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Umnia Mahgoub Date

Outpatient clinic attendance and lower extremity amputation risk among patients hospitalized with diabetic foot ulcers in a large, public hospital in Atlanta, Georgia

By

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Master of Public Health

Global Epidemiology

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By

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BS, BA
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2018

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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2021

Abstract

Outpatient clinic attendance and lower extremity amputation risk among patients hospitalized with diabetic foot ulcers in a large, public hospital in Atlanta, Georgia

By Umnia Mahgoub

Background: Diabetes-related amputations are typically precipitated by a diabetic foot ulcer (DFU). Progression from ulceration to amputation can be halted by appropriate medical and surgical care.

Objective: Our study aims to identify which populations would benefit from interventions to increase access to outpatient limb salvage care.

Methods: We conducted a retrospective cohort study of patients hospitalized with a DFU from 2016-2019 at Grady Memorial Hospital in Atlanta, Georgia. Among patients hospitalized with a DFU, we measured 30-day post-discharge outpatient clinic attendance with limb salvage providers and identified predictors of attendance with these providers. We also investigated the association between 30-day post-discharge clinic attendance and 12-month amputation incidence. Log-binomial regression was used to estimate risk ratios and 95% confidence intervals (CI).

Results: Among 911 patients included in the study, the mean age was 57 years, 69% were male, 80% were Black, and 68% were insured by Medicaid or Medicare. More than half (54%) of eligible patients attended ≥ 1 appointment with limb salvage providers within 30 days post-discharge. Predictors of 30-day post-discharge clinic attendance included age < 56 years (RR 0.88, 95% CI 0.80 – 0.96), being uninsured (RR 1.16, 95% CI 1.05 – 1.28), no history of homelessness (RR 0.85, 95% CI 0.74 – 0.97), and attending ≥ 1 appointment with limb salvage providers 30 days prior to initial hospitalization with DFU (RR 1.17, 95% CI 1.06 – 1.29). Among 375 patients included in the 12-month outcome analyses, the risk of any amputation or all-cause mortality was 22% (n=84). The 12-month adjusted risk of major amputation among patients who attended both medical and surgical post-discharge clinics was 0.49 times (95% CI 0.20 – 1.19) the risk of patients with no attendance.

Conclusion: More than one in five patients experienced amputation or mortality within 12 months of discharge. We observed a non-significant trend between 30-day post-discharge clinic attendance and 12-month incidence of amputation. Interventions to increase access to outpatient care and prevent diabetes-related amputations could prevent amputations.

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INTRODUCTION

Diabetes mellitus is the leading cause of preventable lower extremity amputation (LEA) in the United States (US) and worldwide.[1, 2] Over 100,000 LEAs occur among people living with diabetes each year in the US, and approximately 80% of these LEAs are precipitated by a diabetic foot ulcer.[1, 3] Diabetic foot ulcers are common with a lifetime prevalence of approximately 25% among people living with diabetes in the US.[4] In addition to amputations, diabetic foot ulcers are also associated with high mortality,[5] decreased quality of life,[6, 7] and significant costs to patients and the healthcare system.[3] Diabetes-related LEA rates are increasing in the US,[1] indicating a need to strengthen access to limb salvage services at the primary (i.e., foot ulcer formation), secondary (i.e., progression from ulcer to amputation), and tertiary (i.e., progression from minor [below the ankle] to major [above the ankle] amputation) levels. Patients with diabetic foot ulcers often have an inpatient admission as their first contact with the health system,[8] and thus the hospitalization is an opportunity to link patients to outpatient limb salvage care for secondary and tertiary prevention.

Outpatient clinic attendance has been associated with increased access to diabetic foot ulcer wound care, lower rates of major amputations, and better glycemic control.[9, 10] However, there are limited data on predictors of post-hospital discharge outpatient clinic attendance (post-discharge attendance) among patients hospitalized with diabetic foot ulcers and whether attendance prevents future amputations after hospital discharge. Among patients hospitalized with diabetic foot ulcers in a large, urban, public hospital, we measured 30-day post-discharge attendance with medical and surgical providers engaged in limb salvage and identified

predictors of 30-day post-discharge attendance with these providers. We also determined the association between 30-day post-discharge attendance and 12-month post-discharge incidence of amputation. We hypothesized that 30-day post-discharge attendance would be associated with lower risk of amputation within 12 months of discharge. Our study aims to identify which populations would benefit most from interventions to increase access to outpatient limb salvage care such as patient navigation and mobile clinics.

METHODS

Study setting and design

We conducted a retrospective cohort study of patients hospitalized with a diabetic foot ulcer at Grady Memorial Hospital (GMH) between January 1st, 2016 and December 31st, 2019. GMH is a large, academic, public, hospital in Atlanta, Georgia, and has a large volume of diabetic foot ulcer-related hospitalizations.[11]

Participant eligibility criteria

Eligible participants included adults with diabetes who were hospitalized with a diabetic foot ulcer. The GMH electronic medical record data warehouse was queried for all patients hospitalized with a diabetic foot ulcer and related complications (i.e., diabetic foot osteomyelitis and LEAs) using International Classification of Diseases codes (10th revision) (ICD-10) as previously described (Supplemental Table 1).[11] To confirm diabetes diagnoses and whether a diabetic foot ulcer, diabetic foot osteomyelitis, or a diabetes-related LEA was

present, all identified records were reviewed using a standardized case report form (Supplemental File 1).

Our first study aim was to measure 30-day post-discharge attendance. For our first aim, we excluded patients who died or had bilateral major amputations at the time of their initial hospitalization discharge, as these patients are not eligible for post-discharge limb salvage (Figure 1). Additionally, we excluded patients who died or suffered from an amputation (minor and/or major) within 30 days of discharge. Our second aim was to identify predictors of 30-day post-discharge attendance. For our second aim, we further excluded patients who did not have ≥ 1 outpatient clinic appointment scheduled with medical and/or surgical providers within 30 days of discharge. Our third aim was to measure the association between 30-day post-discharge attendance with medical and/or surgical providers involved in limb salvage and incident amputations occurring within 12 months of discharge. For our third aim, we excluded patients who had < 12 months of post-discharge follow-up at GMH, unless they were known to have died during this period. Excluding patients who had < 12 months of follow-up ensures our main study population includes only patients with known outcomes (i.e., amputation, death, or neither) within 12 months of discharge.

Study definitions

Diabetes was defined by clinical documentation and/or a hemoglobin A1c (HbA1c) ≥ 6.5% during or at any time prior to the initial hospitalization. Diabetic foot ulcer was defined by clinical documentation. Patients with lower extremity osteomyelitis and non-traumatic LEAs

were assumed to have a diabetic foot ulcer and included in the study. Osteomyelitis was defined by radiologist report of X-ray and/or magnetic resonance imaging. LEAs were defined by clinical documentation and were classified as minor or major. For patients with multiple hospitalizations with diabetic foot ulcers during the study period, their first admission was classified as the initial hospitalization.

All data except for medical insurance and outpatient clinic attendance were abstracted by manual review of the records using a standardized case report form (Supplemental File 1) and entered into a REDCap database.[12] Medical insurance and outpatient clinic attendance data were queried through the GMH electronic medical record data warehouse. Race was categorized as Black and non-Black (i.e., White, Hispanic, Asian, and other). Insurance status was categorized as Medicaid or Medicare, uninsured, and other. History of homelessness and history of tobacco use were based on self-report. Heart failure and end-stage renal disease (ESRD) were based on clinical documentation. Data regarding peripheral artery disease was not available. Obesity was defined as a body mass index (BMI) ≥ 30 kg/m^2. Baseline amputation history was categorized as no amputation, minor amputation, and major amputation at the time of initial hospitalization. The initial hospitalization outcome was categorized as ulcer (without diabetic foot osteomyelitis or amputation), diabetic foot osteomyelitis (without amputation), minor amputation, and major amputation. Outpatient clinic attendance *prior* to the initial hospitalization was defined as attending ≥ 1 appointment with medical and/or surgical providers within 30 days prior to initial hospitalization.

Outpatient clinic attendance definition

The primary exposure for this study was 30-day post-hospital discharge outpatient clinic attendance with medical and/or surgical providers. Attendance was defined as completion of ≥ 1 outpatient clinic appointment within 30 days of hospital discharge. Non-attendance was defined as a no-show or patient cancellation of all outpatient appointments scheduled within 30 days of hospital discharge. The 30-day window was chosen based on the Society for Vascular Surgery guidelines for wound care every 1-4 weeks among patients with diabetic foot ulcers.[13] We defined medical providers as family medicine, general medicine, geriatric medicine, internal medicine, endocrinology, or infectious diseases, as these services provide metabolic care and treat diabetic foot ulcer-related infections. We defined surgical providers as podiatry, vascular, general, orthopedic, and trauma surgical services in addition to wound care nurse services, as these services provide wound care, offloading, and peripheral artery disease management.

12-month outcomes definitions

Two groups of 12-month post-hospital discharge outcomes were defined by clinical documentation: 1) major amputation or all-cause death and 2) any amputation (major or minor) or all-cause death.

Statistical analyses

Unadjusted associations between patient characteristics and 1) 30-day post-discharge attendance, and 2) 12-month post-discharge outcomes were assessed with risk ratios (RR) and 95% confidence intervals (CI). We performed log-binomial regression to compare the adjusted

relative risk of 1) major amputation or all-cause death, and 2) any amputation or all-cause death by attendance (i.e., 30-day post-hospital discharge outpatient clinic attendance with medical and/or surgical providers). Covariates included in the regression models were based on observed associations in the bivariate analyses (factors associated with both the exposure and outcome) and confounding factors established from previous literature. Analyses were performed using SAS version 9.4. This study was approved by the Emory Institutional Review Board and the GMH Research Oversight Committee.

RESULTS

Study population and baseline characteristics

A total of 1,380 unique patients had ≥ 1 hospitalization associated with an ICD-10 code of interest at GMH between 2016-2019 (Figure 1). Among these 1,380 patients, 976 (71%) patients were confirmed to have a diabetic foot ulcer, diabetic foot osteomyelitis, or a diabetes-related LEA. Among these 976 patients, 933 (96%) survived the initial hospitalization and were without a bilateral major amputation at the time of discharge. Among these 933 patients, 22 (2%) died and/or underwent an amputation within 30 days of discharge and were excluded from the study.

Among 911 patients included in the study, the mean age was 57 years, 69% were male, 80% were Black, and 68% were insured by Medicaid or Medicare. Most patients (680/911, 75%) had ≥ 1 scheduled appointment with medical and/or surgical providers within 30 days of discharge, and approximately half (492/911, 54%) attended ≥ 1 appointment. Characteristics of patients

that did (n=680) and did not (n=231) have ≥ 1 scheduled appointment with medical and/or surgical providers within 30 days of discharge are provided in Supplemental Table 2. Among the 680 patients that did have ≥ 1 scheduled appointment, the mean age was 56 years, 69% were male, 81% were Black, and 67% were Medicaid or Medicare recipients (Table 1). Most patients (78%) did not attend an appointment with medical and/or surgical providers within 30 days *prior* to the initial hospitalization.

Predictors of 30-day post-discharge attendance

There were 680 patients with ≥ 1 scheduled outpatient clinic appointment with medical and/or surgical providers within 30 days of hospital discharge, of whom 72% (n=492) attended ≥ 1 appointment (Table 1). The mean age of patients with ≥ 1 scheduled appointment was 56.3 years (standard deviation [SD] 12.7). Patients younger than 56.3 years were less likely to attend ≥ 1 appointment 30 days post-discharge compared to those 56.3 years or older (RR 0.88, 95% CI 0.80 – 0.96). Among patients with ≥ 1 scheduled appointment, 68% of women attended ≥ 1 appointment compared to 74% among men (RR 1.09, 95% CI 0.98 – 1.08). Patients who attended ≥ 1 appointment were also more likely to be uninsured (RR 1.16, 95% CI 1.05 – 1.28), and less likely to have a history of homelessness (RR 0.85, 95% CI 0.74 – 0.97). Regarding comorbidities, patients who attended ≥ 1 appointment were less likely to have heart failure (RR 0.76, 95% CI 0.65 – 0.89) or ESRD (RR 0.79, 95% CI 0.65 – 0.96). Regarding outcomes of initial hospitalization, patients who attended ≥ 1 appointment were more likely to have had diabetic foot osteomyelitis (RR 1.28, 95% CI 1.12 – 1.46), a minor amputation (RR 1.46, 95% CI 1.29 – 1.65), or a major amputation (RR 1.36, 95% CI 1.17 – 1.58), compared to patients with diabetic

foot ulcers. Finally, patients who attended ≥ 1 appointment 30 days post-discharge were more likely to have attended ≥ 1 appointment with medical and/or surgical providers 30 days *prior* to the initial hospitalization (RR 1.17, 95% CI 1.06 – 1.29).

12-month outcomes

Among the 375 patients included in the 12-month outcome analyses, the cumulative risk of major amputation or all-cause mortality was 14% (n=51) (Table 2). The risk of any amputation or all-cause mortality was 22% (n=84). The overall all-cause risk of mortality was 5% (n=17) (Figure 1). Among patients who attended ≥ 1 appointment with medical and/or surgical providers within 30 days of discharge, the 12-month risk of major amputation or death was 0.76 times (95% CI 0.43 – 1.34) the risk of patients who did not attend an appointment, and the 12-month risk of any amputation or death was 0.92 times (95% CI 0.59 – 1.43) the risk of patients who did not attend an appointment. Patients who attended ≥ 1 appointment with *both* medical and surgical providers within 30 days of discharge had 0.44 times (95% CI 0.19 – 0.99) the risk of major amputation or death than patients who did not attend an appointment with both providers. Other factors associated with increased 12-month risk of major amputation or death included female sex (RR 0.54, 95% CI 0.32 – 0.89), ESRD (RR 2.45, 95% CI 1.35 – 4.43), and initial hospitalization longer than 10 days (RR 2.09, 95% CI 1.25 – 3.49). Patients with osteomyelitis upon initial hospitalization discharge had a lower 12-month risk of major amputation or death when compared to patients who did not progress beyond a diabetic foot ulcer upon discharge (RR 0.42, 95% CI 0.19 – 0.95).

Adjusted association between 30-day post-discharge attendance and 12-month outcomes

After adjusting for age, sex, insurance status, ESRD, and baseline HbA1c, the 12-month risk of major amputation or death among patients who attended ≥ 1 appointment with medical and/or surgical providers 30 days post-discharge was 0.83 times (95% CI 0.47 – 1.47) the risk of patients who did not attend any appointment, and the 12-month risk of any amputation or death was 0.91 times (95% CI 0.58 – 1.41) the risk of patients who did not attend any appointment (Table 3). We also determined the adjusted association between 30-day post-discharge attendance and 12-month outcomes based on attendance with 1) both medical and surgical providers, 2) only medical providers, and 3) only surgical providers and 12-month outcomes (Table 3; Supplemental Table 3; Supplemental Table 4). After adjusting for age, sex, insurance status, ESRD, and baseline HbA1c, the 12-month risk of major amputation or death among patients who attended ≥ 1 appointment with *both* medical and surgical providers 30 days post-discharge was 0.49 times (95% CI 0.20 – 1.19) the risk of patients who did not attend an appointment with both providers, and the 12-month risk of any amputation or death was 0.79 times (95% CI 0.44 – 1.41) the risk of patients who did not attend an appointment with both providers.

DISCUSSION

The findings of our retrospective cohort study revealed a high number of patients hospitalized with diabetic foot ulcers, most of whom were Black males without private insurance. More than half (54%) of eligible patients attended ≥ 1 appointment with providers engaged in limb salvage during the 30-day post-discharge window. Predictors of 30-day post-discharge attendance with

these providers included younger age, being uninsured, no history of homelessness, having ESRD, and attending ≥ 1 appointment with limb salvage providers 30 days prior to initial hospitalization with a diabetic foot ulcer. We observed a non-significant trend between 30-day post-discharge attendance and 12-month amputation incidence.

There are limited data on predictors of post-discharge attendance among patients hospitalized with diabetic foot ulcers and whether attendance prevents future amputations after hospital discharge. One study of 8,787 patients with diabetes attending outpatient clinic appointments at an academic medical center in Indiana reported patient characteristics associated with primary care utilization. Predictors of primary care utilization in this prospective cohort study included non-White race, age ≤ 45 years, and Medicaid insurance or no insurance.[14] Another study of 165 patients with diabetes in the United Kingdom reported that predictors of amputation in people with a diabetic foot ulcer include missing outpatient clinic appointments and higher HbA1c levels at baseline. After a minimum of 12 months follow-up, 20% of patients (33/165) underwent ≥ 1 diabetes-related amputation. After adjusting for covariates, patients who did not attend their outpatient clinic appointments had a significantly higher odds of undergoing a diabetes-related amputation than those who did attend their appointments.[9] Unlike the Indiana study, our study measured outpatient clinic attendance with both primary and specialized care providers engaged in limb salvage. Similar to the Indiana study, predictors of post-discharge attendance in our study included younger age and no insurance. We observed a similar proportion of amputations as the United Kingdom study (22% vs. 20%), and a similar

trend in reduced risk of amputations among patients who attend outpatient clinic appointments.

Plausible mechanisms regarding how outpatient clinic attendance may reduce the risk of amputation or death after hospitalization with a diabetic foot ulcer are likely linked to better glycemic control (i.e., lower HbA1c) and more opportunities for foot examinations both within and outside of a clinical setting. Our observed trend of a reduced 12-month risk of amputation or death among patients who attended ≥ 1 appointment with medical providers (e.g., endocrinology or internal medicine) could be due to the association between glycemic control and limb salvage.[15] We also observed a trend of increased risk of amputation among patients who attended ≥ 1 appointment with surgical services, which could indicate that patients with more severe disease (e.g., diabetic foot osteomyelitis) are more likely to utilize care services due to the progression of their diabetic foot ulcer.

This study was subject to limitations. First, many patients were excluded from the final analyses of 12-month outcomes due to lack of adequate follow-up time. Consequently, we could be missing data on outpatient clinic attendance, amputations, or deaths that occurred outside of GMH. This may limit the generalizability of our findings to other populations. Second, we were unable to assess the prevalence of peripheral artery disease, which is a major contributor to diabetes-related amputations, especially among Black males.[16] These missing data could contribute to unmeasured confounding. Finally, because there is no unified medical record system across hospitals, our study was subject to misclassification of both post-discharge

attendance status and 12-month amputation or death outcomes. However, our study had a large cohort to assess the overall attendance and to identify predictors of attendance. Our findings regarding the trend of decreased risk of amputation or death among patients who attended ≥ 1 appointment were also consistent even after using multiple models.

CONCLUSIONS

More than half of patients in our cohort attended ≥ 1 outpatient clinic appointment with limb salvage providers within 30 days post-hospital discharge. Older patients with heart failure, ESRD, more severe diabetic foot disease, and a history of homelessness could benefit from interventions to increase patient engagement with limb salvage providers. We observed a non-significant trend between 30-day post-hospital discharge outpatient clinic attendance and 12-month risk of amputation or death among patients hospitalized with a diabetic foot ulcer. Patients who attend ≥ 1 appointment with medical providers may have reduced risk of amputation or death within 12 months of a diabetic foot ulcer episode. Interventions to increase access to care, such as mobile clinics or telemedicine, could decrease the incidence of diabetes-related amputations in large hospital settings.

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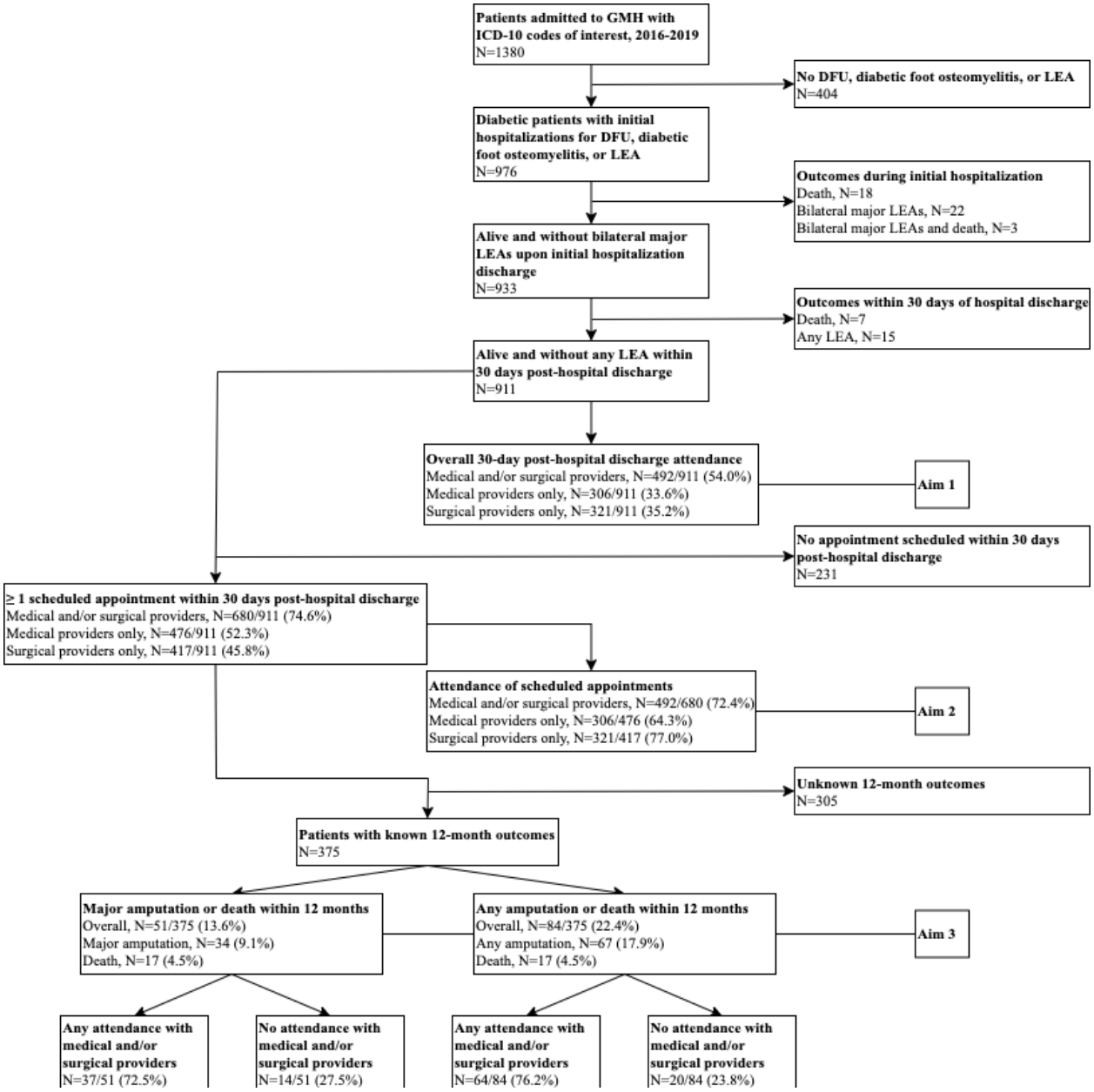
FIGURE AND TABLES

Figure 1. Study flow diagram among patients admitted to GMH with ICD-10 codes of interest



Abbreviations: ICD-10, International Classification of Diseases 10th revision; GMH, Grady Memorial Hospital; DFU, diabetic foot ulcer; LEA, lower extremity amputation

Table 1. Bivariate analyses of 30-day post-discharge attendance among patients with ≥ 1 scheduled appointment with medical and/or surgical providers (N=680)

Patient Characteristic	Total N=680	Attended appointment N=492 (72.4%)	Did not attend appointment N=188 (27.6%)	RR (95% CI)*
Age in years, mean (SD)	56.3 (12.7)	55.4 (12.2)	58.4 (13.8)	
< 56.3 years	340 (50.0)	262 (77.1)	78 (22.9)	Reference
≥ 56.3 years	340 (50.0)	230 (67.7)	110 (32.4)	**0.88 (0.80 – 0.96)**
Sex				
Female	208 (30.6)	142 (68.3)	66 (31.7)	Reference
Male	472 (69.4)	350 (74.2)	122 (25.9)	1.09 (0.98 – 1.21)
Race				
Non-Black	128 (18.9)	95 (74.2)	33 (25.8)	Reference
Black	548 (81.1)	393 (71.7)	155 (28.3)	0.97 (0.86 – 1.08)
Insurance status				
Medicaid/Medicare	449 (67.2)	308 (68.6)	141 (31.4)	Reference
Uninsured	172 (25.8)	137 (79.7)	35 (20.4)	**1.16 (1.05 – 1.28)**
Other	47 (7.0)	37 (78.7)	10 (21.3)	1.15 (0.98 – 1.35)
History of homelessness				
No	545 (80.3)	407 (74.7)	138 (25.3)	Reference
Yes	134 (19.7)	85 (63.4)	49 (36.6)	**0.85 (0.74 – 0.97)**
HbA1c %, mean (SD)	9.4 (2.9)	9.6 (2.9)	9.0 (2.9)	
< 9.4%	359 (53.3)	251 (69.9)	108 (30.1)	Reference
≥ 9.4%	315 (46.7)	238 (75.6)	77 (24.4)	1.08 (0.99 – 1.19)
Comorbidities				
Heart failure				
No	553 (81.3)	419 (75.8)	134 (24.2)	Reference
Yes	127 (18.7)	73 (57.5)	54 (42.5)	**0.76 (0.65 – 0.89)**
ESRD (GFR < 15)				
No	603 (88.7)	447 (74.1)	156 (25.9)	Reference
Yes	77 (11.3)	45 (58.4)	32 (41.6)	**0.79 (0.65 – 0.96)**
Obese (BMI ≥ 30 kg/m^2)				
No	400 (59.2)	291 (72.8)	109 (27.3)	Reference
Yes	276 (40.8)	198 (71.7)	78 (28.3)	0.99 (0.90 – 1.09)
History of tobacco use				
No	303 (45.8)	228 (75.3)	75 (24.8)	Reference
Yes	359 (54.2)	257 (71.6)	102 (28.4)	0.95 (0.87 – 1.04)
Baseline amputation history				
No amputation	481 (70.7)	354 (73.6)	127 (26.4)	Reference
Minor amputation	153 (22.5)	110 (71.9)	43 (28.1)	0.98 (0.87 – 1.09)
Major amputation	46 (6.8)	28 (60.9)	18 (39.1)	0.83 (0.65 – 1.05)
Initial hospitalization outcome				
Ulcer, without diabetic foot osteomyelitis, or amputation	244 (35.9)	143 (58.6)	101 (41.4)	Reference
Diabetic foot osteomyelitis, without amputation	175 (25.7)	131 (74.9)	44 (25.1)	**1.28 (1.12 – 1.46)**
Minor amputation	172 (25.3)	147 (85.5)	25 (14.5)	**1.46 (1.29 – 1.65)**
Major amputation	89 (13.1)	71 (79.8)	18 (20.2)	**1.36 (1.17 – 1.58)**

Initial hospitalization length of stay in days, mean (SD)	11.7 (10.5)	10.8 (8.6)	14.2 (14.2)	
< 11.7 days	436 (64.1)	321 (73.6)	115 (26.4)	Reference
≥ 11.7 days	244 (35.9)	171 (70.1)	73 (29.9)	0.95 (0.86 – 1.05)
30-day pre-hospitalization attendance with medical and/or surgical providers				
No attended appointment	533 (78.4)	372 (69.8)	161 (30.2)	Reference
≥ 1 attended appointment	147 (21.6)	120 (81.6)	27 (18.4)	**1.17 (1.06 – 1.29)**

Abbreviations: RR, risk ratio; CI, confidence interval; SD, standard deviation; HbA1c, hemoglobin A1c; ESRD, end-stage renal disease; GFR, glomerular filtration rate; BMI, body mass index
Data are number (%) unless otherwise specified.
Bold indicates statistical significance (95% CI null value of 1.00)
*Cumulative proportion of attendance
Note: values may not sum to the expected total due to missing values.

Table 2. Bivariate analyses of 12-month outcomes among patients with ≥ 1 scheduled appointment with medical and/or surgical providers within 30 days post-discharge (N=375)

Patient Characteristic	Total N=375	Major amputation or death			Any amputation or death		
		Yes N=51 (13.6%)	No N=324 (86.4%)	RR (95% CI)*	Yes N=84 (22.4%)	No N=291 (77.6%)	RR (95% CI)**
Age in years, mean (SD)	55.6 (12.1)	58.8 (12.6)	55.1 (11.9)		56.0 (12.6)	55.4 (11.9)	
< 55.6 years	183 (48.8)	21 (11.5)	162 (88.5)	Reference	41 (22.4)	142 (77.6)	Reference
≥ 55.6 years	192 (51.2)	30 (15.6)	162 (84.4)	1.36 (0.81 – 2.29)	43 (22.4)	149 (77.6)	1.00 (0.69 – 1.46)
Sex							
Female	115 (30.7)	23 (20.0)	92 (80.0)	Reference	30 (26.1)	85 (73.9)	Reference
Male	260 (69.3)	28 (10.8)	232 (89.2)	**0.54 (0.32 – 0.89)**	54 (20.8)	206 (79.2)	0.80 (0.54 – 1.17)
Race							
Non-Black	55 (14.8)	6 (10.9)	49 (89.1)	Reference	14 (25.5)	41 (74.6)	Reference
Black	318 (85.3)	44 (13.8)	274 (86.2)	1.27 (0.57 – 2.83)	69 (21.7)	249 (78.3)	0.85 (0.52 – 1.40)
Insurance status							
Medicaid/Medicare	249 (67.9)	37 (14.9)	212 (85.1)	Reference	52 (20.9)	197 (79.1)	Reference
Uninsured	90 (24.5)	11 (12.2)	79 (87.8)	0.82 (0.44 – 1.54)	23 (25.6)	67 (74.4)	1.22 (0.80 – 1.88)
Other	28 (7.6)	2 (7.1)	26 (92.9)	0.48 (0.12 – 1.89)	6 (21.4)	22 (78.6)	1.03 (0.49 – 2.17)
History of homelessness							
No	298 (79.7)	45 (15.1)	253 (84.9)	Reference	69 (23.2)	229 (76.9)	Reference
Yes	76 (20.3)	5 (6.6)	71 (93.4)	0.44 (0.18 – 1.06)	14 (18.4)	62 (81.6)	0.80 (0.47 – 1.33)
HbA1c %, mean (SD)	9.5 (2.8)	8.5 (2.4)	9.7 (2.9)		9.1 (2.6)	9.6 (2.9)	
< 9.5%	194 (51.9)	32 (16.5)	162 (83.5)	Reference	45 (23.2)	149 (76.8)	Reference
≥ 9.5%	180 (48.1)	18 (10.0)	162 (90.0)	0.61 (0.35 – 1.04)	38 (21.1)	142 (78.9)	0.91 (0.62 – 1.33)
Comorbidities							
Heart failure							
No	310 (82.7)	40 (12.9)	270 (87.1)	Reference	70 (22.6)	240 (77.4)	Reference
Yes	65 (17.3)	11 (16.9)	54 (83.1)	1.31 (0.71 – 2.42)	14 (21.5)	51 (78.5)	0.95 (0.57 – 1.59)
ESRD (GFR < 15)							
No	341 (90.9)	41 (12.0)	300 (88.0)	Reference	73 (21.4)	268 (78.6)	Reference
Yes	34 (9.1)	10 (29.4)	24 (70.6)	**2.45 (1.35 – 4.43)**	11 (32.4)	23 (67.7)	1.51 (0.89 – 2.56)
Obese (BMI ≥ 30 kg/m^2)							
No	223 (60.0)	35 (15.7)	188 (84.3)	Reference	57 (25.6)	166 (74.4)	Reference
Yes	149 (40.0)	15 (10.1)	134 (89.9)	0.64 (0.36 – 1.13)	26 (17.5)	123 (82.6)	0.68 (0.45 – 1.03)
History of tobacco use							

No	169 (45.9)	20 (11.8)	149 (88.2)	Reference	32 (18.9)	137 (81.1)	Reference
Yes	199 (54.1)	30 (15.1)	169 (84.9)	1.27 (0.75 – 2.16)	51 (25.6)	148 (74.4)	1.35 (0.92 – 2.00)
Baseline amputation history							
No amputation	268 (71.5)	35 (13.1)	233 (86.9)	Reference	58 (21.6)	210 (78.4)	Reference
Minor amputation	83 (22.1)	10 (12.1)	73 (87.9)	0.92 (0.48 – 1.78)	18 (21.7)	65 (78.3)	1.00 (0.63 – 1.60)
Major amputation	24 (6.4)	6 (25.0)	18 (75.0)	1.91 (0.90 – 4.09)	8 (33.3)	16 (66.7)	1.54 (0.84 – 2.83)
Initial hospitalization outcome							
Ulcer, without diabetic foot osteomyelitis, or amputation	125 (33.3)	22 (17.6)	103 (82.4)	Reference	35 (28.0)	90 (72.0)	Reference
Diabetic foot osteomyelitis, without amputation	94 (25.1)	7 (7.5)	87 (92.6)	**0.42 (0.19 – 0.95)**	18 (19.2)	76 (80.9)	0.68 (0.41 – 1.13)
Minor amputation	107 (28.5)	19 (17.8)	88 (82.2)	1.01 (0.58 – 1.76)	28 (26.2)	79 (73.8)	0.93 (0.61 – 1.43)
Major amputation	49 (13.1)	3 (6.1)	46 (93.9)	0.35 (0.11 – 1.11)	3 (6.1)	46 (93.9)	**0.22 (0.07 – 0.68)**
Initial hospitalization length of stay in days, mean (SD)	10.4 (7.8)	13.3 (10.3)	9.9 (7.3)		10.7 (9.1)	10.2 (7.5)	
< 10.4 days	230 (61.3)	22 (9.6)	208 (90.4)	Reference	48 (20.9)	182 (79.1)	Reference
≥ 10.4 days	145 (38.7)	29 (20.0)	116 (80.0)	**2.09 (1.25 – 3.49)**	36 (24.8)	109 (75.2)	1.19 (0.81 – 1.74)
30-day pre-hospitalization attendance with medical and/or surgical providers							
No attended appointment	285 (76.0)	42 (14.7)	243 (85.3)	Reference	64 (22.5)	221 (77.5)	Reference
≥ 1 attended appointment	90 (24.0)	9 (10.0)	81 (90.0)	0.68 (0.34 – 1.34)	20 (22.2)	70 (77.8)	0.99 (0.64 – 1.54)
30-day post-hospital discharge attendance							
Medical and/or surgical providers							
No attended appointment	84 (22.4)	14 (16.7)	70 (83.3)	Reference	20 (23.8)	64 (76.2)	Reference
≥ 1 attended appointment	291 (77.6)	37 (12.7)	254 (87.3)	0.76 (0.43 – 1.34)	64 (22.0)	227 (78.0)	0.92 (0.60 – 1.43)
Medical and surgical providers							
No attended appointment	288 (76.8)	45 (15.6)	243 (84.4)	Reference	68 (23.6)	220 (76.4)	Reference

≥ 1 attended appointment	87 (23.2)	6 (6.9)	81 (93.1)	**0.44 (0.19 – 0.99)**	16 (18.4)	71 (81.6)	0.78 (0.48 – 1.27)
Medical providers							
No attended appointment	190 (50.7)	38 (20.0)	152 (80.0)	Reference	50 (26.3)	140 (73.7)	Reference
≥ 1 attended appointment	185 (49.3)	13 (7.0)	172 (93.0)	**0.35 (0.19 – 0.64)**	34 (18.4)	151 (81.6)	0.70 (0.47 – 1.03)
Surgical providers							
No attended appointment	182 (48.5)	21 (11.5)	161 (88.5)	Reference	38 (20.9)	144 (79.1)	Reference
≥ 1 attended appointment	193 (51.5)	30 (15.5)	163 (84.5)	1.35 (0.80 – 2.27)	46 (23.8)	147 (76.2)	1.14 (0.78 – 1.67)
Podiatry providers							
No attended appointment	349 (93.1)	48 (13.8)	301 (86.2)	Reference	79 (22.6)	270 (77.4)	Reference
≥ 1 attended appointment	26 (6.9)	3 (11.5)	23 (88.5)	0.84 (0.28 – 2.51)	5 (19.2)	21 (80.8)	0.85 (0.38 – 1.91)

Abbreviations: RR, risk ratio; CI, confidence interval; SD, standard deviation; HbA1c, hemoglobin A1c; ESRD, end-stage renal disease; GFR, glomerular filtration rate; BMI, body mass index

Data are number (%) unless otherwise specified.

Bold indicates statistical significance (95% CI null value of 1.00)

*Cumulative proportion of major amputation or death

**Cumulative proportion of any amputation or death

Note: values may not sum to the expected total due to missing values.

Table 3. Unadjusted and adjusted 12-month risk of amputation or death among patients with ≥ 1 scheduled appointment with medical and surgical providers within 30 days post-discharge (N=375)

Attendance status	**Major amputation or death**			**Any amputation or death**		
	RR (95% CI)	**aRR (95% CI)[1]**	**aRR (95% CI)[2]**	**RR (95% CI)**	**aRR (95% CI)[1]**	**aRR (95% CI)[2]**
Any attendance	0.76 (0.43 – 1.34)	0.79 (0.45 – 1.39)	0.83 (0.47 – 1.47)	0.92 (0.59 – 1.43)	0.93 (0.60 – 1.44)	0.91 (0.58 – 1.41)
None	Reference	Reference	Reference	Reference	Reference	Reference
Attended medical & surgical	0.41 (0.17 – 1.03)	0.44 (0.18 – 1.09)	0.49 (0.20 – 1.19)	0.77 (0.43 – 1.39)	0.78 (0.44 – 1.40)	0.79 (0.44 – 1.41)
Attended medical	0.43 (0.18 – 1.01)	0.45 (0.19 – 1.07)	0.47 (0.19 – 1.17)	0.77 (0.44 – 1.36)	0.77 (0.44 – 1.36)	0.73 (0.41 – 1.32)
Attended surgical	1.36 (0.75 – 2.46)	1.35 (0.75 – 2.42)	1.29 (0.72 – 2.32)	1.19 (0.73 – 1.94)	1.18 (0.72 – 1.92)	1.13 (0.69 – 1.83)
None	Reference	Reference	Reference	Reference	Reference	Reference

Abbreviations: RR, risk ratio; aRR, adjusted risk ratio; CI, confidence interval

[1]Adjusted for age and sex

[2]Adjusted for age, sex, insurance status, ESRD, and HbA1c

SUPPLEMENTAL MATERIAL

Supplemental Table 1. ICD-10 codes used to search electronic medical record system

ICD-10 codes	**Diagnosis**
E10.621 and E11.621	Diabetic foot ulcer (diabetes types 1 and 2, respectively)
L97.4 and L97.5*	Non-pressure ulcer
Z86.31	History of diabetic foot ulcer
M86.1-, M86.2-, M86.3-, M86.4-, M86.6-, M86.8-, M86.9-*	Osteomyelitis
Z89.4-, Z89.5-, Z89.6-, Z89.7 -, Z89.8-*	Acquired absence of lower extremity
Z89.9 -*	Acquired absence of a limb not otherwise specified
ICD-10-PCS codes	
0Y6-*	Lower-extremity detachment procedure
0YP9 and 0YPB*	Lower-extremity removal (right and left, respectively)

Abbreviations: ICD-10, International Classification of Diseases 10th revision; PCS, procedure coding system
*Combined with diabetes ICD-10 codes (E08-E13)

Supplemental Table 2. Comparison of patients that did and did not have ≥ 1 scheduled appointment with medical and/or surgical providers within 30 days of discharge (N=911)

Patient Characteristic	Total N=911	Scheduled appointment N=680 (74.6%)	No scheduled appointment N=231 (25.4%)	RR (95% CI)*
Age in years, mean (SD)	57.0 (13.1)	56.3 (12.7)	59.2 (13.9)	
< 57.0 years	461 (50.6)	354 (76.8)	107 (23.2)	Reference
≥ 57.0 years	450 (49.4)	326 (72.4)	124 (27.6)	0.94 (0.87 – 1.02)
Sex				
Female	282 (31.0)	208 (73.8)	74 (26.2)	Reference
Male	629 (69.1)	472 (75.0)	157 (25.0)	1.02 (0.94 – 1.11)
Race				
Non-Black	179 (19.8)	128 (71.5)	51 (28.5)	Reference
Black	725 (80.2)	548 (75.6)	177 (24.4)	1.06 (0.96 – 1.17)
Insurance status				
Medicaid/Medicare	607 (67.9)	449 (74.0)	158 (26.0)	Reference
Uninsured	213 (23.8)	172 (80.8)	41 (19.3)	**1.09 (1.01 – 1.18)**
Other	74 (8.3)	47 (63.5)	27 (36.5)	0.86 (0.72 – 1.03)
History of homelessness				
No	729 (80.1)	545 (74.8)	184 (25.2)	Reference
Yes	181 (19.9)	134 (74.0)	47 (26.0)	0.99 (0.90 – 1.09)
HbA1c %, mean (SD)	9.3 (2.8)	9.4 (2.9)	8.8 (2.6)	
< 9.3%	481 (53.7)	350 (72.8)	131 (27.2)	Reference
≥ 9.3%	415 (46.3)	324 (78.1)	91 (21.9)	1.07 (1.00 – 1.16)
Comorbidities				
Heart failure				
No	725 (79.6)	553 (76.3)	172 (23.7)	Reference
Yes	186 (20.4)	127 (68.3)	59 (31.7)	0.90 (0.81 – 1.00)
ESRD (GFR < 15)				
No	799 (87.7)	603 (75.5)	196 (24.5)	Reference
Yes	112 (12.3)	77 (68.8)	35 (31.3)	0.91 (0.80 – 1.04)
Obese (BMI ≥ 30 kg/m^2)				
No	524 (58.1)	400 (76.3)	124 (23.7)	Reference
Yes	378 (41.9)	276 (73.0)	102 (27.0)	0.96 (0.89 – 1.03)
History of tobacco use				
No	404 (45.9)	303 (75.0)	101 (25.0)	Reference
Yes	477 (54.1)	359 (75.3)	118 (24.7)	1.00 (0.93 – 1.08)
Baseline amputation history				
No amputation	614 (67.4)	481 (78.3)	133 (21.7)	Reference
Minor amputation	225 (24.7)	153 (68.0)	72 (32.0)	**0.87 (0.79 – 0.96)**
Major amputation	72 (7.9)	46 (63.9)	26 (36.1)	**0.82 (0.68 – 0.98)**
Initial hospitalization outcome				
Ulcer, without diabetic foot osteomyelitis, or amputation	387 (42.5)	244 (63.1)	143 (37.0)	Reference
Diabetic foot osteomyelitis, without amputation	237 (26.0)	175 (73.8)	62 (26.2)	**1.17 (1.05 – 1.30)**
Minor amputation	186 (20.4)	172 (92.5)	14 (7.5)	**1.47 (1.35 – 1.60)**
Major amputation	101 (11.1)	89 (88.1)	12 (11.9)	**1.40 (1.26 – 1.55)**

Initial hospitalization length of stay in days, mean (SD)	11.8 (11.7)	11.7 (10.5)	12.2 (14.5)	
< 11.8 days	588 (64.5)	436 (74.2)	152 (25.9)	Reference
≥ 11.8 days	323 (35.5)	244 (75.5)	79 (24.5)	1.02 (0.94 – 1.10)

Abbreviations: RR, risk ratio; CI, confidence interval; SD, standard deviation; HbA1c, hemoglobin A1c; ESRD, end-stage renal disease; GFR, glomerular filtration rate; BMI, body mass index
Data are number (%) unless otherwise specified.
Bold indicates statistical significance (95% CI null value of 1.00)
*Cumulative proportion of scheduled appointments
Note: values may not sum to the expected total due to missing values.

Supplemental Table 3. Log binomial regression models assessing the relationship between any 30-day post-discharge attendance with medical and/or surgical providers and 12-month outcomes

Model	Models	Major amputation or death aRR (95% CI)	Any amputation or death aRR (95% CI)	Covariates Included
1	Any attendance No attendance	0.79 (0.45 – 1.39) Reference	0.93 (0.60 – 1.44) Reference	Age, sex
2	Any attendance No attendance	0.82 (0.47 – 1.43) Reference	0.94 (0.60 – 1.45) Reference	Age (continuous), sex
3	Any attendance No attendance	0.83 (0.50 – 1.38) Reference	0.91 (0.59 – 1.42) Reference	Age, sex, race
4	Any attendance No attendance	0.81 (0.46 – 1.41) Reference	0.90 (0.58 – 1.40) Reference	Age, sex, insurance status
5	Any attendance No attendance	0.87 (0.50 – 1.51) Reference	0.92 (0.60 – 1.44) Reference	Age, sex, insurance status, ESRD
6	Any attendance No attendance	0.83 (0.47 – 1.47) Reference	0.91 (0.58 – 1.41) Reference	Age, sex, insurance status, ESRD, HbA1c (continuous)

Abbreviations: aRR, adjusted risk ratio; CI, confidence interval; ESRD, end-stage renal disease; HbA1c, hemoglobin A1c

Supplemental Table 4. Log binomial regression models assessing the relationship between subgroups of 30-day post-discharge attendance with medical and/or surgical providers and 12-month outcomes

Model	Models	Major amputation or death aRR (95% CI)	Any amputation or death aRR (95% CI)	Covariates Included
1	Medical & surgical attendance	0.44 (0.18 – 1.09)	0.78 (0.44 – 1.40)	Age, sex
	Medical attendance only	0.45 (0.19 – 1.07)	0.77 (0.44 – 1.36)	
	Surgical attendance only	1.35 (0.75 – 2.42)	1.18 (0.72 – 1.92)	
	No attendance	Reference	Reference	
2	Medical & surgical attendance	0.46 (0.19 – 1.13)	0.79 (0.44 – 1.42)	Age (continuous), sex
	Medical attendance only	0.47 (0.20 – 1.10)	0.78 (0.44 – 1.37)	
	Surgical attendance only	1.36 (0.76 – 2.44)	1.19 (0.73 – 1.93)	
	No attendance	Reference	Reference	
3	Medical & surgical attendance	0.62 (0.31 – 1.22)	0.78 (0.43 – 1.40)	Age, sex, race
	Medical attendance only	0.62 (0.33 – 1.19)	0.74 (0.41 – 1.31)	
	Surgical attendance only	1.21 (0.73 – 2.03)	1.17 (0.72 – 1.90)	
	No attendance	Reference	Reference	
4	Medical & surgical attendance	0.45 (0.18 – 1.12)	0.76 (0.43 – 1.37)	Age, sex, insurance status
	Medical attendance only	0.44 (0.18 – 1.05)	0.69 (0.38 – 1.26)	
	Surgical attendance only	1.34 (0.75 – 2.41)	1.18 (0.73 – 1.92)	
	No attendance	Reference	Reference	
5	Medical & surgical attendance	0.49 (0.20 – 1.22)	0.80 (0.44 – 1.44)	Age, sex, insurance status, ESRD
	Medical attendance only	0.46 (0.19 – 1.12)	0.71 (0.39 – 1.30)	
	Surgical attendance only	1.31 (0.74 – 2.33)	1.18 (0.73 – 1.91)	
	No attendance	Reference	Reference	
6	Medical & surgical attendance	0.49 (0.20 – 1.19)	0.79 (0.44 – 1.41)	Age, sex, insurance status, ESRD, HbA1c (continuous)
	Medical attendance only	0.47 (0.19 – 1.17)	0.73 (0.41 – 1.32)	
	Surgical attendance only	1.29 (0.72 – 2.32)	1.13 (0.69 – 1.83)	
	No attendance	Reference	Reference	

Abbreviations: aRR, adjusted risk ratio; CI, confidence interval; ESRD, end-stage renal disease; HbA1c, hemoglobin A1c

Supplemental File 1. Standardized case report form for electronic medical record review

Chart review guide version 03/16/2020

Important acronyms:

AKA: above knee amputation
BKA: below knee amputation
CHF: congestive heart failure
CKD: chronic kidney disease
ESRD: end-stage renal disease
HF: heart failure
OR: operating room
TMA: trans-metatarsal amputation
N/A: not applicable
NH: nursing home (e.g., discharge to NH)

b/l: bilateral
s/p: status post. For example, "s/p amputation" means the patient had an amputation
c/b: complicated by
DC: discharged or discontinued
LE: lower extremity
LLE: left lower extremity
RLE: right lower extremity

Important definitions:

Baseline amputation: amputations that occurred BEFORE the index admission
Index admission: first admission from 01/01/2016 onwards that fits study criteria

Burns: some patients with diabetes will have burns to their feet in part due to neuropathy. Those burns count as ulcers/wound to our study

Cellulitis: skin infection that can occur with or without an ulcer/wound. Patients with ulcer/wound or osteomyelitis or amputation AND cellulitis are included in our study.

Osteomyelitis: means bone infection, not all are on the foot and/or related to diabetes.

FIRST STEP: Confirm patient has diabetes: present in Problem List (found on Snap Shot) OR discharge summary REDCap OR any hba1c >/=6.5 on labs

Do not review charts further for patients without diabetes

SECOND STEP: Find the index admission

How to find admissions:

-Click “Chart Review” and select “Encounters” tab
-Use “Admissions” filter
-Hospital admissions will have a red circle with a hospital bed symbol. The cross symbol denotes emergency department visits which are NOT included as index admissions.

How to find the index admission:

Patients may have multiple hospital discharges with ICD-10 codes of interest during the study period (2016-2019). However, not all hospitalizations associated with ICD-10 codes of interest necessarily fit our case definition.

1-Search the term “ulcer”, filter for notes, and look for any notes associated with an admission that fits study inclusion criteria

Ulcers will count towards our study if:

Tip: use “ctrl-f” to search the term “ulcer” in any note. You do not have to read the entire note.

1-Present history of present illness (HPI) note and discharge summary.
2-If no ulcer noted on documents above, ulcer present in wound care note if available
3-If no wound care note available or no ulcer noted, ulcer present on infectious diseases and surgical consult note (if available).

Link to consult notes can be found at the bottom of the discharge summary. Note there are many types of ulcers that are not related to diabetic foot, including “stress ulcers”, “gastric ulcers”, “aphthous ulcers” etc.

<u>Things listed in the hospital problem list do not reflect current problems. It is common for ulcers that are no longer present to be listed there.</u>

2-Search the terms “osteomyelitis”, filter for images, and look for any reports associated with an admission that fits study inclusion criteria. Do not look for osteomyelitis in notes. Just imaging reports.

Osteomyelitis of the foot or the stump among patients with history of amputation at the level of the ankle by X-ray or MRI in the 3 months prior to admission

Common language includes “concerning for osteomyelitis”, “consistent with osteomyelitis”, “cannot exclude osteomyelitis”.

3-Search for amputations under surgery tab

Definition: any lower-extremity amputation unrelated to trauma (e.g., car accident).

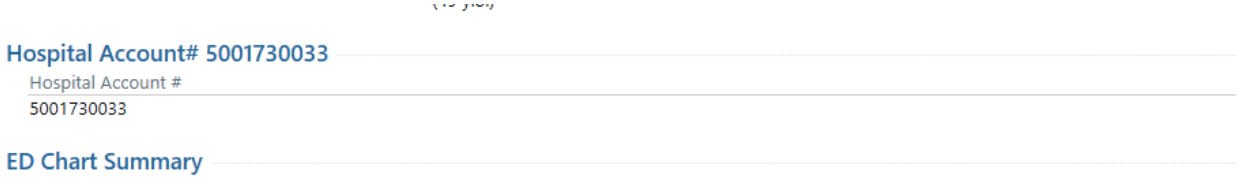
After this search is completed and you verify the patient meets inclusion criteria, find the index admission (first hospital admission from 01/01/2016 onwards that meets study criteria).

In most instances the index hospital admission will be the date already in REDCap. The dates need to be changed if that is not the index admission.

Case report form sections – guidance for selected sections

1-Encouter ID:

-Scroll to the bottom of the discharge document
-Click on “detailed report”
-Copy/paste “hospital account #”



2-Encounter number: obtain from Excel sheet. Write 999 if index admission not listed in the Excel sheet.

3-Lower-extremity baseline (right and left limbs)

-“History of right lower-extremity amputation prior to index admission” refers to any amputations that occurred prior to the index admission

-Open the encounter and you will be taken to the "Report Viewer" tab
-The "Discharge Summary" will pop-up. The discharge summary will have information on the hospital course and the patients' medical history (including prior amputations).

This document is not always accurate, particularly regarding documentation of prior amputations.

Most errors are due to omission – patient had a previous amputation, and it is not recorded on the physician notes

-Scroll to the bottom and check if there is a surgery and/or infectious diseases service consult.
-How to resolve discrepancies on history of amputations:

1-Surgery note (if available) states patient had amputation -> trumps all notes
2-Infectious diseases note (if available) states patient had amputation -> trumps discharge summary and admission note

Also check records for amputation surgeries prior to index admission. Caution: patient may have had higher amputations levels outside Grady since last surgery at Grady.

4-Amputations:

Minor: toes and part of the foot
Major: 2 types
(1) Below Knee Amputation (BKA) – this does NOT include foot and toe amputations
(2) Above Knee Amputation (AKA)

Surgical reports linked to one hospital admission may be linked together. You need to scroll down and read one report at a time.

5-Final outcomes:

-Click "Chart review" and select "notes". Read last note to see if patient was alive or dead.
-Mark "unknown" if there is an encounter, but unclear if patient discharged alive.

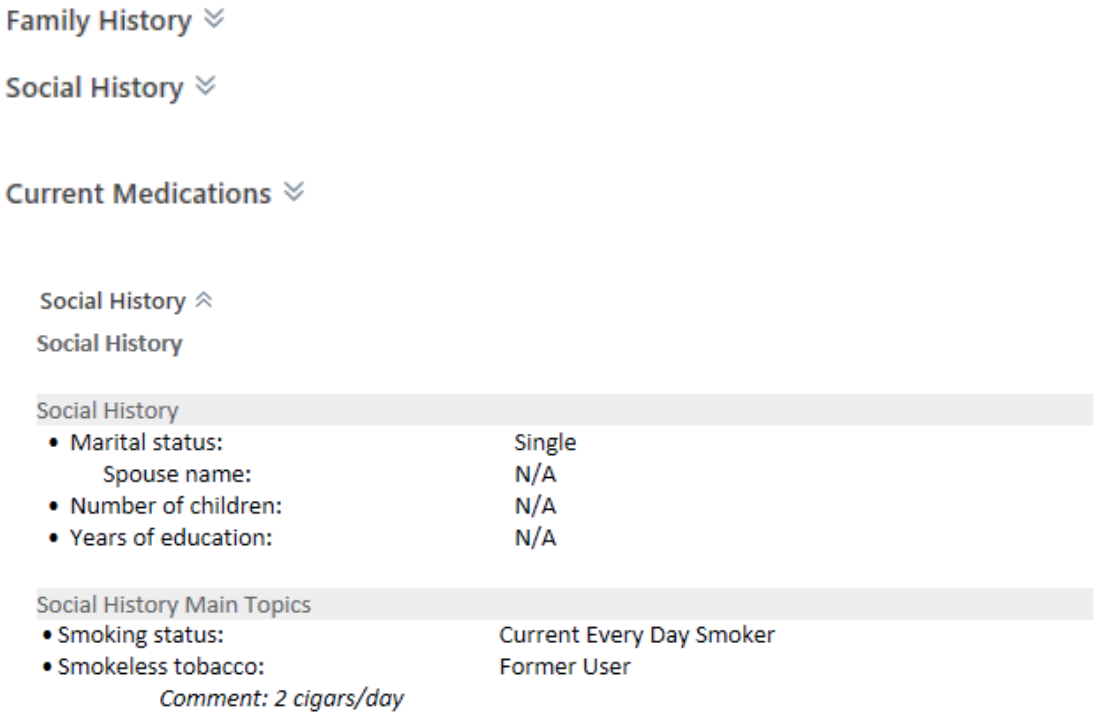
6-Demographics

1-Tobbaco:

-Type "tobacco" on the search tool and select "Notes"

- "Tobacco use at index admission" open and read notes around time of index admission. Use "ctrl-f" and search "tobacco" to find information in the note. This information is usually in the "Social History" section. There may be discrepancies between notes.

-The Social History can be pre-loaded in some notes (see below)



Typed documentation of tobacco use trumps pre-loaded documentation

2- History of homelessness at or before index admission:

-Type “homeless” on the search tool and select “Notes”
-Look for mentions of history of homelessness at or before index admission

3- Discharge to rehabilitation facility upon index admission discharge:

-Click “Chart Review” and select “Note” tab
-Use “service” filter and look for “social work” and “case management” notes. These services can appear as “social work”, “social work function”, “case management”, “case management function”.
Any disposition other than home should be marked as “yes”.
-Copy/paste rehabilitation facility address (if available) or name (if address not available)

7-Co-morbidities and labs

-Review index admission discharge summary and admission note. Can use “ctrl-f” function:

a-End-stage renal disease: Search terms “End stage renal disease”, “ESRD”, “CKD 5”, “Chronic kidney disease stage 5”. Note “Chronic kidney disease” or “CKD” stage 1 to 4 are not the same as end-stage renal disease.

b-Heart failure: Search terms “Heart failure”, “Congestive heart failure”, “CHF”, “diastolic heart failure”, “HFrEF”, “HFpEF”.

-Creatinine: (will be under chemistry)
-Click “results review” and click on “chemistry” drop down, click the “+” sign
-Click on “creatinine” and then “flowsheet” to see all results
-Select value closest to index admission date
-No need to fill if patient has ESRD

-Hemoglobin A1c (will be under diabetes)
-Select value closest to index admission date
-Write 99.9 if no A1c available
-Write 1111-11-11 for the date if no A1c available

8-Height and weight

-Click on “Review Flowsheets”
-Click “Vitals”
-Find weight and height closest to date of initial hospital admission
-Since height is not expected to change significantly, can use values further from index admission if no height close to index admission is available
-Weight should be entered in pounds and height in inches (1 foot = 5 inches)