention at least as safe as routine care?	X	
8. Will all participants receive at least usual care?	X	
9. Do you intend to gather just enough data to learn and complete the cycle?	X	
10. Do you intend to limit the time for data collection in order to accelerate the rate of improvement?	X	
11. Is the project intended to test a novel hypothesis or replicate one?		X
12. Does the project involve withholding any usual care?		X
13. Does the project involve testing interventions/practices that are not usual or standard of care?		X
14. Will any of the 18 identifiers according to the HIPAA Privacy Rule be included?		X

Adapted from Foster, J. (2013). Differentiating quality improvement and research activities. Clinical Nurse Specialist, 27(1), 10–3. https://doi.org/10.1097/NUR.0b013e3182776db5

Appendix F

DNP Project Roadmap

Student Name: Joni-Kay Johnson

Project Title: Implementation of a Risk Stratification Foot Screening Tool at a Free Outpatient Clinic: A Quality Improvement Project

Project Advisor: Dr. Constance Glenn DNP, MSN, FNP-BC, CNE

Project Practice Mentor: Dr. Micheal DeMasi, DNP, APRN, FNP-BC

	Doctor of Nursing Practice Project Roadmap	
Component	**Definition**	**Date Done**
Phase 1: Problem Identification and Evidence Review		
Clinical Inquiry including background and significance of problem	Describe local problem and its significance. Include data to frame local problem.	07/01/23
Organizational priority	Summarize information that supports topic/problem is an organizational priority.	07/10/23
Searchable Question	Write a focused, searchable question using an established method (e.g. PICO).	7/15/23
Evidence search	External evidence • Summarize search strategy (e.g. databases, keywords, filters/limits, criteria for article selection, tools for critical appraisal). Include practice-based evidence (e.g. evidence-based solutions that experts/other health systems have implemented to address practice problem).	7/20/23
	Internal evidence • Summarize applicable unit/community/department/hospital/organizational level data or data required for national entities (e.g. CMS, NDNQI, AHRQ).	7/20/23
	Perform needs assessment if applicable.	N/A

Evidence appraisal, summary, and recommendations	Organize evidence that answers focused clinical question in a clear concise format (e.g. table or matrix).	7/20/23
	Appraise literature for quality and applicability of evidence using established method (e.g. Johns Hopkins Nursing EBP Research Evidence Appraisal Tool, Joanna Briggs Institute Critical Appraisal Tools, Fuld Institute for EBP critical appraisal tools etc.).	7/20/23
	State recommendations(s) and link to evidence strength and quality and risk/benefits.	08/20/23
Phase 2: Project Planning		
Project goals	State intended, realistic outcomes of project using established method (e.g. SMART criteria).	08/31/23
Framework	Select framework/model to guide implementation (e.g. EBP model, QI framework, Change model).	08/31/23
Context	Describe project setting and participants or population, or other elements that are central to where the change will occur.	08/31/23
Key stakeholders	Identify agencies, departments, units, individuals needed to complete the project and/or affected by project, and strategies to gain buy-in.	09/30/23
Practice change/intervention	Provided detailed description of practice change or intervention (e.g. new or revised policy).	09/30/23
Evaluation	Summarize plan for evaluating the effectiveness of the practice change. Identify applicable process and outcome data to be collected/tracked and tools to do this. Identify the methods for analyzing/interpreting the data (e.g. control, run or Pareto charts).	10/31/23
Possible barriers to implementation	Identify possible barriers and implementation strategies to mitigate these barriers.	10/31/23
Sustainment	Identify strategies to sustain the change.	11/30/23
Timeline	Create a realistic timeline for project completion.	11/30/23
Resources	Identify all resources (e.g. indirect and direct) needed to complete the project.	11/30/23
Ethical merit	Identify and obtain the required review and approval needed for implementation (e.g. institution, community agency, IRB).	12/01/23
Phase 3: Implementation		

Implement project	Carry out the project using selected implementation framework/model.	12/15/23
	Track any deviations/changes from the project plan.	
Phase 4: Evaluation		
Results/Interpretation	Using an established method (e.g. run or control charts) display data and interpret project outcomes.	03/15/24
	Report evaluation of the effectiveness of the practice change, including extent the practice change was implemented (process outcome) and extent to which the desired outcome(s) were achieved.	03/15/24
Return on investment	Identify the final resources that were used to implement the project. Calculate and report the return on investment.	03/15/24
Phase 5: Dissemination		
Traditional	Disseminate to the project setting in a manner meaningful to them (e.g. executive report, poster, presentation at a meeting, poster with QR code to access details of project, etc.)	04/15/24
	Disseminate in the format required by the academic institution (e.g. poster, public presentation) and	
	Prepare final project write-up using established reporting guidelines (e.g. EPQA, SQUIRE) and academic institution requirements.	
Non-traditional	Develop a website to display project, use personal or program social media (e.g. Twitter, Facebook) to share project information.	05/01/24

PICO, Population, Intervention, Comparison, Outcome; **CMS**, Center for Medicaid and Medicare Services; **NDNQI**, National Dataset of Nursing Quality Indicators; **AHRQ**, Agency for Healthcare Research and Quality; **SMART**, specific, measurable, attainable, relevant, timely; **IRB**, Institutional Review Board; **EPQA**, Evidence-Based Practice Process Quality Assessment Guidelines; **SQUIRE,** Standards for QUality Improvement Reporting Excellence

Appendix G

Risk Stratification Foot Screening Tool

FOOT CARE EXAM

Patient Name:		Exam Date:	

Height:	ft	inches		Hx Diabetes:	No	Yes (medium)	Type I	Type II
Weight:		lbs.		Hx Smoking:	No	~~Yes~~ (low)		# years
DOB:	/	/		Current Smoker:	No	Yes (medium)		# years
Gender:	M	F	Other	Amputation: Modifier Q7 (Class A)	No	Yes	Right	Left

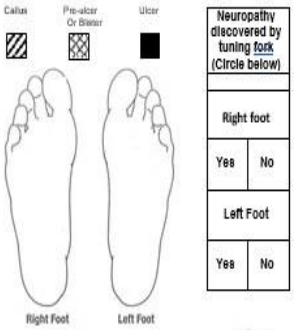
FOOT			
If abnormal, check mark Left or Right ~~foot~~ Class C Findings	No	Lt	Rt
History of Foot Ulcer(s) (high)			
Current Foot Ulcer(s) (high)			
Abnormal Foot Shape (low)			
Toe deformity (~~bunion, hammer~~) (low)			
Callus Buildup (low)			
History of callusing (low)			
Elevated temperature (Cellulitis) (high)			
Lower extremity pain (low)			
Blister/ Laceration (high)			
Can patient see plantar foot? Yes/No			
Does patient use appropriate footwear? Yes / No			

VASCULAR FINDINGS				
Class B and Class C Findings Modifier 8 - need 2 Class B for ~~billing~~ Modifier 9 - need 1 Class B, 2 Class C billing	Acceptable	LL	RL	
Dorsalis Pedis Pulse (medium)	B			
Posterior Tibial ~~Pulse~~ (medium)	B			
Foot Hair Growth (low)	B			
Capillary Refill (medium)	B			
Pallor or Rubor (medium)	B			
Nail Changes (medium)	B			
Skin texture (~~thin, shiny~~) (medium)	B			
Claudication (medium)	C			
Cold feet (medium)	C			
Burning feet (medium)	C			
Edema (medium)	C			
Paresthesia (medium)	C			
Monofilament score	10/10	/10	/10	/10

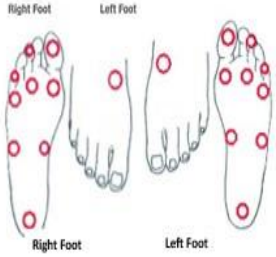
Risk Assessment Score: _____

Referral to Primary	YES	NO
Circle Intervention Needed: Nail clipping, Callous removal; Wound care; Fungal Treatment. ~~Other:~~		

Draw pattern on foot where there is:
H = Healthy; R = Redness; S = ~~Swelling~~; W = Warmth; D = ~~Dryness~~; M = Maceration



Neuropathy discovered by tuning ~~fork~~ (Circle below)	
Right foot	
Yes	No
Left Foot	
Yes	No



Can feel nylon ~~filament~~ Cannot feel nylon ~~filament~~

Score count of (+) sensation on left and right foot.
Normal score = 10/10

Provider Print Name: _____ Signature: _____

FOOT CARE EXAM

Based on Examination, Risk Score Assessments are low, medium, and high.

Recommendations are:

- Low Risk: Low -Routine foot care at least yearly. Appointment within 1 year. Provide patient education.
- Medium Risk – Follow-up appointment with Provider within 1 week. Provide patient education.
- High Risk-Follow-up appointment with Provider within 24 hours. Provide patient education.

Appointment Date: _____

I _____ acknowledge that I have had a foot screening completed. The results of this screening have been discussed with me, I have been assigned a risk score and have been given a recommended follow up appointment based on my score.

Appendix H
Patient Education on Self-foot care

Appendix I
CITI Training Certificates

CITI PROGRAM

Completion Date 02-Sep-2023
Expiration Date 02-Sep-2026
Record ID 57287773

This is to certify that:

Joni-Kay Johnson

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

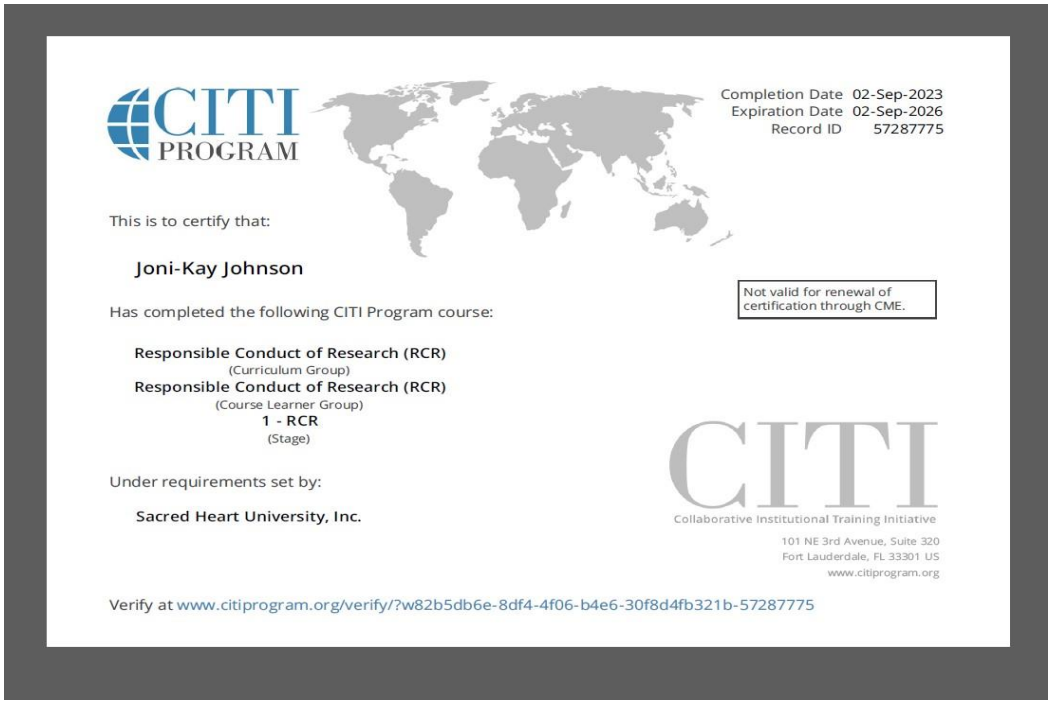
Students conducting no more than minimal risk research
(Curriculum Group)
Students - Class projects
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Sacred Heart University, Inc.

CITI
Collaborative Institutional Training Initiative
101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

Verify at www.citiprogram.org/verify/?w470e41b8-bcc1-4079-bcbf-195fdfe96caa-57287773



CITI PROGRAM

Completion Date 02-Sep-2023
Expiration Date 02-Sep-2026
Record ID 57287775

This is to certify that:

Joni-Kay Johnson

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

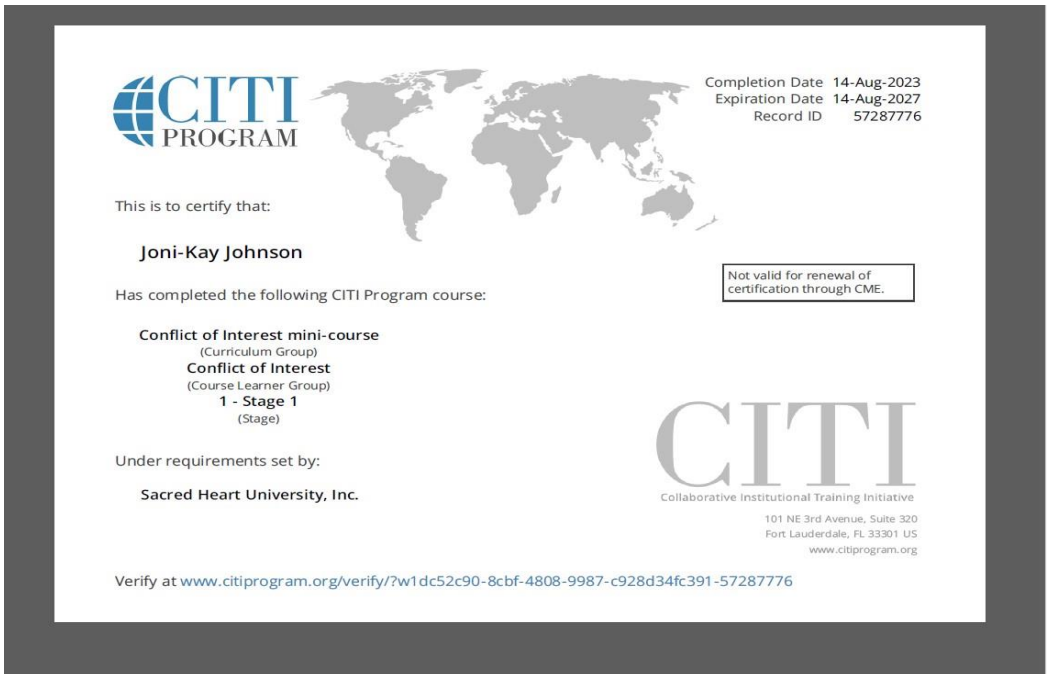
Responsible Conduct of Research (RCR)
(Curriculum Group)
Responsible Conduct of Research (RCR)
(Course Learner Group)
1 - RCR
(Stage)

Under requirements set by:

Sacred Heart University, Inc.

CITI
Collaborative Institutional Training Initiative
101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

Verify at www.citiprogram.org/verify/?w82b5db6e-8df4-4f06-b4e6-30f8d4fb321b-57287775



CITI PROGRAM

Completion Date 14-Aug-2023
Expiration Date 14-Aug-2027
Record ID 57287776

This is to certify that:

Joni-Kay Johnson

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Conflict of Interest mini-course
(Curriculum Group)
Conflict of Interest
(Course Learner Group)
1 - Stage 1
(Stage)

Under requirements set by:

Sacred Heart University, Inc.

CITI
Collaborative Institutional Training Initiative

101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

Verify at www.citiprogram.org/verify/?w1dc52c90-8cbf-4808-9987-c928d34fc391-57287776

Appendix J
Sacred Heart IRB Exempt Status

From: Samuolis, Prof. Jessica <samuolisj@sacredheart.edu>
Sent: Sunday, October 29, 2023 12:00 PM
To: Johnson, Jonikay T. <johnsonj10@mail.sacredheart.edu>; IRB <IRB@sacredheart.edu>
Cc: Glenn, Prof. Constance H. <glennc@sacredheart.edu>; Samuolis, Prof. Jessica <samuolisj@sacredheart.edu>
Subject: RE: IRB#231027A - Exempt Status Request

Joni-Kay,
Thank you for the revised file. Your application for IRB exemption is approved. Best of luck with your project.
Dr. Samuolis
Acting IRB Chair

Appendix K
Project Poster Presentation

DR. SUSAN L. DAVIS, R.N., & RICHARD J. HENLEY COLLEGE OF NURSING
Sacred Heart University

Implementation of a Risk Stratification Foot Screening Tool at a Free Outpatient Clinic : A Quality Improvement Project

Project Leader: Joni-Kay Johnson BSN, RN Project Advisor :Constance Glenn, DNP, MSN, APRN, FNP-BC, CNE Practice Mentor : Michael DeMasi, DNP, APRN,

Rationale

- Foot conditions are highly prevalent among the medically underserved population due to unknown disease status, inadequate footwear, poor personal hygiene, poor lifestyle, and harsh environmental exposure.
- Foot pathologies can cause discomfort or pain, and in some cases can lead to sepsis, amputation, or death.
- Comprehensive foot examinations are essential in detecting foot pathologies to sustain mobility and quality of life.

Background

Internal Data

- Sage Healthcare (SHC) is a free outpatient clinic located in Bridgeport, Connecticut that provides free healthcare, dental, mental services, mental health services, and medical screenings to patients of all ages.
- SHC delivers holistic barrier-free healthcare to the underserved, uninsured and disadvantaged in partnership with local universities.

External Data

- The literature highlights that foot management programs provide an inexpensive preventative measurement in communities and educating providers to use a user-friendly foot screening tool reduces the rate of ulcers, re-ulcerations and foot amputations, especially in diabetic patients (Persaud et al., 2018).

PICO Question

In urban patients that utilize free foot examinations (P), does the implementation of a risk stratification foot screening tool (I) compared to current practice (C) lead to identification of patients with foot problems (O) within a 3-month period?

Methods

Information Sources

- PubMed, CINAHL-Ultimate, and the Cochrane Database of Systematic Reviews.

Key Words

- foot screening, foot examination, foot problems in underserved population, foot screening guidelines, and diabetic foot screening.

Limitations

- Inclusion criteria included English language, articles from 2014-2024.

peer-reviewed articles, scholarly journals, and academic journals.

Critical Appraisal Tools Used

- Articles were appraised using Melnyk & Fineout-Overholt's Rapid Critical Appraisal Tool.

Levels of Evidence Synthesis

Project Goals

1. To implement an evidence-based risk stratification scoring system with foot screenings to identify the level of risk at a free outpatient clinic.
2. To evaluate the number of patients screened and identify the number of patients in each risk category.
3. To implement follow-up appointment guidelines according to risk score.
4. To implement patient education according to risk stratification score.

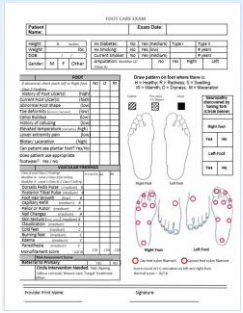
Recommendations Based on the Evidence

Evidence-based guidelines on the prevention and management of foot disease dictate, there are five key elements that underpin efforts to prevent foot ulcers:

- Identifying the at-risk foot.
- Regularly inspecting and examining the at-risk foot.
- Educating the patient, family, and health care professionals.
- Ensuring routine wearing of appropriate footwear.
- Treating risk factors for ulceration (Schaper et al, 2020).

Implementation

- The Model for Improvement framework guided the implementation of a risk stratification screening tool at SHC.
- Project implementation began in December 2023 and ran for 12 weeks.
- The risk stratification tool was developed using
- evidence –based guidelines on foot screenings.
- Patients were categorized as :low, medium or high risk based on findings.
- The internal Quality Improvement/ (QI) committee reviewed and approved the tool for use.



PDSA Cycle

Plan: The current screening tool at SHC was reviewed. A new screening form, with risk assessment score was developed by the DNP project team.

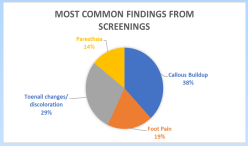
Do: An educational session was provided to first-professional degree nursing students and their clinical preceptors on the foot screening process.

Study: Findings evaluated from both the original tool and new screening tool with risk scoring. Data examined: number of patients screened, findings from each screening, risk assessment score for each patient, interventions needed, and follow-up appointments made.

Act: Process revised using the PDSA cycle to promote the sustainability of a foot screening tool utilizing a risk stratification score with all patients.

Outcomes

- 54 foot screenings were completed during this project; 32 screenings using the original form with no risk stratification score and 22 using the revised form.



- With the new screening form with risk stratification score, more patients were identified as medium and high risk.
- Using the original form, only 4 patients were identified that needed a follow up appt with the Provider
- Many patients had multiple concurrent findings, with 36% of patients having 2 or more abnormal findings in different screening categories.
- All patients screened with the revised form were given follow-up appointments to be seen by the provider, with 68% of those appointments occurring within 2 weeks of the screening.

Sustainability Plan

- Recommendations to ensure sustainability include:
- To have the screening forms completed electronically and directly into the patient's electronic health record instead of being done on paper and then uploaded to the chart.
- The foot screening program will continue to be monitored by the clinic's Quality Assurance/Quality Improvement/Risk Management (QA/QI/RM) committee.

Lessons Learned

- The screening form with risk stratification score is effective in identifying patients who are at risk for foot disease and provides a more streamlined process for patients to get timely follow-up appointments.
- Continued education is essential to the success of this screening tool.
- Streamlining follow up appointments based on risk score ensures that patients are seen in a timely manner.

Contact: Joni-Kay Johnson BSN, RN johnsonj10@mail.sacredheart.edu

Appendix L

Executive Summary

Located in Fairfield County, one of the wealthiest counties in the country, Bridgeport's median household income is one of the lowest in the state . In 2021, the city's poverty rate was 21.8%,which is nearly double both the national and state average. The city has a high rate of residents that are medically underserved. Medically underserved communities are specific populations that have a shortage of primary healthcare services or otherwise face unmet healthcare needs. This population is faced with complex challenges and at risk of illness due to inequities and disparities in access to health care services. They are known to suffer from poor health and can be reluctant to seek healthcare except in crisis. Without timely identification and appropriate treatment foot and ankle problems are a concern; they can cause significant discomfort and pain and may escalate from a minor problem to a very serious one, or lead to infections and amputations (Mullins et al., 2022). Comprehensive foot examinations are essential in detecting foot pathologies in order to sustain movement and quality of life. The purpose of this evidence-based quality improvement project was to implement a risk stratification screening tool for all foot examinations, implement a follow up appointment system based on risk score and provide patient education on self-foot care within a free clinic setting. Based on findings, risk scores would be determined to be low, medium, or high risk and have recommended follow up care based on the risk score.

The Model for Healthcare Improvement Plan-Do-Study-Act framework was used for the planning, implementation, and evaluation of this project. A foot screening tool already in use at the clinic was modified to include a risk stratification tool. The tool was developed by the DNP team and approved for use by the internal quality improvement committee at the clinic. Data was

assessed over a 12- week period, to determine the percentage of foot exams performed, risk stratification assigned to each patient, number of referrals and follow up appointments made compared to a review of foot exams performed prior to the initiation of the risk stratification tool.

During 12 weeks of implementation, a total of 54 foot screenings were completed; 32 screenings using the original form with no risk stratification score and 22 using the revised form. Of the 32 patients screened, only 4 patients were referred to the medical provider for a follow-up appointment. 22 patients were screened using the revised form that assigned a risk stratification score to each patient. Of those screened, 7 (31%) were found to be low risk, 13 (59%) medium risk and 2 (9%) high risk. The results identified that 68 % of patients received a follow up appointment within 1 week based on significant screening findings versus 12.5% of patients where no risk score was assessed.

Results showed that implementing the risk stratification foot screening tool was clinically significant for the clinic, as it allowed for the screening and detection of foot conditions of patients as well as recommendations for follow-up care. Implementation of this tool helped to increase the amount of follow up appointments with a healthcare provider, compared to using the foot screening tool with no risk stratification score. The tool helped to streamline follow up appointments based on risk score, which ensured that more patients were seen in a timely manner to prevent the progression of foot complications and disease.