Improving Timely Referrals by Implementing Lower Extremity Amputation Prevention Tool in an Suburban Wound Care Clinic

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Abstract

Background: *Globally, every 30 seconds there is an amputation due to a non-healing diabetic foot ulcer (DFU). Research shows prevention programs such as utilizing a Lower Extremity Amputation Prevention (LEAP) tool could reduce DFU complications.*

Local Problem: *Impact DuPage (2013) reported that 8.1% of the DuPage population had diabetes, however 12% of the patients with diabetes have had no diabetic foot screening [1]. At a clinic located in DuPage County, the charts audit for the second half of 2017 indicated 55% compliance with documentation of diabetic foot exams.*

Method: *This quality improvement (QI) used four two-weeks Plan-Do-Study-Act cycles. Each cycle included tests of change (TOC) related to patient and team engagement, DFU screening, and referral for treatment. Data were analyzed using run charts and the impact of the interventions were measured.*

Intervention: *Staff was engaged by a kickoff in-service, daily huddles, and weekly team meetings. A modified "Team Effectiveness Diagnostic" survey measured team engagement. Foot Care for a Lifetime was used as shared decision-making tool. Clinicians assessed patients with diabetes with the LEAP checklist and utilized referral log to track appropriate referrals. Results: At the end, patient and team engagement improved to 75% and 92% respectively; also all patients with DFUs were assessed by the LEAP tool (100%) and appropriate referrals (100%) were made.*

Conclusion: *Team engagement was essential in the success of this QI. Patient engagement in the care of their DFU was empowering to patients. The team became better engaged with patients and patients reported more involvement in their own care.*

Keywords: Diabetic Foot Care, Lower Extremity Amputation Prevention Tool, LEAP Tool, Diabetic Foot Ulcer, DFU

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The United States is facing increasing prevalence of type 2 diabetes mellitus affecting more than 12% of adults (Centers for Disease Control and Prevention [CDC], 2017). Globally, every 30 seconds there is a lower extremity amputation due to non-healing diabetic foot ulcers (DFU). Up to 85% of amputations in patients with diabetes are precipitated by DFUs. Additionally, 15-25% of people with diabetes will develop a DFU with a 50-70% recurrence rate which further compromises the patient's health [2]. According to the International Working Group on the Diabetic Foot (IWGDF) guidelines, diabetic foot screening should be done yearly and persons identified as high-risk should have diabetic foot exams every one to six months [3]. DFUs are the tenth leading cause of death in Illinois. The financial impact of complications in DFU has been increasing. According to the American Podiatric Medical Association, every $1 invested in care of DFU results in $27 to $51 of saving for the health care system among patients with commercial insurance. For Medicare-eligible patients, every $1 invested in care by a podiatrist result in $9 to $13 of savings. The estimated average cost of each lower extremity amputation is $70,000 [4].

Available Knowledge

Incomplete foot exams and late identification of diabetic foot complications may delay appropriate care for patients who need vascular or podiatry interventions. In research conducted by Siersma et al and Sibbald et al, patients with DFUs were unemployed (50-79%) or unable to work, contributing to a profoundly impacted quality of life, financial hardships and loss of productivity [5, 6]. There are high mortality risks with ulceration

(85%), and amputation increases the mortality risk by two folds in patients with diabetes. Thus multidisciplinary care is needed to care for patients with DFUs [7].

The clinicians at EWCC realized that there was a gap between guidelines and their practice, such as lack of documentation of a peripheral neuropathy exam (45%), and probe to bone on wound assessment (90%). Also, 60% of patients in this clinic with DFUs reported owning therapeutic diabetic foot wear, and only 17% had adequate glycemic control (A1c<7).

Rationale

Multidisciplinary approach to diabetic foot care can be based on the Chronic Care Model (CCM), which develops restructuring health care through interactions between health systems and communities. In addition, the CCM emphasizes data collection to improve health systems at patient level, clinical practice, and community level [8]. The Institute for Healthcare Improvement (IHI) Model is structured based on the tests of change, team-building, and data analysis for QI projects. The IHI model has been proven effective in change theory, staff satisfaction, and quality improvement in patient care [9]. Implementation of a standardized method of identification of abnormal diabetic foot exams was needed to improve the patient-centered, safe, and effective care and timely referral to podiatry or vascular services at EWCC. The aim of this project was to improved right care for diabetes patient with DFU to 90%, receiving diabetic foot exams and referrals to vascular or podiatry as appropriate, over a 90 day period. Right Care was measured by a combination of post survey scores, screening checklists, and referrals to improve outcome.

Methods

The EWCC is part of Edward-Elmhurst Health, a non-profit organization in the suburb of the Chicago metropolitan area, serving 25-40 patients daily, open week days. According to the Wound Expert, the electronic medical record used, DFUs were the second most prevalent wound treated at EWCC. The clinic employs two nurse practitioners, two physical therapists, four registered nurses, certified nurse assistants, a patient service representative, and a clinic manager. Stakeholders in this project included all clinic staff, medical directors, clinic manager, and patients and their families and caregivers. Majority of patients seen have had various Medicare plans (62%), 36% commercial insurance plans, and 1% uninsured or waiting for Medicaid approval. English is the primary language of more than 95% of patients, followed by Spanish 4%, and other (1%). The clinic has access to various groups of vascular specialists and podiatrists in the same building, as well as locally.

Interventions

Throughout the eight weeks, four Plan-Do-Study-Act (PDSA) rapid cycles with tests of change (TOC) were conducted. The four main interventions were team engagement, patient engagement, utilizing a specific tool for assessment of diabetic feet, and tracking referrals (Table 1). Various interventions including a kick off meeting, daily huddles, weekly team meetings, and mid-day huddles were employed to enhance team engagement. Team engagement was assessed weekly with a modified Team Effectiveness Diagnostic (TED) survey (Team Effectiveness Questionnaire, n.d.) [10]. The original TED survey has 45 questions divided into seven categories. Each week, one question from each category was placed in the modified survey (Linkert survey) and the score was calculated.

Table 1: Test of changes: *The aim of this QI project was to improved right care for diabetes patient with DFU to 90%, receiving diabetic foot exams and referrals to vascular or podiatry as appropriate, over a 90 day period. at EWCC. Right Care was measured by a combination of post survey scores, screening checklists, and referrals to improve the outcome.*

Intervention	PDSA cycle 1	PDSA cycle 2	PDSA cycle 3	PDSA cycle 4
Teamwork/ engagement	Daily huddle < 2 min	Continue daily huddle, weekly team meeting with lunch	Add mid-day daily huddle	Add email to engage team
Patient Engagement/ Experience of care	Utilizing Diabetic Foot Care for Lifetime, shared decision-making (SDM) tool to engagement patient.	New patients with DFU receive SDM tool by receptionist upon check-in to view.	Expand SDM tool to all existing diabetic patient	Expand SDM tool to patient with diabetes with no DFU
Utilizing LEAP tool	Implement LEAP Screening tool on initial visit	Continue ramp with both NPs new patients	Continue c LEAP Paper/ Electronic template in EMR, 1-1 education of providers	Using LEAP tool to assess for abnormal foot exam on pt without DFU
Referral tracking log (RTL)	Implement RTL for new patients with abnormal diabetic foot exam	Continue ramp with both NPs new patients	Prepared referral prescription for vascular/podiatry, receptionist enters referral log	Two APNs track their own referral in referral log book

Patients with diabetes were identified based on diagnoses on the electronic medical record and/or diagnosis mentioned in the provider referral order. Diabetic Footcare for a Lifetime, developed by U.S. Department of Health and Human Services [USDHHS], was used as a shared decision-making (SDM) tool. This SDM tool had a multiple-choice question survey which was used to assess the patient's engagement by the end of the visit. The LEAP tool developed by the Health Resources and Services Administration (HRSA, 1992) was used to examine diabetic feet and identify abnormal diabetic foot exams. The utilization of the LEAP checklist was measured as an indicator of improving standard of care in the clinic [11]. A simple table was created to track the referral to vascular or podiatry services when needed.

Study of Interventions

Data from each intervention except team engagement was collected twice weekly during the project and then recorded and graphed into Excel designed Run Charts provided by the IHI. The team engagement data was collected weekly per team request. The trends in changes were identified at the end of each cycle, and a new TOC was implemented to meet the aim of this project [9]. Evaluation of the data made it possible to gauge changes, trends, and variation over time. Positive reinforcement was implemented to improve team work and team engagement for providing patient centered care.

Measures

A retrospective chart audit was performed at the beginning of the project to identify areas for improvement. Outcome and process measures were calculated into data points for evaluation. Overall, this project included eight interventions and one balancing measure to assess whether the changes resulted in improvements in patient care. The operational definitions for process and outcome of each nine measures are detailed in Table 2. The patient Engagement tool, a valid and reliable tool developed by USDH-HS, was used to measure patient confidence in diabetic foot care. Team engagement was evaluated by participation in daily huddles, weekly meetings, and an average score on TED surveys, a valid and reliable survey. The LEAP tool is a valid tool developed by HRSA with high reliability [10]. The balancing measure of the visit length was tracked to see whether improved changes increased visit length. Efforts were made to confirm the accuracy and completeness of data collection and necessary subsequent adjustments were integrated through subsequent PDSA cycles.

Table 2: Quality Improvement Project Measurement Worksheet: Interventions, Process and Outcome Measures

	TOC/Core intervention	Measure	Operational Definition
AIM: Achieve 90% Right are for patient with abnormal diabetic foot exam over 90 days. 1-How many patient received SDM (Y(1)/N(0)). 3-Abnormal DF screening documented in log (Y(1)/N(0)). Right Care measured by: calculating mean of the average of score.			2-LEAP checklist completed (Y(1)/N(0)). 4- Referral generated (Y(1)/N(0)).
A: Teamwork	Kick off	**Process**: 90% team participation in daily huddle.	Num/Denom: average of (#team members participate on daily huddle /#members on team)
		Outcome: Increase the mean team efficacy score to 90% over 90days.	Mean score: Increase the mean scores of modified team effectiveness to 90%. Team effectiveness score at baseline 78% obtained before intervention.
B: Patient Engagement	SDM reviewed with patient by provider.	**Process**: Increase the number of patient with DFU who received Diabetic Foot Care patient education tool to 80%.	Num/denom:(#tool used/#patient who has diabetes with foot ulcer
		Outcome: Increase the number of pts with DFU demonstrating of proper diabetes foot care to 80%.	Mean score : Average of Mean of the patients' post visit survey score
C: Implementation of LEAP tool	Lower Extremity Amputation prevention tool	**Process**: Utilizing the LEAP checklist among patient with DFU to 90%.	Num/denom:# checklist completed/#diabetic patient seen for DFU that day
		Outcome: Identification of abnormal diabetic foot exam to 80%.	Num/denom: #total abnormal diabetic foot exam /#of LEAP checklist completed
D: Developing a tracking log tool	DNP student enters data in the tracking log tool	**Process**: Utilizing tracking log 90% of time to generate podiatry /vascular referrals.	Num/denom: #patient in tracking log/# patient who meet the criteria for referral (abnormal foot exam)
		Outcome: people with abnormal foot exam actually received the referral 95%.	Num/denom:(#patient receiving the vascular/podiatry referral/#patient on the referral log)
Balancing Measure Visit Length. Track visit length to ensure that utilizing check list does not increase visit time (the burden of scheduling). Document time spent on the checklist 80% of time for DFU initial visit.			Oper def(#of minutes total spent on diabetic foot ulcer initial visit/#of diabetic foot ulcer initial visit). Operational definition is the mean office visit length during this project.

Analysis

Run Charts, a dynamic view of the variation in one system over time, were utilized to analyze trends. Each Run Chart was carefully analyzed, and data from each cycle was used to guide future TOC, highlight variations to assist in decision making and create adjustments to interventions. Run Charts are the best tools to determine if the improvement strategies have had the desired effect [9]. The project meets federal guidelines for QI and did not involve human subject research, thus did not require review from the Institutional Review Board. No outside funding was received for this project. There was no conflict of interest identified by the author.

Results

Over 90 days, a median of 90% Right Care for diabetic foot exams was achieved (Figure 1). Interventions and small TOC were implemented during each two-week PDSA cycle, with the goal of meeting the aim. The balancing measure was the length of the initial visit of the patient with DFU, which was 75 minutes at baseline. The goal was to sustain the length of the initial visit throughout the project, while implementing the four areas of change in the care of DFU. The visit length increased by 10 min in the first PDSA cycle, and then reduced to the baseline most of the time in the remaining cycles. There were only two outliers, patients with multiple ulcers, who required more time during initial visits (Table 2).
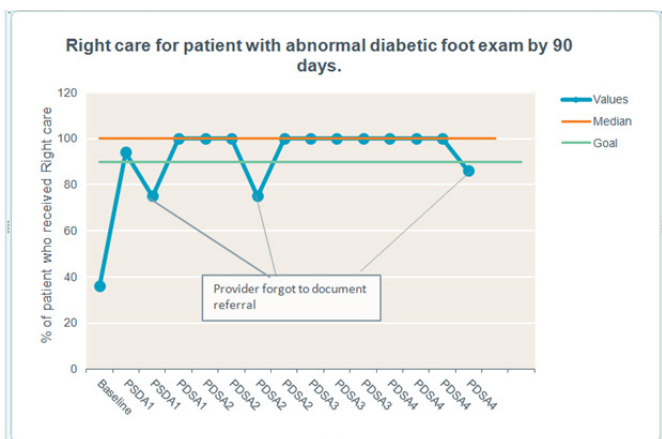

Figure 1: Right Care
1-How many patient received SDM (Y(1)/N(0)).
2-LEAP checklist completed (Y(1)/N(0)).
3-Abnormal DF screening documented in log (Y(1)/N(0)).
4- Referral generated (Y(1)/N(0)).
Right Care measured by: calculating mean of the average of score.

Team Engagement

Team engagement began with an initial kickoff in-service for the staff. The clinicians in the EWCC were encouraged to hand out the SDM tools to patients and utilize the LEAP tool for assessment. The team participation in daily huddles improved from 80% at the beginning of the first PDSA cycle, to 90% in the end of the fourth cycle. Team engagement interventions included daily huddles, weekly meeting, and weekly emails to discuss the QI progress. Staff completed a weekly team engagement survey to identify the opportunities for improvement in team performances. Average scores on the team engagement survey improved from 40% initially to 92% at the end of the 90-day project. Staff engagement and participation improved as the project continued, however, high census and training new staff temporarily affected the team engagement, and the score dropped to 72%. Overall, most of the team score was below the goal of 90% (Figure 2), indicating opportunity for improvement. Ideal huddle time in this clinic was 5-10 minutes in the beginning of the day (8am) and before lunch break, allowing staff to participate without interference with other obligations.
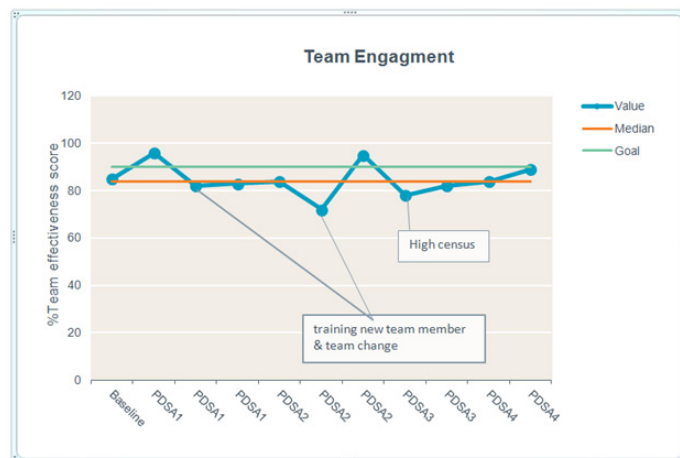

Figure 2: Team Engagement, The median for team engagement in daily huddles and team meeting was 92% above the goal of 90%.

Patient Engagement

Prior to the implementation of this project, every clinician educated and engaged patients in diabetic foot care according to their discretion, and a standardization of the process was needed. All clinicians were instructed to use the Diabetic Foot Care for Lifetime as a SDM tool. In the first cycle, there was zero participation, and by the end fourth cycle, 100% of patients were engaged by SDM. Patient engagement was assessed with the post education survey. Patient's post visit survey baseline was 55%. As clinicians became more creative in engaging patients on diabetic foot care, the post survey scores improved, trending above median for the third and fourth cycles. The sequence of implementing SDM by the providers detailed in the Table 1. The trend of collected data illustrated in Figure 3.
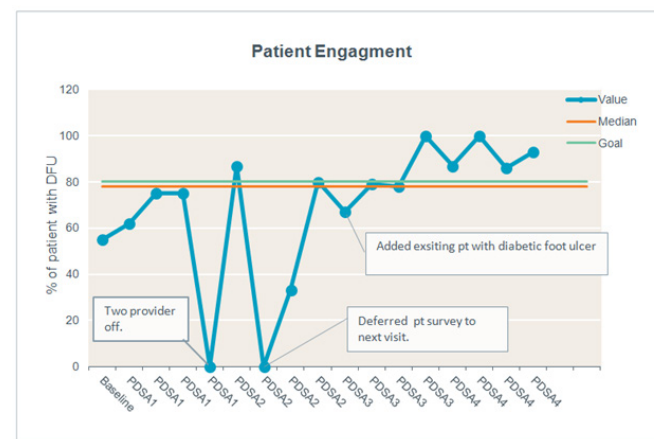

Figure 3: The median for patient's post survey score was 75%.

Utilizing LEAP Tool

Assessment of patients with DFUs was performed using LEAP checklist [Figure 4]. Utilizing a paper copy of the LEAP tool on assessment of DFUs started in first PDSA cycle with one provider, followed by all providers in the second cycle. In the third PDSA cycle, utilizing the electronic version of LEAP was added to data collection, and in the final cycle, all diabetic patients were assessed by LEAP. A median of 100% indicated that the used of the LEAP tool was an acceptable choice by clinicians for DFU evaluation. Twenty new patients with DFU were assessed during this 90 days, 15 patients identified as having an abnormal diabetic foot exam.
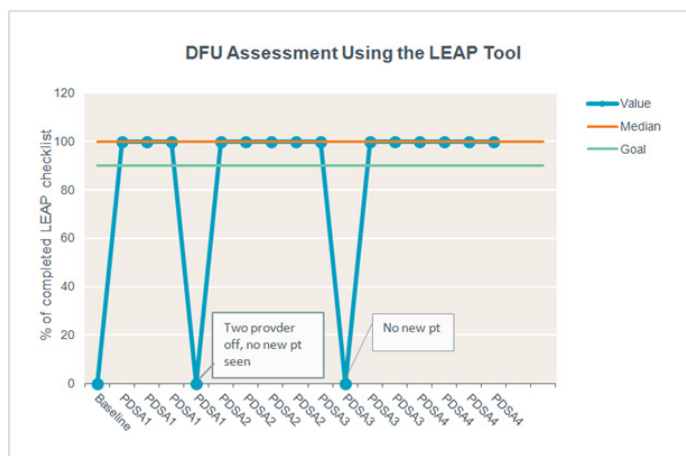

Figure 4: The median of assessment of Diabetic Foot Ulcer with LEAP tool was 100%.

Referral Tracking Log

Utilizing referral tracking log was variable among the clinicians [figure 5]. In the first cycle, referral was tracked by one provider for one team, second cycle referral was tracked by one provider for both teams. In the third cycle, was tracked by another team members. In the fourth cycle, each clinician tracked their own team referral. Entering patients in the tracking log remained challenging for the team, who struggled with staffing and taking responsibility of updating the tracking log.
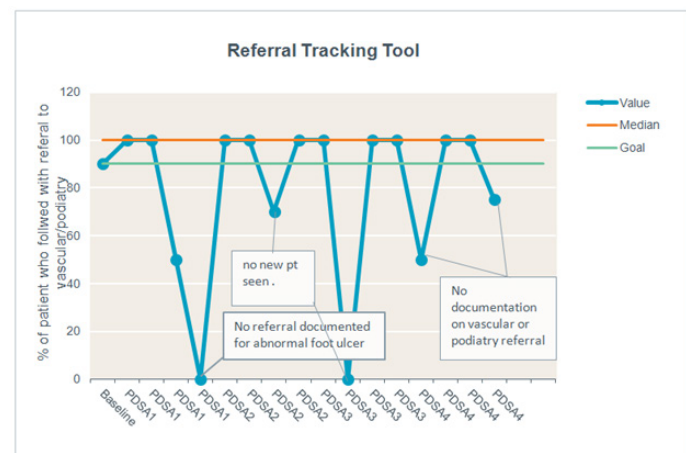

Figure 5: Tracking referral to vascular or podiatry

Discussion

Chart audits of patients with DFUs in the second half of 2017

confirmed the need for improvement in the quality of care for patients with DFU at EWCC. Chart audits results increased awareness, and identified the opportunities for improvement for DFUs' treatment. The most successful components of the project were patient education and engagement on diabetic foot care, and team engagement. The LEAP tool served as an identifier of an abnormal diabetic foot exam. This QI project standardized the diabetic foot exam, improved the clinicians' skills, and facilitated communication between clinicians and primary care providers. Daily huddles and team meetings allowed a dialogue regarding team concerns, and fostered shared decision making among staff and leadership. Our team was able to create a culture of team work and dynamic communication.

Interpretation

It was apparent that all stakeholders buy-ins were critical in the success of this QI. Furthermore, it was essential to seek out the reasoning behind the disengagement of team members by active listening. This project facilitated discussion of the strengths and weaknesses among the team members.

Low census of new DFUs may have contributed to the perfect score in the utilization of the LEAP tool, and a high census may reduce the compliance of clinicians. This project improved assessment and documentation of diabetic foot exams, improved timely referral for interventions needed to treat DFUs. Training new team members and inadequate staffing were major barriers to further the success of this project.

Limitations

The project can be easily implemented in other clinics, the ease-of-use interventions such as the SDM tool and LEAP tool increase the generalizability to other sites. The design of the project was geared towards a clinic with multiple staff, so a single provider clinic may not have enough time for both patient education and assessment using the LEAP tool in first visit, and may expand the patient education to the follow up visits. Imprecise delivery of the SDM tool and the LEAP checklist may result in missed opportunities to impact right care for diabetic foot exams. Effort was made to increase data reliability and reduce variation in data collection and chart audits by use of a single data collector. Patient's perception, cultural beliefs, level of comprehension, and language barriers may have influenced data collection. Patients may not have wanted to discuss their diabetic foot history and number of previous ulcers, or may have answered questions falsely.

Conclusions

The aim of this QI project was achieved. Team members showed increased engagement in the EWCC. Going forward, the EWCC is planning to continue to use the component of the LEAP tool in assessment, documentation, and initiating referral of the DFUs. This project is sustainable because of the support of management and a deeply engaged team who have the shared desire to improve patient care in a practice with a culture that values improvement.

The support of the staff and management was essential in im-

plementation of this QI. This project highlighted that team work not only improves patient care, but also enhances the clinician confidence in providing the safe, seamless, and personal care, which is the vision of Edward-Elmhurst Health.

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