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Research Paper

Characteristics of patients with diabetes and a history of myocardial infarction initiating PCSK9 and SGLT2 inhibitors

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ABSTRACT

Study objective: Proprotein convertase subtilisin/kexin type 9 inhibitors (PCSK9i) and sodium-glucose cotransporter-2 inhibitors (SGLT2i) reduce the risk for atherosclerotic cardiovascular disease (ASCVD) events in patients with diabetes and ASCVD. We assessed factors associated with initiating either medication among patients with diabetes and a prior myocardial infarction (MI).

Setting/participants: US adults ≥19 years old with private health insurance (MarketScan) or government health insurance (Medicare) who had diabetes and a prior MI and initiated a PCSK9i or an SGLT2i in 2017 or 2018.

Main outcome measures: PCSK9i or SGLT2i initiation was identified using pharmacy claims.

Results: Overall, 8102 patients initiated a PCSK9i (n = 1501; 18.5%) or an SGLT2i (n = 6601; 81.5%). Patients with 2 and ≥3 versus 1 prior MI (risk ratio [RR]: 1.32 [95%CI: 1.17–1.48] and 1.68 [1.41–2.01], respectively), prior coronary revascularization (1.47 [1.31–1.64]), prior stroke (1.28 [1.06–1.56]), history of peripheral artery disease (1.27 [1.14–1.41]), receiving cardiologist care (1.51 [1.36–1.67]) or taking ezetimibe (2.57 [2.35–2.82]) were more likely to initiate a PCSK9i versus an SGLT2i. Patients with a history of short-term (RR 1.07 [95%CI 1.05–1.09]) or long-term (1.07 [1.04–1.09]) diabetes complications, and taking a low/moderate- and high-intensity statin dosage (1.61 [1.51–1.70] and 1.68 [1.58–1.77], respectively) were more likely to initiate an SGLT2i versus a PCSK9i. Among patients who initiated a PCSK9i, 2.9% subsequently initiated an SGLT2i; 0.8% who initiated an SGLT2i subsequently initiated a PCSK9i.

Conclusion: The decision to initiate PCSK9i or SGLT2i is explained by having very high cardiovascular disease risk for those initiating PCSK9i and diabetes complications for those initiating SGLT2i.

1. Introduction

Patients with diabetes and a history of atherosclerotic cardiovascular disease (ASCVD) are considered to have a very high risk for recurrent ASCVD events [1]. Proprotein convertase subtilisin/kexin type 9 inhibitors (PCSK9i) and sodium-glucose cotransporter-2 inhibitors (SGLT2i) have each been shown to reduce the risk for recurrent ASCVD events among individuals with diabetes and a history of ASCVD [2,3]. Despite their high risk for recurrent ASCVD events, a small proportion of patients with diabetes and a history of ASCVD initiate these medications.

There may be different reasons that lead clinicians to prescribe a PCSK9i or an SGLT2i for their patients with diabetes and a history of ASCVD [4]. However, the reasons why some patients with diabetes and a history of ASCVD are prescribed a PCSK9i while others are prescribed an SGLT2i are unclear. The main objective of the current study was to compare the characteristics of patients with diabetes and a history of myocardial infarction (MI) who initiated a PCSK9i versus an SGLT2i. As a secondary objective, we compared the characteristics of patients with diabetes and a history of MI who initiated a PCSK9i to their counterparts who did not initiate either a PCSK9i or an SGLT2i, and those who initiated an SGLT2i to their counterparts who did not initiate either a PCSK9i or an SGLT2i.

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Table 1
Characteristics of patients who initiated a PCSK9i, an SGLT2i, and those who did not initiate either medication.

Characteristics	Initiated a PCSK9i	Initiated an SGLT2i	Did not initiate a PCSK9i or an SGLT2i
	N = 1501	N = 6601	N = 278,675
Calendar year of the index date			
2017	641 (42.7%)	3130 (47.4%)	135,653 (48.7%)
2018	860 (57.3%)	3471 (52.6%)	143,022 (51.3%)
Age in years, mean (SD)	71.5 (8.7)	69.8 (10.3)	77.3 (8.9)
Age, years			
21–54	82 (5.5%)	645 (9.8%)	4946 (1.8%)
55–64	172 (11.5%)	1053 (16.0%)	11,791 (4.2%)
66–74	693 (46.2%)	2619 (39.7%)	85,352 (30.6%)
≥75	554 (36.9%)	2284 (34.6%)	176,586 (63.4%)
Female	730 (48.6%)	2421 (36.7%)	138,282 (49.6%)
Race/ethnicity[a]			
Non-Hispanic white	1042 (83.6%)	4128 (84.2%)	216,142 (82.5%)
Non-Hispanic Black	86 (6.9%)	273 (5.6%)	25,165 (9.6%)
Other	119 (9.5%)	502 (10.2%)	20,631 (7.9%)
History of heart failure	775 (51.6%)	3141 (47.6%)	175,396 (62.9%)
Chronic kidney disease	658 (43.8%)	2263 (34.3%)	142,151 (51.0%)
Number of prior MIs			
1	1194 (79.5%)	5760 (87.3%)	230,611 (82.8%)
2	217 (14.5%)	678 (10.3%)	35,713 (12.8%)
≥3	90 (6.0%)	163 (2.5%)	12,351 (4.4%)
Prior coronary revascularization	273 (18.2%)	669 (10.1%)	27,069 (9.7%)
Prior stroke	78 (5.2%)	253 (3.8%)	14,880 (5.3%)
History of peripheral artery disease	333 (22.2%)	976 (14.8%)	69,302 (24.9%)
Cardiologist care	1173 (78.1%)	4392 (66.5%)	162,002 (58.1%)
Endocrinologist care	326 (21.7%)	1465 (22.2%)	29,188 (10.5%)
Diabetes complications			
Short-term	323 (21.5%)	1881 (28.5%)	58,793 (21.1%)
Long-term	929 (61.9%)	4222 (64.0%)	175,302 (62.9%)
Insulin use	578 (38.5%)	2511 (38.0%)	87,089 (31.3%)
Statin use and intensity			
No statin use	558 (37.2%)	556 (8.4%)	49,627 (17.8%)
Low/moderate-intensity	413 (27.5%)	2203 (33.4%)	112,400 (40.3%)
High-intensity	530 (35.3%)	3842 (58.2%)	116,648 (41.9%)
Ezetimibe use	451 (30.0%)	442 (6.7%)	10,730 (3.9%)

Numbers reported in table are mean (standard deviation) or n (percentage).
[a] Available only in Medicare.
MI: myocardial infarction; PCSK9i: proprotein convertase subtilisin/kexin type 9 inhibitors; SGLT2i: sodium-glucose cotransporter-2 inhibitors; SD: standard deviation.

2. Materials and methods

We analyzed data from US adults with commercial health insurance in the MarketScan database or with government health insurance through Medicare. MarketScan data for the calendar years 2006 through 2018 were obtained from Truven Health Analytics (IBM Watson Health). Data for all Medicare beneficiaries ≥65 years of age with fee-for-service, inpatient, outpatient, and pharmacy health insurance benefits who had an MI between 2006 and 2018 were obtained from the Centers for Medicare and Medicaid Services (CMS) Chronic Conditions Warehouse. The Institutional Review Board at the University of Alabama at Birmingham approved the study and waived the requirement to obtain informed consent.

2.1. Study population

We included patients who had a pharmacy fill for a PCSK9i (i.e., alirocumab or evolocumab) or an SGLT2i (i.e., canagliflozin, dapagliflozin, empagliflozin, or ertugliflozin) between January 1, 2017, and December 31, 2018. We selected this time range to allow for uptake of medications following Food and Drug Administration approval of PCSK9i in 2015 and SGLT2i in 2013. For each patient, the date of their first pharmacy fill for a PCSK9i or an SGLT2i on or after January 1, 2017 was defined as their index date. Patients who had a fill for a PCSK9i or SGLT2i using all available pharmacy claims prior to January 1, 2017, were excluded from the analysis. We further restricted the study population to those who had diabetes and a prior MI hospitalization before initiating a PCSK9i or an SGLT2i and who were alive on their index date. The definitions of diabetes and MI hospitalization are provided in Supplemental Table 1. To be included in the analysis, we required patients to have continuous fee-for-service inpatient, outpatient and pharmacy coverage while living in the US for the 365 days prior to their index date. To avoid including the same patient in the analysis twice, we restricted the study population to patients in the MarketScan database who were 19 to 64 years of age, and those in the Medicare database who were ≥66 years of age, on their index date.

For the secondary analysis, we selected a 10% random sample of patients with diabetes and a history of MI who did not fill a PCSK9i or an SGLT2i between January 1, 2017, and December 31, 2018. A random index date between January 1, 2017, and December 31, 2018, was generated for each patient not filling a PCSK9i or an SGLT2i and the same exclusion criteria as outlined above for PCSK9i or SGLT2i initiators were applied to this population.

2.2. Patient characteristics

We used beneficiary enrollment data to determine each patient's age on their index date, and sex. For Medicare beneficiaries, race/ethnicity was also determined using enrollment data. Data on race/ethnicity were not available in the MarketScan database. We used all available claims prior to each patient's index date to assess short-term (i.e., ketoacidosis, hyperosmolarity, coma) and long-term (i.e., diabetic nephropathy, retinopathy, neuropathy, or peripheral angiopathy) diabetes complications, a history of heart failure, chronic kidney disease, number of prior MI hospitalizations, prior coronary revascularization (i.e., percutaneous coronary intervention or coronary artery bypass graft), prior stroke, history of peripheral artery disease, receipt of care from a cardiologist or endocrinologist, and use of insulin, statins and ezetimibe. Definitions of these characteristics are provided in Supplemental Table 2. Among patients who initiated a PCSK9i, we used pharmacy fill data in the 365 days after their index date to determine whether they subsequently initiated an SGLT2i. Also, among patients who initiated an SGLT2i, we determined whether they initiated a PCSK9i in the following 365 days. For this analysis, if a claim was not present, we assumed that the patient did not have a procedure done, have a disease or take a medication.

2.3. Statistical analysis

Analyses were conducted after pooling data for patients in the MarketScan and Medicare databases. We estimated summary statistics for characteristics of patients who initiated a PCSK9i, an SGLT2i and those who did not initiate a PCSK9i or an SGLT2i. Poisson regression models with robust variance estimators were used to calculate risk ratios (RR) and 95% confidence intervals (CI) for initiating a PCSK9i versus an SGLT2i associated with each of the patient characteristics [5]. The first

model was unadjusted. The second model included adjustment for calendar year, age, sex, race/ethnicity and each of the remaining patient characteristics one-at-a-time. The third model included all patient characteristics simultaneously. As race/ethnicity data are not available in Marketscan, we created a variable that included Medicare beneficiaries race/ethnicity according to their enrollment data and a separate level of race/ethnicity for patients in the Marketscan database. This allowed us to include all patients in the regression models, even those missing information on race/ethnicity. We repeated the Poisson regression models calculating the RR and 95% CI for initiating an SGLT2i versus a PCSK9i.

In a secondary analysis, we used Poisson regression models with robust variance estimators to calculate RRs and 95% CI for initiating a PCSK9i versus not initiating a PCSK9i or an SGLT2i, and for initiating an SGLT2i versus not initiating a PCSK9i or an SGLT2i associated with each of the patient characteristics. Models included adjustment for all patient characteristics, simultaneously. We repeated the analyses for patients in the Marketscan and Medicare databases, separately. All analyses were completed using SAS v. 9.4 (SAS Institute Inc., Cary, NC).

3. Results

Overall, 8102 patients with diabetes and a prior MI initiated a PCSK9i or an SGLT2i between January 1, 2017, and December 31, 2018, and met the inclusion criteria for the current analysis (Supplemental Fig. 1). Among these patients, 1501 (18.5%) initiated a PCSK9i and 6601 (81.5%) initiated an SGLT2i. No patients initiated both a PCSK9i and an SGLT2i on the same day. Characteristics of patients who initiated a PCSK9i, an SGLT2i and who did not initiate either a PCSK9i or an SGLT2i (n = 278,675) are shown in Table 1. Among patients who initiated a PCSK9i, 62.8% were taking a statin. In comparison, 91.6% of those who initiated an SGLT2i and 82.2% of those who did not initiate either medication were taking a statin. Among the 1501 patients who initiated a PCSK9i, 43 (2.9%) subsequently initiated an SGLT2i, while 50 patients (0.8%) who initiated an SGLT2i subsequently initiated a PCSK9i.

3.1. Initiation of a PCSK9i versus SGLT2i

After multivariable adjustment, patients 21–54, 55–64 and ≥75 years of age were less likely to initiate a PCSK9i versus an SGLT2i compared to their counterparts 66–74 years of age (Table 2). Females and patients with chronic kidney disease, a history of two or three or more MIs versus one prior MI, prior coronary revascularization, prior stroke, history of peripheral artery disease, receiving cardiologist care, and taking ezetimibe were more likely to initiate a PCSK9i versus an SGLT2i. Having a history of short-term and long-term diabetes complications and taking a low-moderate- or high-intensity statin as compared with not taking a statin were associated with a lower likelihood of initiating a PCSK9i versus an SGLT2i. The RRs for initiating an SGLT2i versus a PCSK9i are shown in Supplemental Table 3. The results stratified by data source are shown in Supplemental Table 4.

Table 2
Risk ratio for initiating a PCSK9i versus an SGLT2i associated with patient characteristics (n = 8102).

	Risk ratio (95% CI)		
Characteristic	Model 1	Model 2	Model 3
Calendar year of the index date			
2017	1 (ref)	1 (ref)	1 (ref)
2018	1.17 (1.06–1.28)	1.16 (1.06–1.27)	1.20 (1.10–1.30)
Age, years			
21–54	0.54 (0.44–0.67)	0.57 (0.46–0.71)	0.71 (0.58–0.87)
55–64	0.67 (0.58–0.78)	0.71 (0.61–0.83)	0.77 (0.66–0.89)
66–74	1 (ref)	1 (ref)	1 (ref)
≥75	0.93 (0.84–1.03)	0.91 (0.83–1.01)	0.82 (0.74–0.90)
Female	1.49 (1.36–1.63)	1.42 (1.30–1.56)	1.31 (1.20–1.42)
Race/ethnicity[a]			
Non-Hispanic white	1 (ref)	1 (ref)	1 (ref)
Non-Hispanic Black	1.19 (0.98–1.44)	1.11 (0.92–1.34)	1.12 (0.94–1.34)
Other	0.95 (0.80–1.13)	0.94 (0.80–1.12)	1.09 (0.92–1.28)
History of heart failure	1.14 (1.04–1.25)	1.06 (0.97–1.17)	0.93 (0.85–1.02)
Chronic kidney disease	1.38 (1.26–1.52)	1.29 (1.18–1.42)	1.31 (1.19–1.43)
Number of prior MIs			
1	1 (ref)	1 (ref)	1 (ref)
2	1.41 (1.24–1.60)	1.37 (1.21–1.55)	1.32 (1.17–1.48)
≥3	2.07 (1.74–2.46)	1.95 (1.64–2.32)	1.68 (1.41–2.01)
Prior coronary revascularization	1.69 (1.51–1.89)	1.77 (1.59–1.98)	1.47 (1.31–1.64)
Prior stroke	1.29 (1.05–1.57)	1.22 (1.00–1.49)	1.28 (1.06–1.56)
History of peripheral artery disease	1.48 (1.33–1.65)	1.39 (1.24–1.54)	1.27 (1.14–1.41)
Care by a cardiologist	1.63 (1.46–1.83)	1.64 (1.47–1.84)	1.51 (1.36–1.67)
Care by an endocrinologist	0.98 (0.88–1.09)	0.99 (0.89–1.11)	0.92 (0.83–1.02)
Diabetes complications			
Short-term	0.73 (0.66–0.82)	0.71 (0.64–0.80)	0.74 (0.66–0.82)
Long-term	0.93 (0.85–1.02)	0.87 (0.79–0.95)	0.78 (0.71–0.86)
Insulin use	1.02 (0.93–1.12)	0.99 (0.90–1.08)	1.04 (0.95–1.13)
Statin use and intensity			
No statin use	1 (ref)	1 (ref)	1 (ref)
Low/moderate-intensity	0.32 (0.28–0.35)	0.31 (0.28–0.35)	0.37 (0.33–0.41)
High-intensity	0.24 (0.22–0.27)	0.25 (0.22–0.27)	0.29 (0.26–0.32)
Ezetimibe use	3.47 (3.18–3.78)	3.38 (3.10–3.69)	2.57 (2.35–2.82)

Model 1: unadjusted
Model 2: adjusted for calendar year of each beneficiary's index date, age, sex, race/ethnicity. All other patient characteristics were included one-at-a-time.
Model 3: adjusted for all the patient characteristics simultaneously.
[a] Available only in Medicare.

CI: confidence interval; MI: myocardial infarction; PCSK9i: proprotein convertase subtilisin/kexin type 9 inhibitors; SGLT2i: sodium-glucose cotransporter-2 inhibitors.

3.2. Initiating a PCSK9i or an SGLT2i versus not initiating either medication

Patients who were age 21–54 and 55–64 versus 66–74 years and those of 'other' race/ethnic background versus non-Hispanic white were more likely to initiate a PCSK9i and to initiate an SGLT2i versus not initiating either medication (Table 3). Also, receipt of care by a cardiologist and an endocrinologist, insulin use, and ezetimibe use were associated with a higher likelihood of initiating a PCSK9i and an SGLT2i versus not initiating either medication. Patients who were ≥75 versus 66–74 years, non-Hispanic Black versus non-Hispanic white, and with a history of heart failure or chronic kidney disease were less likely to initiate a PCSK9i and an SGLT2i versus not initiating either medication. Female sex, having a history of two or three or more versus one prior MI, and prior coronary revascularization were associated with a higher likelihood, while having short-term diabetes complications and statin use were associated with a lower likelihood of initiating a PCSK9i versus not initiating either medication. Short- and long-term diabetes complications and low-moderate or high-intensity statin use were associated with a higher likelihood of initiation of an SGLT2i, while having two or three or more versus one prior MIs, a history of stroke, and peripheral artery disease were associated with a lower likelihood of initiating an SGLT2i versus not initiating either medication. The RRs for initiating a PCSK9i and initiating an SGLT2i, each versus not initiating either medication stratified by data source are shown in Supplemental Tables 5 and 6, respectively.

Table 3
Risk ratio for initiating a PCSK9i or an SGLT2i versus not initiating either medication associated with patient characteristics.

	Risk ratio (95% CI)	
Characteristic	PCSK9i initiation[a]	SGLT2i initiation[a]
N, initiating medication	1501	6601
N, not initiating medication	278,675	278,675
Calendar year of the index date		
2017	1 (ref)	1 (ref)
2018	1.28 (1.16–1.42)	1.04 (0.99–1.09)
Age, years		
21–54	1.80 (1.43–2.26)	2.94 (2.70–3.20)
55–64	1.46 (1.23–1.73)	2.24 (2.09–2.41)
66–74	1 (ref)	1 (ref)
≥ 75	0.40 (0.36–0.45)	0.53 (0.50–0.56)
Female	1.13 (1.02–1.26)	0.76 (0.73–0.80)
Race/ethnicity[b]		
Non-Hispanic white	1 (ref)	1 (ref)
Non-Hispanic Black	0.78 (0.62–0.97)	0.66 (0.58–0.74)
Other	1.34 (1.11–1.62)	1.26 (1.15–1.38)
History of heart failure	0.68 (0.61–0.76)	0.79 (0.75–0.83)
Chronic kidney disease	0.82 (0.73–0.92)	0.55 (0.52–0.58)
Number of prior MIs		
1	1 (ref)	1 (ref)
2	1.27 (1.10–1.48)	0.88 (0.81–0.95)
≥3	1.53 (1.23–1.91)	0.67 (0.58–0.79)
Prior coronary revascularization	1.76 (1.54–2.01)	0.99 (0.91–1.07)
Prior stroke	1.09 (0.87–1.37)	0.74 (0.65–0.84)
History of peripheral artery disease	0.97 (0.86–1.11)	0.73 (0.68–0.79)
Care by a cardiologist	2.43 (2.14–2.77)	1.24 (1.17–1.30)
Care by an endocrinologist	1.73 (1.52–1.98)	1.92 (1.80–2.04)
Diabetes complications		
Short-term	0.85 (0.74–0.97)	1.37 (1.30–1.46)
Long-term	0.95 (0.85–1.08)	1.37 (1.30–1.46)
Insulin use	1.32 (1.18–1.49)	1.06 (1.00–1.13)
Statin use and intensity		
No statin use	1 (ref)	1 (ref)
Low/moderate-intensity	0.34 (0.30–0.38)	1.74 (1.58–1.90)
High-intensity	0.30 (0.27–0.34)	2.17 (1.99–2.37)
Ezetimibe use	7.43 (6.62–8.33)	1.53 (1.39–1.68)

The relative risks presented were adjusted for all the patient characteristics listed above simultaneously.

[a] Versus not initiating a PCSK9i or an SGLT2i.

[b] Race/ethnicity was only available only in Medicare.

CI: confidence interval; MI: myocardial infarction; PCSK9i: proprotein convertase subtilisin/kexin type 9 inhibitors; SGLT2i: sodium-glucose cotransporter-2 inhibitors.

4. Discussion

In the current study, several factors were associated with a higher likelihood of initiating a PCSK9i versus an SGLT2i including having a history of multiple prior ASCVD events or ASCVD risk factors, receiving care from a cardiologist or taking ezetimibe. Additionally, patients with diabetes complications or taking a statin were more likely to initiate an SGLT2i versus a PCSK9i. The current findings suggest clinicians may be using a patient-centered approach when prescribing a PCSK9i or an SGLT2i to their patients with diabetes and history of MI. PCSK9i were filled by patients with indicators of having a very high risk for recurrent ASCVD events while SGLT2i were filled by patients with indicators of diabetes complications. However, very few patients with diabetes and a history of MI initiated both a PCSK9i and an SGLT2i suggesting a missed opportunity to further reduce their risk for recurrent ASCVD events.

According to the 2018 American Heart Association (AHA)/American College of Cardiology (ACC) multi-society blood cholesterol guideline, PCSK9i initiation is considered reasonable for patients at very high ASCVD risk who have a low-density lipoprotein cholesterol (LDL-C) ≥70 mg/dL despite maximally tolerated statin therapy and/or ezetimibe [1]. In this guideline, very high risk is defined by a history of two or more major ASCVD events or one major ASCVD event and two or more high-risk conditions (e.g., diabetes, chronic kidney disease, or coronary revascularization). The 2019 European Society of Cardiology (ESC) guideline on diabetes, pre-diabetes, and cardiovascular diseases, the 2020 American Association of Clinical Endocrinologists (AACE)/American College of Endocrinology (ACE) consensus statement on the management of dyslipidemia and prevention of CVD, and the 2020 American Diabetes Association Standards of Care recommend adults with diabetes and a history of ASCVD who are at very high risk for recurrent events should consider initiation of a PCSK9i if they have LDL-C ≥ 70 mg/dL despite maximally tolerated statin therapy in combination with ezetimibe, or if they have a history of statin-associated adverse events [6–9]. The AACE/ACE statement also recommends a PCSK9i for patients with LDL-C ≥ 55 mg/dL with extremely high ASCVD risk despite maximally tolerated statin therapy and/or ezetimibe [7]. In the current study, patients with diabetes who had multiple prior MIs versus one prior MI, a prior stroke, history of peripheral artery disease, chronic kidney disease or a prior coronary revascularization were more likely to initiate a PCSK9i versus an SGLT2i. Consistent with published guidelines and recommendations, the current findings suggest that physicians are prescribing PCSK9i based on a patient's risk for recurrent ASCVD events.

According to the 2019 ESC guidelines on diabetes, pre-diabetes, and cardiovascular diseases and the 2020 American Diabetes Association clinical practice recommendations, initiation of an SGLT2i is reasonable for patients with diabetes who have established ASCVD as part of their glucose-lowering regimen and to lower ASCVD risk [6,8]. In the current analysis, patients who had a history of short-term or long-term diabetes complications were more likely to initiate an SGLT2i versus a PCSK9i. These data suggest SGLT2i may have been prescribed for improving glycemic control and minimizing additional diabetes complications.

Both the 2018 AHA/ACC cholesterol guideline and 2020 American Diabetes Association Standard of Care recommend a clinician-patient dialogue focused on indications for taking medication, risks, benefits, patient concerns and preferences so that patient-centered strategies for ASCVD prevention may be optimized [1,9]. Adherence to treatment plans and outcomes are expected to be better if plans are concordant with patient preferences [10]. In the current study, prescribing patterns of clinicians with regard to PCSK9i versus SGLT2i appeared to be patient-centered with a focus on high risk for recurrent ASCVD events for those who initiated a PCSK9i and a high risk for diabetes complications for those who initiated an SGLT2i.

Most patients with diabetes and a history of ASCVD have very high risk for recurrent ASCVD events, and therefore, many may benefit from taking both an SGLT2i and a PCSK9i [1,11]. However, <1% of patients in the current study initiated both medications. This represents a missed opportunity to reduce the risk for recurrent ASCVD events in this high-risk population. In order to reduce these missed opportunities, it may be beneficial to develop holistic secondary prevention guidelines for patients with a history of diabetes and ASCVD.

There are several strengths to the current study including a large number of patients with commercial health insurance and Medicare coverage. Both data sets used for the current analysis have information from patients residing in the entire US. Claims data provide an objective measure of pharmacy fills for PCSK9i and SGLT2i. However, the current study has limitations. Results from the current study may not be generalizable to patients without health insurance and the analysis period precedes current guideline recommendations for SGLT2i initiation. Data on race/ethnicity were not available through the Marketscan database. We assumed that the absence of a pharmacy fill claim or diagnosis code meant the beneficiary was not taking a medication or did not have a condition, which may result in the misclassification of some variables, including diabetes and history of MI. However, this approach has been shown to have high sensitivity and positive predictive value in prior studies [12–15]. We did not have information on LDL-C, glucose and hemoglobin A1C levels, and statin-associated adverse events among these patients.

5. Conclusions

The findings of the current study suggest a patient-centered approach of prescribing PCSK9i to individuals with multiple prior ASCVD events and prescribing SGLT2i to individuals with a high risk for diabetes complications. The use of each medication was low in the current study of US adults with health insurance, a prior history of MI and diabetes. Efforts to increase the guideline-recommended utilization of PCSK9i and SGLT2i are warranted.

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Declaration of competing interest

KO, KEM, and PD: Amgen employees and have stock in Amgen.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ahjo.2022.100121.

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