Diabetes Ther (2016) 7:91–103
DOI 10.1007/s13300-015-0148-5

ORIGINAL RESEARCH

Transitions of Care for People with Type 2 Diabetes: Utilization of Antihyperglycemic Agents Pre- and Post-Hospitalization

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Received: October 6, 2015 / Published online: December 11, 2015

ABSTRACT

Introduction: Little research to date has examined antihyperglycemic agent (AHA) utilization among patients with type 2 diabetes mellitus (T2DM) around transitions of care from inpatient to outpatient settings. Discontinuity of care between inpatient and outpatient settings has been associated with adverse clinical outcomes, so a better understanding of AHA treatment patterns is important.

Methods: This retrospective study assessed AHA utilization among a sample of United States adults with a T2DM diagnosis listed on an inpatient admission during 2010–2012 in the MarketScan® Hospital Drug database (Truven Health Analytics). AHA use while hospitalized was measured from inpatient medication administration records in that database. AHA use pre- and post-hospitalization was assessed from outpatient retail and mail order pharmacy claims in the MarketScan Commercial and Medicare Supplemental databases, which contain de-identified insurance claims from large employers and health plans. The hospital and claims databases are linked, allowing patients to be followed across transitions of care.

Results: The study sample ($N = 8144$) was 53% male, with a mean age of 66 years. Twenty-one percent had no T2DM diagnosis or claims for AHAs in the 90-day pre-hospitalization period suggesting they may have been newly diagnosed at the time of admission. Most (83%) patients used AHAs while hospitalized, but the proportions with AHA claims 30 days pre- and post-hospitalization were only 53% and 40%, respectively. Biguanides and sulfonylureas were the most common outpatient agents. Most (70%) patients who had no AHA utilization pre-hospitalization continued to have no AHA utilization post-hospitalization. About half the patients with AHA claims pre-hospitalization did not have any AHA claims post-discharge.

Electronic supplementary material The online version of this article (doi:10.1007/s13300-015-0148-5) contains supplementary material, which is available to authorized users.

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Conclusion: Further research is warranted to explore the reasons why AHAs are not continued following hospital discharge. Inadequate treatment of T2DM remains an issue before and after hospitalization; inpatient stays represent an important and frequently missed opportunity to assess and optimize care for these patients.
Funding: Janssen Scientific Affairs, LLC.

Keywords: Antihyperglycemic agents; Hospitalization; Transitions of care; Treatment; Type 2 diabetes mellitus

INTRODUCTION

In the United States (US), the goal of optimizing treatment strategies for type 2 diabetes mellitus (T2DM) has grown in urgency with the epidemic rise of the disease. In 2012, an estimated 9.3% of the US population had diabetes, compared to 8.3% in 2010 [1]. The number of hospitalizations each year among people with diabetes also has risen substantially, from 2.8 million in 1988 to nearly 5.5 million in 2009 [2]. Previous research has suggested that discontinuity of care from the inpatient to the outpatient setting is common, with perhaps as many of 42% of patients discharged on medication not reporting that medication regimen to subsequent outpatient providers [3].

Current treatment guidelines recommend the use of insulin as the preferred treatment for hyperglycemia in the hospital setting, and as a result, hospitalized patients with T2DM often have the other antihyperglycemic agents (AHAs) held and insulin initiated [4]. However, it remains unclear how hospitalized patients transitioning to outpatient care are being treated following discharge. Whether patients receiving oral AHAs/glucagon-like peptide-1 receptor agonists (GLP-1s) prior to hospitalization resume their use, and whether patients who were undiagnosed or untreated before their hospitalization begin antihyperglycemic therapy after discharge, have been poorly studied. With the tremendous increase in diabetes and focus on linking continuity of care with adverse clinical outcomes, it is imperative to better understand which therapeutic strategies may lead to the best outcomes for patients with T2DM. Determining current treatment patterns around transitions of care represents the first step toward optimizing therapy across treatment settings.

To assess AHA utilization patterns around inpatient to outpatient transitions of care, we conducted a retrospective database study among a sample of US adults hospitalized with a diagnosis of T2DM during 2010–2012.

METHODS

This study was a retrospective analysis of de-identified medical and pharmacy data from the 2010–2012 MarketScan® Hospital Drug, Commercial, and Medicare Supplemental databases (Truven Health Analytics). The Hospital Drug database is derived from hospital ordering and billing systems, and includes diagnosis and drug administration information from inpatient settings in 659 acute-care US hospitals. The Commercial database includes inpatient, outpatient, and outpatient prescription drug claims for commercially insured employees and their dependents, covered under a variety of fee-for-service and managed care health plans through over 100 large employers and health plans located across the US. The Medicare

Supplemental database contains the healthcare experience of retirees with Medicare supplemental insurance paid for by a subset of employers. Over 55,000 hospital discharges in the 2010–2012 Hospital Drug database can be linked to claims in the Commercial and Medicare Supplemental databases, and served as the basis of this study that followed patients across outpatient and inpatient settings of care.

Patients selected for the study were required to meet the following criteria: (1) hospitalization recorded in the linked Hospital Drug database between January 1, 2010 and December 31, 2012 with a T2DM diagnosis code [International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9) 250.x0, 250.x2] listed in any diagnosis field, the earliest of which represented the index hospitalization; (2) available data in linked claims for a period of 90 continuous days before the index hospitalization admission date and 90 days after the index hospitalization discharge date; and (3) age 18 years or above on the index hospitalization admission date. Patients with any claims of ketoacidosis in the 90 days before the index hospitalization admission date, during the index hospitalization, or in the 90 days after the index hospitalization discharge date were excluded from the study. This exclusion was intended to help ensure patients with type 1 diabetes miscoded as type 2 on the index hospitalization were not part of the study sample. Although ketoacidosis can occur in T2DM, it is more often associated with type 1 diabetes [4].

AHA utilization was the key outcome measured in this study and was assessed before, during, and after the index hospitalization. Pre-hospitalization AHA utilization was based on retail outpatient pharmacy claims 30 days pre-admission, and mail order pharmacy claims 90 days pre-admission (including the date of admission). This time period was selected because retail pharmacy prescriptions typically cover up to 1 month of therapy while mail order prescriptions may cover up to 3 months of therapy. Therefore, AHA claims in this time window were likely to represent AHA therapy as of the time of admission. Retail pharmacy claims also were assessed during 60 and 90 days pre-admission to assess the sensitivity of the primary pre-index measure. AHA utilization during the index hospitalization was derived from inpatient medication administration data from the date of admission through the date of discharge. Post-hospitalization AHA utilization was based on retail and mail order outpatient pharmacy claims on the date of discharge and the subsequent 30 days. This time period was selected because the intent was to capture prescriptions filled shortly after discharge, which were most likely to represent any regimen changes that occurred as a result of hospitalization. However, because some patients may have had a pre-admission supply of medication that they continued to use post-discharge, AHA claims over 60 and 90 days after discharge also were measured. Within each time period, binary variables were created to record patients' AHA utilization at the class level (e.g., biguanides, sulfonylureas) and overall (i.e., any agent). In addition, medication utilization was categorized as insulin only (without oral AHAs or GLP-1), or one, two, or three oral AHAs/GLP-1s with or without insulin.

Other information recorded for patients at the time of index admission included age, gender, health plan type, and geographic region. Additional variables measured during the 90-day pre-hospitalization period included Deyo Charlson Comorbidity Index (CCI) score

[5], and selected comorbidities and concomitant medications (displayed in Table 1).

The primary diagnosis on the index admission was used as the reason for admission. Diagnoses that were glycemic (hyperglycemia, non-ketotic hyperosmolar coma, hypoglycemia), microvascular (nephropathy, retinopathy, neuropathy, or foot ulcer), or macrovascular (cardiovascular, including atherosclerosis, myocardial infarction, ischemic heart disease, heart failure, stroke, or transient ischemic attack) in nature were flagged because of their potential relatedness to diabetes. Other primary diagnosis codes were grouped at the three-digit ICD-9

Table 1 Patient demographic profile and baseline clinical characteristics

Characteristics	Study patients ($N = 8144$)	
	N/mean	%/SD
Age, years (mean, SD)	66.2	13.2
Male (*N*, %)	4334	53.2%
Top 3 health plan types (*N*, %)		
PPO	3076	37.8%
Comprehensive	3002	36.9%
POS plan	726	8.9%
Geographic region (*N*, %)		
Northeast	68	0.8%
North Central	1013	12.4%
South	6459	79.3%
West	595	7.3%
Unknown	9	0.1%
No T2DM medical or prescription claim in 90 days pre-index (*N*, %)	1708	21.0%
Baseline period Deyo-CCI (mean, SD)	1.6	1.8
Baseline presence of comorbid conditions (*N*, %)		
Cardiovascular disease	2419	29.7%
Diabetic peripheral neuropathy or foot ulcer	694	8.5%
Diabetic retinopathy	336	4.1%
Diabetic nephropathy	253	3.1%
Concomitant medications (*N*, %)		
Antihyperlipidemic medications	4153	51.0%
Antihypertensive medications	5139	63.1%
Antiobesity medications	10	0.1%

Deyo-CCI Deyo Charlson Comorbidity Index, *POS* Point of service, *PPO* Preferred provider organization, *SD* standard deviation, *T2DM* type 2 diabetes mellitus

code level to identify the top other reasons for admission among the study sample. The length of the index hospitalization and discharge status were also recorded.

The presence of hypoglycemia or hyperglycemia during the index admission was measured using relevant primary or secondary diagnosis codes listed on the index admission. Because hypoglycemia may be poorly coded on claims, in addition to hypoglycemia diagnosis codes, other diagnoses that may be indicative of the condition [e.g., ICD-9 249.30, 250.30 (diabetic coma) and 962.3 (poisoning by insulin)] also were used to identify hypoglycemia in accordance with a published algorithm [6]. Diagnoses of uncontrolled diabetes, diabetes with hyperosmolarity and abnormal glucose were defined as hyperglycemia.

All variables were tabulated for descriptive review. Frequencies and percentages were calculated for categorical variables and means and standard deviations were examined for continuous variables. Descriptive analysis was undertaken to compare medication use before, during and after hospitalization.

The study described in this paper was an analysis of de-identified data and did not entail primary research with human or animal subjects. As such, institutional review board approval was not required prior to undertaking this research.

RESULTS

Study Sample Selection and Characteristics

A total of 9580 patients with T2DM were identified in the data source, and 85% ($N = 8144$) met all inclusion criteria for the study. Study-eligible patients had a mean age of 66 years and 53% were male. Twenty-one percent had no T2DM diagnosis or claims for AHAs in the prior 90 days (Table 1). See Table 1 for complete demographics and clinical characteristics.

Index Admission Characteristics

The hospitals in which the index admission occurred tended to be medium (200–499 beds, 57%) or large-sized (500+ beds, 30%). Most were non-teaching hospitals (97%) located in urban areas (85%).

A primary or secondary diagnosis of T2DM was required on the index hospitalization for study inclusion, but the primary reason for admission was not diabetes related for most patients in the study sample (Table 2). Only 3% of patients had T2DM (ICD-9 250.x0, 250.x2) listed as the primary diagnosis on their index hospitalization. Twenty-two percent of patients had a primary diagnosis potentially related to diabetes, most of whom had a primary diagnosis of a macrovascular-related condition (21%); few patients had glycemic-related (<1%) or microvascular-related (<1%) conditions. Examination of other primary diagnoses revealed a wide variety of conditions, with no particular one predominating. The most common primary diagnoses are shown in Table 2 and included osteoarthritis (6%), cardiac dysrhythmias (4%), and pneumonia (3%).

Length of stay averaged 4.2 days (median 3 days; range 1–89 days). Most patients were discharged home, but 10% were transferred to another facility (e.g., long-term care, skilled nursing).

Table 2 Characteristics of the index hospitalization

Characteristics	Study patients ($N = 8144$)	
	N/Mean	%/SD
Primary diagnosis (*N*, %)		
T2DM	271	3.3%
Glycemic related	57	0.7%
Microvascular related	66	0.8%
Macrovascular related	1704	20.9%
Top five other primary diagnoses (*N*, %)		
ICD-9 715 Osteoarthrosis	474	5.8%
ICD-9 427 Cardiac dysrhythmias	322	4.0%
ICD-9 486 Pneumonia, organism unspecified	213	2.6%
ICD-9 786 Respiratory system/other chest symptoms	192	2.4%
ICD-9 038 Septicemia	189	2.3%
Hypoglycemia at index admission (*N*, %)	177	2.2%
Hyperglycemia at index admission (*N*, %)	898	11.0%
Length of index hospitalization, days (mean, SD)	4.2	4.0
Discharge status (*N*, %)		
Discharged home	6948	85.3%
Transferred to another facility	848	10.4%
Other/Unknown	348	4.3%

ICD-9 International Classification of Diseases, Ninth Revision, Clinical Modification, *SD* standard deviation, *T2DM* type 2 diabetes mellitus

AHA Utilization

Almost half (47%) of patients with T2DM did not have any AHA claims in the 30 days prior to hospitalization, and this proportion rose to about 60% in the 30 days following discharge (Table 3). Seventeen percent of patients had no AHA utilization while in the hospital.

Biguanides (i.e., metformin) were the most commonly filled oral AHAs pre- and post-hospitalization, followed by the sulfonylureas and dipeptidyl peptidase-4 (DPP-4) inhibitors (Fig. 1). Although only about 15% of patients utilized insulin pre- or post-hospitalization, insulin was utilized by the majority of patients (71%) during hospitalization.

Patients who did not have a claim for AHAs before their hospitalization were unlikely to have one afterward, and patients who had a claim for AHAs before hospitalization often discontinued them following discharge. Of the patients without AHA claims in the 30 days before their hospitalization, 70% continued to

Table 3 AHA utilization 30 days pre-, during, and 30 days post-hospitalization

	Pre-hospitalization $N = 8144$		During hospitalization $N = 8144$		Post-hospitalization $N = 8144$	
	N	%	*N*	%	*N*	%
AHAs[a]						
Biguanides	2103	25.8	1999	24.5	1408	17.3
Sulfonylureas	1526	18.7	1786	21.9	1051	12.9
Insulins	1302	16.0	5739	70.5	1206	14.
DPP-4 inhibitors	599	7.4	593	7.3	400	4.9
Thiazolidinediones	585	7.2	568	7.0	312	3.8
Other[b]	146	1.8	42	0.5	80	1.0
Type of AHA regimen						
No AHAs	3846	47.2	1376	16.9	4846	59.5
Insulin only (no oral agent or GLP-1)	824	10.1	3135	38.5	823	10.1
1 oral agent/GLP-1 ± insulin(s)	2139	26.3	2395	29.4	1742	21.4
With insulin	304	3.7	1689	20.7	281	3.5
Without insulin	1835	22.5	706	8.7	1461	17.9
2 oral agents/GLP-1s ± insulin(s)	1053	12.9	986	12.1	601	7.4
With insulin	146	1.8	732	9.0	85	1.0
Without insulin	907	11.1	254	3.1	516	6.3
3 oral agents/GLP-1s ± insulin(s)	282	3.5	252	3.1	132	1.6
With insulin	28	0.3	183	2.2	17	0.2
Without insulin	254	3.1	69	0.8	115	1.4

AHA antihyperglycemic agent, *DPP-4* dipeptidyl peptidase-4. *GLP-1* glucagon-like peptide-1 receptor agonist

[a] Patients may use more than one AHA during an observation period; therefore the sum of the percentages may be greater than 100%

[b] 'Other' consists of the following AHA classes; alpha-glucosidase inhibitors, amylin analogs, bile acid sequestrants, dopamine receptor agonists, GLP-1 agonists, and meglitinides; all of which had little utilization (< 2%) during the three observation periods

have no AHA claims in the 30 days after leaving the hospital (Fig. 2). Approximately, half of the patients who did have an AHA claim before admission did not have any AHA claims in the 30 days post-discharge. The majority (55%) of patients who were administered AHAs during hospitalization had no AHA claims after leaving the hospital (Fig. 3).

A subgroup analysis that assessed AHA claims among patients with no T2DM diagnosis or claims for AHAs in the 90 days pre-admission ($N = 1708$) revealed that 77% of

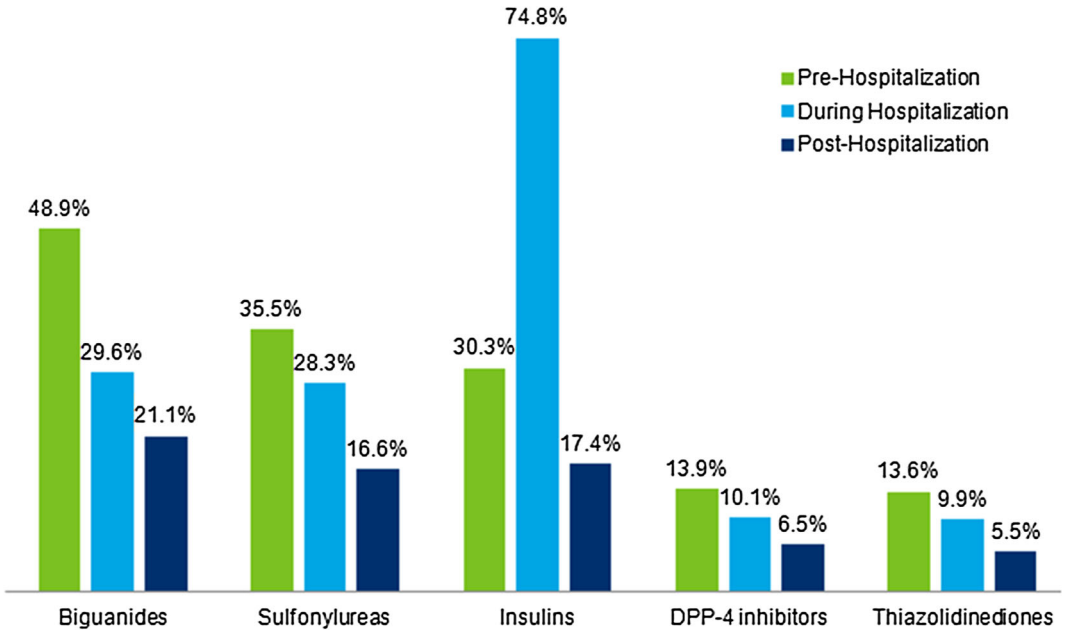

Fig. 1 Most common antihyperglycemic agents pre-, during, and 30 days post-hospitalization in patients with pre-hospitalization utilization of any antihyperglycemic agent ($n = 4298$). *DPP-4* dipeptidyl peptidase-4

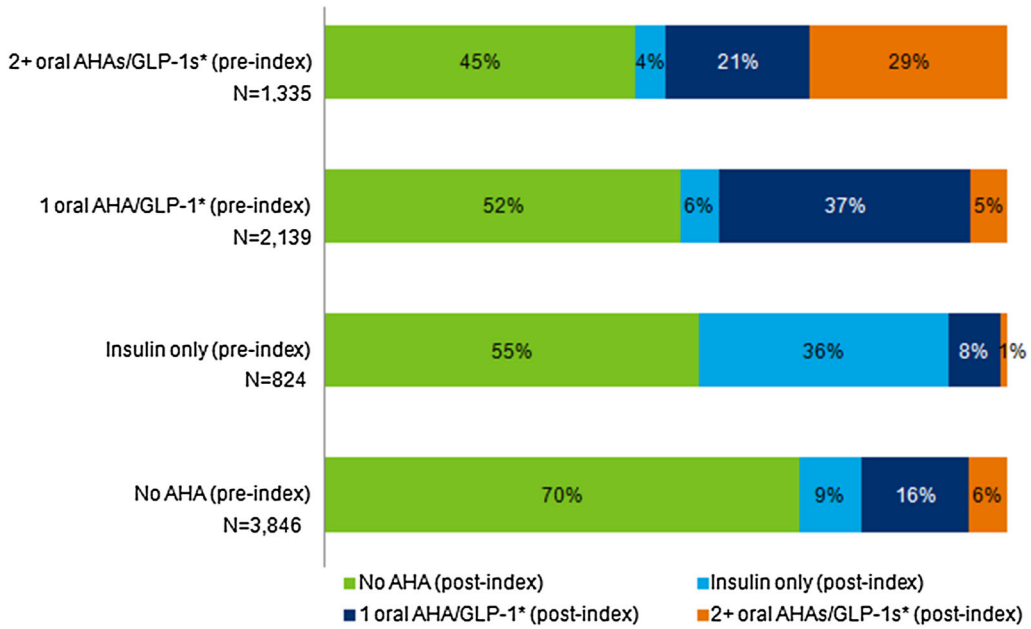

Fig. 2 Changes in AHAs from pre- to 30 days post-hospitalization—all patients ($n = 8144$). *Asterisks* with or without insulins. *AHA* Antihyperglycemic agent, *GLP-1* Glucagon-like peptide-1 receptor agonist

these patients had no AHA claims in the 30 days after discharge. The corresponding rate among patients with evidence of either T2DM diagnoses or AHA claims pre-admission ($N = 6436$) was 55%. In another subgroup analysis among patients whose index

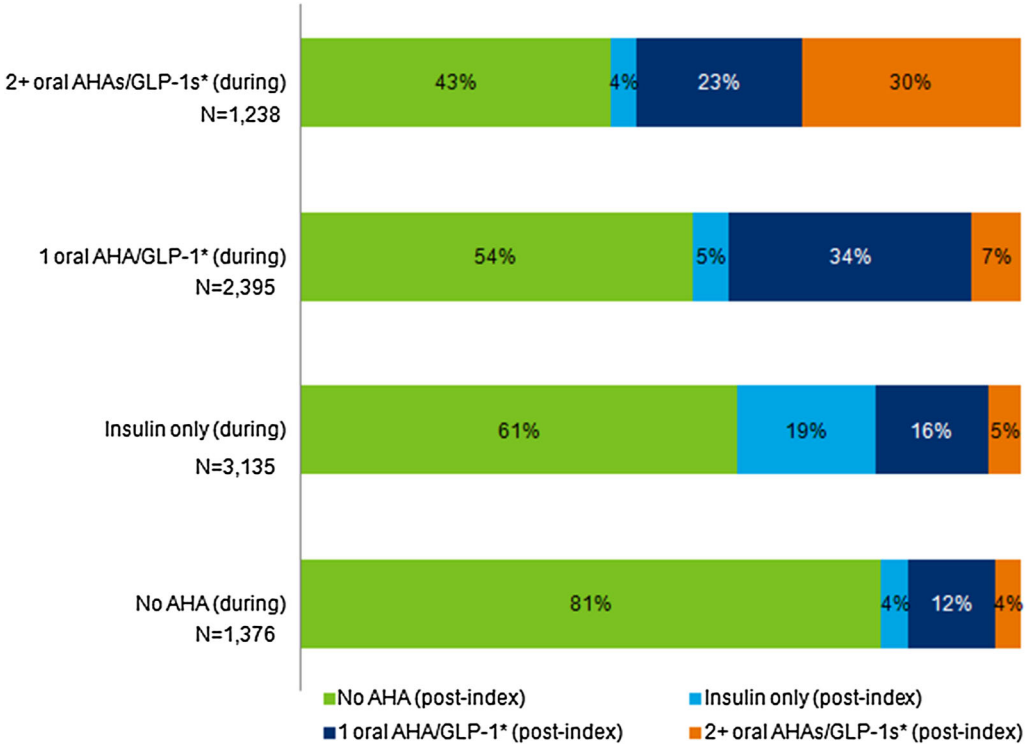

Fig. 3 Changes in AHAs during hospitalization to 30 days post-hospitalization—all patients ($n = 8144$). *Asterisks* with or without insulins. *AHA* Antihyperglycemic agent, *GLP-1* Glucagon-like peptide-1 receptor agonist

admission diagnosis was T2DM ($N = 271$), 61% of patients had an AHA claim following discharge, compared to 40% among patients whose hospitalization had a non-T2DM primary diagnosis ($N = 7873$).

In the 60- and 90-day pre- and post-hospitalization analysis, the proportion of patients with no AHA utilization decreased as the follow-up period increased (Table 4). In the 90 days pre-admission, 35% of patients had no AHA claims, compared to 47% over 30 days pre-admission. The corresponding post-discharge rates were 35% with no AHA claims over 90 days and 60% over 30 days. No AHA claims either pre-admission or post-discharge were observed among 24% of the sample over 90 days, compared to 35% over 30 days.

DISCUSSION

The results of this retrospective study of hospitalized adults with T2DM suggest patients may not be receiving optimal AHA therapy during transitions of care around the time of hospitalization. Most patients (83%) received AHAs while hospitalized, but approximately half had no AHA claims in the 30 days prior to hospitalization (90 days for mail order) and about 60% had no AHA claims in the 30 days post-discharge. Lengthening the pre- and post-hospitalization periods reduced the proportion of patients without AHA claims but one-third of patients still had no AHA claim before and after the hospital stay even with a longer 90-day window. Patients who did not have AHAs claims before hospitalization were

Table 4 Utilization of AHAs over 30-, 60-, and 90-day periods pre- and post-hospitalization ($n = 8144$)

	Pre-hospitalization			Post-hospitalization		
	30 days (%)	60 days (%)	90 days (%)	30 days (%)	60 days (%)	90 days (%)
Proportion of patients, by AHA regimen						
No AHAs	47.2	39.4	35.0	59.5	43.4	35.4
Insulin only (no oral agent or GLP-1)	10.1	12.0	14.5	10.1	13.0	12.5
1 oral agent/GLP-1 ± insulin(s)	26.3	29.5	30.8	21.4	28.2	30.7
2 oral agents/GLP-1s ± insulin(s)	12.9	14.8	15.0	7.4	12.1	16.5
3 oral agents/GLP-1s ± insulin(s)	3.5	4.3	4.7	1.6	3.3	4.8

AHA antihyperglycemic agent, *GLP-1* glucagon-like peptide-1 receptor agonist

unlikely to start afterward, and a large proportion of patients who utilized AHAs pre-admission or during their stay often discontinued these medications upon discharge. This is concerning because lack of continuity of care has been associated with adverse clinical outcomes, especially in patients with a chronic condition [3]. In a study of Medicare beneficiaries with diabetes hospitalized for acute myocardial infarction, for example, patients discharged without AHA therapy had higher mortality rates 30 days, 6 months, and 1 year post-hospitalization than patients discharged on AHA therapy, even after multivariable adjustment of differences between groups [7].

It deserves mention that although all patients in the study had a primary or secondary diagnosis of T2DM during the index hospitalization, 21% percent of patients in this study had no healthcare claims with a T2DM diagnosis and no pharmacy claims for AHAs in 90 days prior to their index hospitalization. Specific clinical details on these patients were not available in the database used for the analysis, but these patients may represent previously undiagnosed patients whose T2DM was initially identified during the index admission. It also is possible they were diagnosed patients treated with lifestyle interventions alone (e.g., diet and exercise but no AHA) who did not incur any healthcare services carrying a T2DM diagnosis in the 90 days prior to hospitalization. These patients had the lowest rates of post-discharge AHA claims but subgroup analyses excluding them entirely did not drastically alter study results; 60% of all patients had no AHA claims in the 30 days post-discharge whereas after this exclusion, 55% of the remaining patients had no AHA claims in the 30 days post-discharge.

Our study finding that 60% of all patients with T2DM had no AHA claims in the 30 days post-discharge (corresponding figures for 60 and 90 days post-discharge were 44, and 35%, respectively) while high, was in line with the small body of previous research examining post-discharge AHA treatment patterns. Wu et al. [8] studied 2160 patients with T2DM who used insulin both in the 30 days before and during hospitalization, identified through retrospective medical records review at a US health system, and found 61% discontinued insulin upon discharge. About 60% of these

patients were also treated with oral AHAs in the 6 months before hospitalization, but only about 20–25% were treated with oral AHAs in the 60 days post-discharge. Bergenstal et al. [9] assessed pre- and post-admission treatment patterns in a retrospective database analysis of 400 patients, and found 24% had a reduction in AHA regimen after hospitalization. Lipska et al. [7] found that 13.4% of 8791 Medicare patients on AHA therapy at the time of admission for acute myocardial infarction were discharged without such therapy, according to medical record review conducted as part of the National Heart Care Project. In a retrospective chart review of 217 diabetic patients admitted with acute myocardial infarction, Lovig et al. [10] found 11.5% of these patients were discharged without any AHAs, despite most having no clinical reason to discontinue AHAs. Griffith et al. [11] retrospectively examined 1359 men with poorly controlled diabetes (HbA1c >8.0%) discharged from Veterans' Administration hospitals and found less than one quarter had a change in therapy upon discharge, and almost one-third had no change in therapy or scheduled follow-up for continuing care within 30 days. The authors suggest that this lack of treatment modification or follow-up care despite evidence of poorly controlled disease may reflect 'clinical inertia.'

An alternate explanation to 'clinical inertia' is that there was a deliberate decision to not utilize AHAs post-hospitalization. While the data used in this study did not allow examination of clinical decision making, lifestyle interventions alone may be appropriate initial treatment for T2DM [4] and survey data suggests about 14% of US adult diabetes patients do not use AHAs, [1] so not all patients in our sample were expected to have AHA utilization post-discharge. In addition, some patients in our study may have had non-diabetes-related elevated glucose levels during hospitalization that resulted in an erroneous T2DM diagnosis on their hospital record; any such patients may not have required AHA utilization post-discharge. It is notable, though, that Loving and colleagues [10] conducted medical chart review to assess reasons for AHA discontinuation among diabetic patients hospitalized for myocardial infarction and were unable to find a clear reason for discontinuation for 88% of patients. That, along with the high proportion of patients with no post-hospitalization AHA in the current and previous studies, suggests hospitalization may not result in an appropriate re-evaluation of therapy. This may be problematic, as patients with T2DM who are hospitalized tend to have poorer glycemic control than comparable patients who are not hospitalized, and the hospitalization may present an opportunity to intervene [12]. Other literature has suggested that a hospital admission may allow an opportunity to improve long-term diabetes care [13].

We measured AHA pre- and post-hospitalization utilization based on outpatient pharmacy claims, leaving open the possibility that patients may have received AHAs that do not appear in the data. For example, it is possible that some patients received samples, paid cash for low-cost generic AHA prescriptions such that no claim was generated to their health plan, or had a pre-admission supply of medication that they utilized post-discharge, all of which could make it appear as if patients had no AHA utilization when, in fact, they did use AHAs post-discharge. In addition, inpatient medication utilization for readmitted patients (12% within 30 days; 21% within 90 days) was not captured in our post-discharge medication utilization measures. Treatment non-adherence, for

example, patients receiving but not filling AHA prescriptions, also could be reason for the lack of AHA claims since non-adherence is a known issue in this population [14].

The results of this study are based on patients whose data were captured in the linked MarketScan Hospital Drug database, which may not be generalizable to all individuals with T2DM in the US. The hospitals that contribute to the database are primarily community hospitals and are disproportionately located in the southern region of the US. Most hospitals in which an index admission occurred were non-teaching hospitals (97%) and located in urban areas (85%). AHA utilization patterns at teaching hospitals or rural facilities could be different than seen in our sample.

CONCLUSIONS

The results of this study suggest that a large proportion of hospitalized patients with T2DM may not receive optimal transitions of care in and out of the hospital. Most patients (83%) utilized an AHA while hospitalized but one-half of all patients did not fill an AHA prescription either in the 30 days before or 30 days after hospitalization, and almost one-third of patients did not fill an AHA prescription in the 90 days before or after hospitalization. One-fifth of patients for whom T2DM is listed on a claim associated with their inpatient care had no evidence of being treated for diabetes before their admission, suggesting they may have been newly diagnosed at the time of admission and would not have become aware of their T2DM at that time if not for the hospitalization. Under-diagnosis of T2DM and inadequate treatment of diagnosed T2DM remains an issue in and out of the hospital; when patients are hospitalized, it is crucial to take advantage of this opportunity to appraise and optimize their care.

ACKNOWLEDGMENTS

This research was sponsored by Janssen Scientific Affairs, LLC, Raritan, NJ, USA and was conducted primarily by Truven Health Analytics, Cambridge, MA, USA. Truven Health Analytics provides custom consulting services to all major pharmaceutical and biotech companies, in addition to other entities such as the US government. As part of a consulting agreement with Truven Health Analytics, Janssen Scientific Affairs, LLC provided funding to support protocol development, data analysis, and manuscript development activities associated with this study. The article processing charges for this publication were funded by Janssen Scientific Affairs, LLC. Publication of study results was not contingent on the sponsor's approval. The authors acknowledge the assistance of Talia Foster of Truven Health Analytics in the preparation of this manuscript. All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this manuscript, take responsibility for the integrity of the work as a whole, and have given final approval to the version to be published.

Disclosures. Leslie Montejano and Donna McMorrow are employees of Truven Health Analytics. Lien Vo was an employee of Janssen Scientific Affairs, LLC at the time of the research.

Compliance with ethics guidelines. This article does not contain any new studies with

human or animal subjects performed by any of the authors.

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