Health System Factors Contributing to Diabetic Foot Ulcerations and Amputations

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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 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 seventh 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*, can markedly 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.

ANALYSIS/DISCUSSION

Factors contributing to increase LE complications included: 1) misclassified foot risk score/discrepancy between primary and podiatry FR scores, 2) lack of patient DM education and 3) late referral to podiatry. Over 75% of patients already had neuropathy, prior ulceration and/or amputation at 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. In addition to including a more detailed review of pedal care, we propose the following referral algorithm to provide efficient and effective treatment for our Veteran population.

PROPOSED REFERRAL ALGORITHM BASED ON FOOT RISK SCORE

0 **No Foot Risks**	1. Education – Into to DM education per GMC guidelines upon onset of DM diagnosis **Follow up – General physician per GMC guidelines, annually**
1 **LOPS**	1. Education- DM management/ Advanced Foot Risk Education Annually 2. Podiatric surgery- Prosthetic orders such as inserts/ shoe modifications **Follow up – General physician per GMC guidelines, bi-annually**
2 A **LOPS with pedal deformity**	1. Education- DM management/ Advanced Foot Risk Education Annually 2. Podiatric surgery- Prosthetic orders such as inserts/ shoe modifications; consideration for prophylactic intervention to address deformity **Follow up – General physician per GMC guidelines or podiatry, bi-annually**
2B **PAD**	1. Education- DM management/ Advanced Foot Risk Education Annually 2. Podiatric surgery- Prosthetic orders such as inserts/ shoe modifications; consideration for prophylactic intervention to address deformity 3. Vascular surgery - Possible revascularization/ intervention if non-invasive vascular studies are abnormal **Follow up – General physician per GMC guidelines; podiatry every 3 months**
3A **History of Ulceration**	1. Education- DM management/ Advanced Foot Risk Education Annually/ 2. Podiatric surgery- Prosthetic orders such as inserts/ shoe modifications; consideration for prophylactic intervention to address deformity 3. Vascular surgery - Possible revascularization/ intervention if non-invasive vascular studies are abnormal **Follow up – General physician per GMC guidelines; podiatry every 3 months**
3B **History of Amputation**	1. Education- DM management/ Advanced Foot Risk Education Annually/ Podiatry Refresher biannually 2. Podiatric surgery- Prosthetic orders such as inserts/ shoe modifications; consideration for prophylactic intervention to address deformity 3. Vascular surgery - Possible revascularization/ intervention if non-invasive vascular studies are abnormal **Follow up – General physician per GMC guidelines; podiatry every 3 months**

CONCLUSIONS

A large number of factors are either not collected 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 adherence to self-management, 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).

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DISCLOSURES

There are no financial disclosures for this research project.