Compliance to quality metrics among individuals with Medicare Advantage coverage and type II diabetes stratified by the presence of a foot ulcer or amputation

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Background

Diabetes is the single largest risk factor for developing non-traumatic foot ulcers and amputations.[1] The Centers for Disease Control and Prevention (CDC) estimates that 11.8% of individuals living with diabetes have a diabetic foot ulcer (DFU).[2] Additionally, CDC estimates show that there are 71,000 diabetes-related amputations among adults in the United States.[3]

Diabetic foot ulcers (DFU) and amputations significantly impact mortality and quality of life.[3,4] Establishing a more timely diagnosis and following recommended diabetes-related care could potentially limit such negative effects.[5]

Objective

To describe differences in compliance with quality metrics related to diabetes care in individuals with Medicare Advantage (MA) coverage and type II diabetes mellitus (T2DM) with and without DFU or amputation.

Methods

Study Design:
- Retrospective, cohort study of individuals with T2DM and healthcare coverage through Humana Inc., a large multistate healthcare company that offers Medicare Advantage, stand-alone prescription drug plan, and commercial plan offerings.

Data Sources:
- Administrative medical, laboratory and pharmacy claims and enrollment and Health Effectiveness Data and Information Set (HEDIS) data were obtained.

Inclusion Criteria:
- Eligible individuals had to have a diagnosis of T2DM, which was identified using International Classification of Diseases, Ninth (ICD-9, 250.x2) and Tenth Revision (ICD-10, E11, E13) diagnosis codes.
  - A T2DM diagnosis needed to be present in claims in 2014.
  - T2DM had to be listed on at least one emergency room visit or hospitalization, or at least two outpatient visits.
  - Pharmacy claims with evidence of anti-diabetic medication use, including insulin, in 2014 were also used to identify T2DM.
- Continuous enrollment in a Medicare Advantage plan between January 1, 2014 and December 31, 2015 was required.

Exclusion Criteria:
- Did not qualify for inclusion in 2014 HEDIS metric calculation
- Type 1 diabetes mellitus (ICD-9 250.x1 and 250.x3)
- DFU or amputation in 2014
- Not continuously enrolled between January 1, 2014, and December 31, 2015

Outcomes and Statistical Analyses:
- Diabetes-related quality metric compliance and other individual-related characteristics were identified in 2014.
- Presence or absence of a new DFU or amputation was determined in 2015.
- Analysis of variance (ANOVA) (continuous variables) and Chi-square (categorical variables) were used to analyze the differences in patient characteristics and quality metric compliance across subgroups with an amputation, a new DFU, or neither.
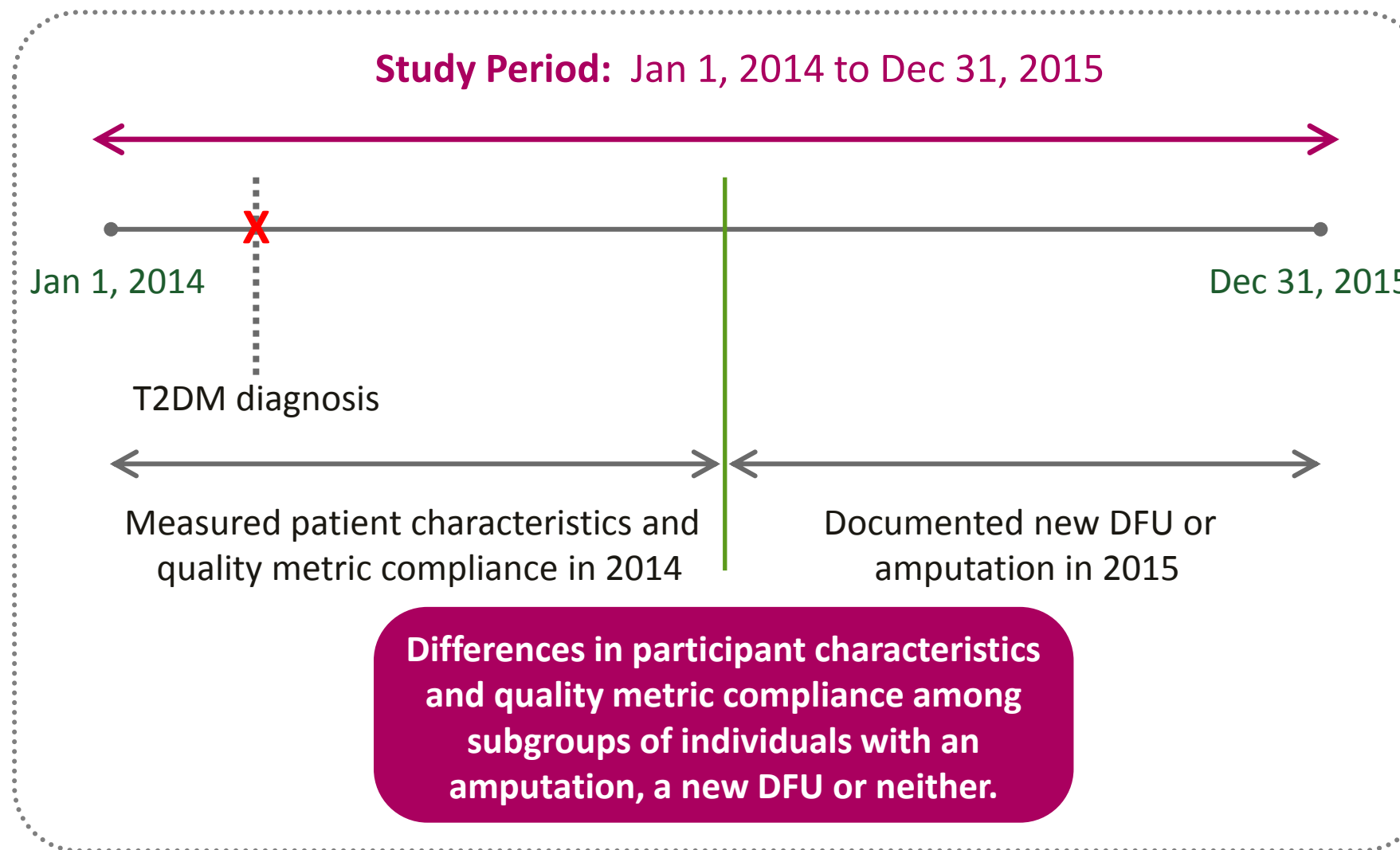
Results

Figure 1. Study Design

Study Period: Jan 1, 2014 to Dec 31, 2015

Jan 1, 2014 — Dec 31, 2015

T2DM diagnosis

Measured patient characteristics and quality metric compliance in 2014 | Documented new DFU or amputation in 2015

Differences in participant characteristics and quality metric compliance among subgroups of individuals with an amputation, a new DFU or neither.

Table 1. Study Population Characteristics

Measure	Amputation[a] (n=1,217)	DFU[a] (n=12,268)	Neither[a] (n=361,015)	P value[b]
Age in years, mean ± SD	65.8 ± 7.5	67.6 ± 7.0	68.4 ± 6.6	<0.001
Age <65 years, % (n)	36% (438)	26% (3,190)	20% (72,203)	<0.001
Female, % (n)	30% (365)	46% (5,643)	51% (184,118)	<0.001
Race/Ethnicity, % (n)				
Caucasian	78% (949)	82% (10,060)	76% (274,371)	<0.001
African American	18% (219)	14% (1,717)	14% (50,542)	<0.001
Disabled[c]/ESRD, % (n)	67% (815)	53% (6,502)	39% (140,796)	<0.001
DCSI[d] for 2014, mean ± SD	4.6 ± 2.4	2.9 ± 2.1	2.0 ± 1.9	<0.001
DCSI[d] for 2014-2015, mean ± SD	6.8 ± 2.0	4.7 ± 2.2	2.6 ± 2.0	<0.001

DCSI, diabetes complications severity index; DFU, diabetic foot ulcer; ESRD, end stage renal disease; SD, standard deviation
[a] Complications were measured in 2015 only
[b] Differences in group means and proportions were tested using ANOVA and Chi-square, respectively
[c] Disabled was defined using the Original Reason for Entitlement Code data provided from Centers for Medicare and Medicaid Services
[d] DCSI was calculated for either 12 or 24 months and individual diagnoses were only counted once during the time periods

Individuals who developed a DFU or had an amputation in 2015 were younger, and more likely to be male and classified as disabled than individuals who did not develop similar complications.

Table 2. Compliance with Specified HEDIS Quality Metrics

Measure	Amputation[a] (n=1,217)	DFU[a] (n=12,268)	Neither[a] (n=361,015)	P value[b]
Completed annual retinal exam[b,c], % (n)	46% (560)	55% (6,747)	55% (198,558)	<0.001
Completed annual kidney function test[b,c], % (n)	92% (1,120)	91% (11,164)	90% (324,913)	<0.001
HbA1c in control (≤8)[c], % (n)	29% (353)	39% (4,785)	47% (169,677)	<0.001
Adherent to oral anti-diabetic medications (n=181,533)[d], % (n)	76% (249)	77% (3,649)	78% (137,727)	0.09
Visited a podiatrist, % (n)	40% (487)	25% (3,067)	13% (46,932)	<0.001
Visited an endocrinologist, % (n)	13% (158)	12% (1,472)	8% (28,881)	<0.001
Visited a vascular surgeon, n (%)	45% (548)	36% (4,417)	26% (93,864)	<0.001

DFU, diabetic foot ulcer; HbA1c, hemoglobin A1c; HEDIS, health effectiveness data and information set
[a] Complications were measured in 2015 only.
[b] Differences in group means and proportions were tested using ANOVA and Chi-square, respectively.
[c] These measures were captured from HEDIS metric administrative data.
[d] Only includes individuals taking oral anti-diabetic medications, adherent defined as proportion of days covered (PDC) >80%.

There were significant associations between DFU/amputation status and quality metric compliance for all specified HEDIS quality measures except oral antidiabetic medication adherence.

Conclusions

- These findings suggest that individuals who developed a new DFU or had an amputation may have lower compliance with certain HEDIS quality metrics and inherent differences in demographic and clinical characteristics compared to those individuals that did not develop similar complications.
- Individuals with more severe complications were more likely to be <65 years of age and, hence more likely to be eligible for Medicare due to disability.
- Early implementation of interventions targeted at reducing the incidence of DFU/amputation, as well as greater focus on improving compliance to established quality care guidelines, may help limit downstream T2DM complications.

Limitations

- Data limitations common with claims-based analyses (i.e., missing or improperly coded data and the inability to capture unavailable data that may be relevant confounders), are applicable to this study.
- The retrospective, cohort study design is not sufficient to establish a causal link between population characteristics and T2DM complications.
- Other confounding variables, such as the presence of comorbidities, were not controlled for in the analysis and may have impacted the results.
- This research was done in a Medicare Advantage population residing primarily in the south and, therefore, results may not be generalizable other populations.

References
1. American Podiatric Medical Association. Diabetic wound care. Available at: http://www.apma.org/Learn/FootHealth.cfm?ItemNumber=981. Accessed on 5/17/2017.
2. CDC. History of Foot Ulcer Among Persons with Diabetes --- United States, 2000—2002. MMWR. 2003;52(45);1098-1102.
3. Driver VR, Fabbi M, Lavery LA, Gibbons G. The costs of diabetic foot: the economic case for the limb salvage team. J Vasc Surg. 2010;52:17S-22S.
4. Relationship between diabetes complications and health related quality of life among an elderly population in the United States - American Diabetes Association, 75th Scientific Session Boston, MA June 5-9, 2015.
5. Singh N, Armstrong DA, Lipsky BA. Preventing foot ulcers in individuals with diabetes. JAMA .2005;293:217-28.

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