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STATEMENT OF PURPOSE

Many factors affect lower extremity (LE) complications (e.g., diabetic foot ulcers [DFU], or amputations) in individuals with diabetes mellitus (DM), including glycemic control and pedal abnormalities. This retrospective electronic medical record (EMR/CPRS) review identified additional personal and health system-level risk factors for developing pedal complications, specifically ulcerations and amputations.

LITERATURE REVIEW

Diabetes Mellitus (DM) and diabetes complications were the 7th leading cause of death in the US in 2013. Common DM complications including coronary arterial disease (CAD), peripheral arterial disease (PAD), renal failure, visual loss, stroke, heart attack, and premature death. These complications reduce the length and quality of life of DM patients. Proactive management of risk factors, including patient education about diabetes and foot management, can decrease microvascular complications of diabetes. Accordingly, the US government has set goals for increasing preventive care to persons with DM, as well as decreased rates of hospitalization and complications.

METHODS

We created a randomly-selected cohort of 107 Veterans with 1+ diabetes-related hospitalizations or 2+ outpatient visits, and 1+ prescriptions of diabetes medications filled in 2014-2015 with documented DFUs or LE amputation. A comprehensive medical record review was performed from patient's diabetes onset or first Hines VA visit to June 2019. Data included documentation of: annual foot risk (FR) scores, co-morbid conditions, complication outcomes and formal DM education received.

Figure 1. Health System Trajectory of DFU²

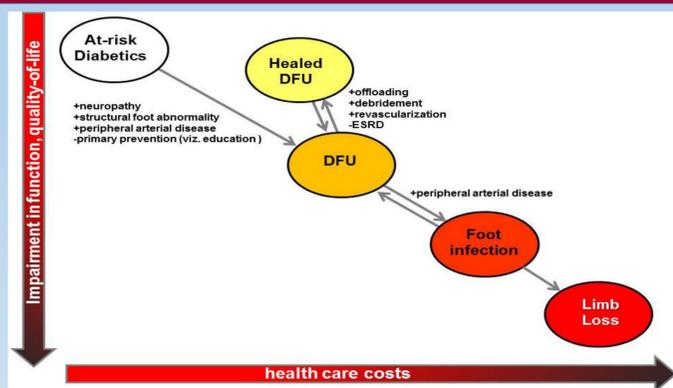


Figure 2. PROPOSED REFERRAL ALGORITHM BASED ON FOOT RISK SCORE

Risk Factors	DM Medical Management	Education: Intro to DM	Education: DM – II	Education: Intro to Foot Care (prior to pedal complication)	Education: Foot Care Management (after pedal complication)	Prosthetics (inserts/shoes)	Podiatric Surgery	Vascular Surgery	PCP Follow-Up (per VA guidelines)
0. No Foot Risks	X	X							X
1. Loss of protective sensation (LOPS)	X	X	X	X	X	X			X
2A. LOPS with pedal deformity	X	X	X	X	X	X	X		X
2B. LOPS with PAD	X	X	X	X	X	X	X	X	X
3. History of Ulceration/Amputation	X	X	X	X	X	X	X	X	X

- We propose adding two new classes (highlighted in blue above) for individuals with DM at high risk for ulceration and/or amputation.
- Currently available DM education classes provide basic diabetes management (DM-I) as well as an interdisciplinary class (medical, nursing, pharmacy, dietary) with behavioral component (DM-II).
- Neither of the existing classes currently includes a podiatrist or detailed information on DFU or amputation prevention.

Our findings suggest the need for 2 additional courses – one focused on preventing foot problems, aimed primarily at individuals with DM and no current foot problems and a second class that focuses on foot management after DFU or amputation.

ANALYSIS/DISCUSSION

Factors contributing to increased LE complications included:

- misclassified foot risk score/discrepancy between primary care and podiatry FR scores
- lack of patient DM education
- delayed podiatric evaluation

- Over 75% of patients had prior neuropathy, ulceration and/or amputation before their first podiatry encounter.
- We propose to make patient education a more prominent aspect of diabetic treatment and management. Pedal health is minimally highlighted in the diabetic education courses.

CONCLUSIONS

A large number of factors are either not collected and/or easily accessible within the EMR to assist providers in identifying patients at highest risk of developing complications. We recommend that the FR screening process also include personal factors (e.g., elevated HgA1c, co-morbid conditions, social support). We also identified system-level practices (e.g., suboptimal referral to formal DM education, co-pays that contribute to patient inability to self-manage, failure to address patient FR misunderstanding of increased/misclassified FR scores by various health providers) that need improvement.

We propose an enhanced FR screening to improve DFU prevention and prognosis with an associated referral algorithm to address FR factors, decrease LE complication incidence and prevent associated adverse outcomes (e.g., physical disability or nursing home placement).

REFERENCES

- Centers for Disease Control and Prevention. Diabetes Report Card 2014. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2015.
- Barshes, Neal, Meena Sigireddi, James S. Wrobel, Archana Mahankali, Jeffrey M. Robbins, Panos Koungias, & David G. Armstrong. "The system of care for the diabetic foot: objectives, outcomes, and opportunities." Diabetic Foot & Ankle [Online], 4 (2013)
- American Diabetes Association. Economic costs of diabetes in the U.S. In 2007. Diabetes Care 2008
- American Diabetes Association. Consensus Development Conference on Diabetic Foot Wound Care: 7-8 April 1999, Boston, Massachusetts. American Diabetes Association. Diabetes Care. 1999 Aug;22(8):1354-60. Review. PubMed PMID: 10480782.
- Reiber, Gayle E., Gregory J. Raugi, and Donald Rowberg. "The process of implementing a rural VA wound care program for diabetic foot ulcer patients." Ostomy/wound management 53.10 (2007): 60
- Johnston, Mark V., et al. "Personal and treatment factors associated with foot self-care among veterans with diabetes." Journal of rehabilitation research and development 43.2 (2006): 227.
- Lawrence A. Lavery, DPM, Edgar J.G Peters, MD. Effectiveness of the Diabetic Foot Risk Classification System on the International Working Group on the Diabetic Foot. Diabetes Care . 2001.

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- The views expressed in this presentation are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the United States government.
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